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COCAINE AND HEROIN IN EUROPE 1983-93

A Cross-national Comparison of Trafficking and Prices

GRAHAM FARRELL, KASHFIA MANSUR, and MELISSA TULLIS*

Drug law enforcement aims to reduce the consumption of illicit drugs through reducing supply and increasing prices. Data on cocaine and heroin seizures, prices, and methods of trafficking are presented for 1983-93. Seizures, giving some indirect indicator of trafficking, rose sharply for both drugs in the second half of the the 1980s. Prices of both drugs showed a decline across the decade, and the prices of both drugs seemed to track each other. Data on the primary means of transport of cocaine and heroin into Europe lends support to an explanation of the price patterns in terms of the risk factors these impose for traffickers. The nature of the trafficking, and the mechanism by which enforcement of trafficking laws is intended to impact upon the problem, suggest that the rapid substitution of interdicted traffickers and routes is highly likely, and that present levels of enforcement will have little deterrent or preventive impact. While the European drug scene is changing rapidly, not least due to political changes, the analysis may retain some general applicability.

The aim of drug control law enforcement is to reduce the supply of illicit drugs and increase the price in order to reduce consumption.¹ Via a reduction in consumption it is assumed that social cost is reduced. This paper presents trends in the prices of cocaine and heroin in Europe from 1983 to 1993, in the context of the amounts of those drugs reported seized by law enforcement agencies and the means of transport of the drugs. Variations in the price of a good are one of the most commonly used indicators of the working of market mechanisms. Price variations for the drugs are explained in terms of the activity of law enforcement agents and traffickers, and of factors that distinguish illicit drug price systems from those of licit markets. Some of the implications for present practices are not encouraging. However, the best way to begin to tackle a problem is to recognize it and try to gain some understanding. The data sources are reviewed, followed by a brief description of trends in cocaine and heroin seizures and their interpretation with respect to drug supply. This gives the context for the development of the drug price analyses. The paper does not contain the balancing demand-side information against which the price equilibriums would be reached, but this does not preclude any interpretation of the present data: it may be a possibility for furthering the work contained herein. The trends in European prices are placed in the context of, and contrasted to, the US market and the hazard imposed by law enforcement upon the trafficking of illicit drugs. The paper concludes with a discussion of implications and possibilities for further research.

* United Nations International Drug Control Programme (UNDCP), August 1994, revised March 1995. Views expressed are not necessarily those of the United Nations. The UNDCP database on illicit traffic was meticulously maintained by Ilse Hüttler for many years, and more recently by Marlene Manuel, Suzanne Strömberg, and Thomas Larquie. The authors also thank Bill Burnham, Kalman Szendrei, Sandeep Chawla, and Gary Lewis of UNDCP, Peter Reuter of the University of Maryland, and Ken Pease of the University of Manchester, for comments and advice on earlier drafts.

¹ The role of price elasticities of demand is discussed later in the paper.

The Data Source

The United Nations has conducted an annual survey of illicit drug traffic since the late 1940s. All member states receive a questionnaire (Annual Reports Questionnaire or ARQ) requesting details of number and amount of seizures by law enforcement agencies, cultivation and harvest, wholesale and retail prices, manufacture, and diversion of drugs from licit channels. Data are typically reported annually to the United Nations Commission on Narcotic Drugs (e.g. UNDCP 1993). The data presented from the ARQ in this paper relate to drug seizures and prices. The reporting rate for the questionnaire varies around 40–50 per cent, and there is incomplete reporting on some of the questionnaires returned by member states. The data here focuses upon Europe, the region for which the data are the most complete of those routinely gathered by UNDCP. Some information is included regarding major transit route countries that are adjacent to European countries, where the data are relevant, available, and contribute to an understanding of patterns and trends in the European market.

The second source of information comprises reports of individual seizures of international significance by UN Member States.² These reports provide some additional information that is not available from the ARQs, such as means and methods of transport, some information on the possible origins of the drugs, and some details on traffickers arrested.

The two data sources have different strengths, weaknesses, and possibilities for analysis that are compared and contrasted elsewhere (UNDCP 1994), and these will be touched on only insofar as they affect the analysis herein.

Trends in Illicit Drug Seizures

Trends in seizures are discussed as a supply-side indicator to give a general context to the subsequent analysis with respect to the increasing levels of cocaine and heroin that reached the market after the mid-1980s. Seizures trends are described and then interpreted.

Amount seized

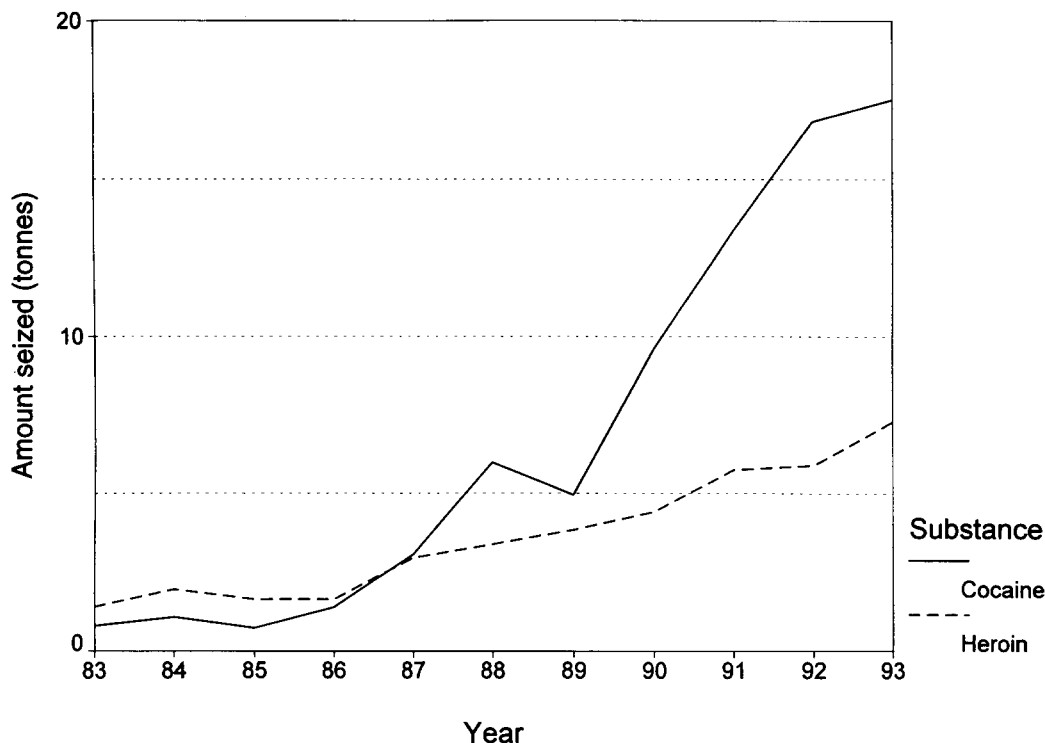
Figure 1 shows the amount of cocaine and heroin reported seized in Europe from 1980 to 1993.³ In the early 1980s the volume of cocaine and heroin seized was, by current standards, almost negligible:⁴ cocaine at only a few hundred grams and heroin between one and two tonnes. The amount seized of both types of drug increased rapidly in the second half of the decade. In 1987, the amount of cocaine seized

² The term 'seizures of international significance' refers to seizures of controlled narcotic and psychotropic substances which are significant in respect of either their weight, their place of origin or destination, or the nationality of the traffickers involved (the last three of these are taken to be indicators of international trafficking).

³ Cocaine refers to cocaine base and salts. Calculations were also run where coca leaf was included with cocaine, and morphine seizures with heroin: this increased the volume of the total seizures only slightly and did not affect any of the substantive findings.

⁴ In the early 1980s even this volume was causing some alarm: an internal UNDCP document did forecast the 'exponential' increase in seizures that took place in the early 1980s. What was then seen as an enormous increase is now largely obscured by the events of the second half of the decade.

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Source: UN ARQs

FIG. 1 Cocaine and heroin seized in Europe 1983–93

overtook heroin and maintained a strong increase thereafter.⁵ The reported amount of seized cocaine almost doubled each year until 1990, and appeared to stabilize thereafter.

At the cross-national level, eight countries (Belgium, France, Germany, Italy, Netherlands, Portugal, Spain, and the UK) accounted for the vast majority of all cocaine seized: 97 per cent in 1992, 92 per cent in 1993. Seizures by country for cocaine are shown in Table 1, and average seizure weights in Table 2.⁶ Among these eight countries, Spain has reported by far the most cocaine seized each year, while Portugal has reported large amounts relative to its size and population. With respect to average weight seized, there appears to be a gradual increase for the whole of Europe across the decade. Portugal, Spain, and France consistently demonstrate the largest average seizure weights.

⁵ It is worth noting that seizure weights of two drugs cannot be compared literally since the same weight of both drugs might supply a different number of consumers, but the relative change in seizures of each is of interest.

⁶ Average seizure weights derived from the annual reports often include 'seizures' for possession offences. They are therefore almost certainly underestimates of seizures made by customs—as later sections in this paper suggest. However, since this fact is constant over time it still enables some analysis of trends. At the other extreme, the other mediating aspect of average seizure weights is that one or a few extremely large seizures can skew the average upwards. This was the case for the heroin data in 1991—see Table 2.

TABLE 1 *Weight Seized in Countries Accounting for the Bulk of Cocaine Seized in Europe, 1980–1993 (to Nearest Kilogram)*

| Year | Belgium | France | Germany ^a | Italy ^b | Netherlands | Portugal | Spain | UK | All Europe |
|-------|---------|--------|----------------------|--------------------|-------------|----------|--------|-------|------------|
| 1980 | 1 | 58 | 23 | 53 | 46 | 1 | 58 | 40 | 299 |
| 1981 | 14 | 113 | 24 | 63 | 10 | 76 | 50 | 21 | 395 |
| 1982 | 5 | 80 | 29 | 105 | 37 | 4 | 114 | 19 | 449 |
| 1983 | 25 | 229 | 108 | 223 | 59 | 46 | 275 | 96 | 1,152 |
| 1984 | 101 | 122 | 172 | 73 | 180 | 59 | 277 | 66 | 1,131 |
| 1985 | 62 | 96 | 165 | 112 | 125 | 70 | 303 | 85 | 1,114 |
| 1986 | 116 | 246 | 186 | 129 | 274 | 165 | 669 | 102 | 2,018 |
| 1987 | 270 | 754 | 263 | 330 | 406 | 222 | 1,135 | 360 | 3,971 |
| 1988 | 404 | 589 | 496 | 617 | 517 | 301 | 3,471 | 329 | 6,994 |
| 1989 | 90 | 939 | 1,406 | 668 | 1,425 | 793 | 1,852 | 499 | 8,099 |
| 1990 | 538 | 1,845 | 2,474 | 802 | 4,288 | 360 | 5,512 | 611 | 16,906 |
| 1991 | 756 | 831 | 964 | 1,291 | 2,492 | 110 | 7,574 | 1,078 | 17,212 |
| 1992 | 1,223 | 1,627 | 1,334 | 1,367 | 3,433 | 1,860 | 4,454 | 2,267 | 18,180 |
| 1993 | 2,892 | 1,720 | 1,052 | 1,101 | 3,720 | 219 | 5,351 | 770 | 18,633 |
| Total | 6,496 | 9,249 | 8,696 | 6,935 | 17,012 | 5,271 | 31,095 | 6,343 | 96,553 |

^a Seizure figures for Germany combined East and West Germany prior to 1988.

^b Italy was the only country that also regularly reported large amounts of cocaine seized in units of measurement other than kilograms (e.g. sachets, packets etc.), which are not included here. These amounted to nearly 5,000 'units' over the 12 year period.

TABLE 2 *Average Seizure Weight in Countries Accounting for the Bulk of Cocaine Seized in Europe 1980–1993 (Kilograms)*

| Year | Belgium | France | Germany ^a | Italy | Netherlands | Portugal | Spain | UK | All Europe ^b |
|---------|---------|--------|----------------------|-------|-------------|----------|-------|------|-------------------------|
| 1980 | — | — | — | — | — | — | 0.21 | — | 0.21 |
| 1981 | — | — | — | — | — | — | — | — | — |
| 1982 | — | — | — | — | — | — | — | — | — |
| 1983 | 0.39 | 0.74 | 0.07 | 0.41 | 1.00 | — | — | 0.14 | 0.26 |
| 1984 | 0.74 | 0.21 | 0.09 | 0.11 | 0.16 | — | 0.46 | 0.07 | 0.21 |
| 1985 | 0.47 | 0.27 | — | 0.23 | — | — | 0.47 | 0.13 | 0.26 |
| 1986 | 0.51 | 0.53 | — | 0.21 | — | — | 0.53 | 0.17 | 0.24 |
| 1987 | 1.06 | 1.40 | — | 0.37 | — | — | 0.56 | 2.03 | 0.62 |
| 1988 | 1.06 | 0.97 | — | 0.47 | — | 2.15 | 1.31 | 0.21 | 0.46 |
| 1989 | 0.20 | 1.36 | — | 0.40 | — | 4.84 | 0.66 | 0.24 | 0.68 |
| 1990 | — | 2.99 | — | 0.47 | — | 1.04 | 1.88 | 0.33 | 0.57 |
| 1991 | 1.47 | 1.08 | — | 0.55 | — | 2.42 | 2.01 | 0.53 | 6.43 ^c |
| 1992 | 1.28 | 1.39 | — | 0.45 | 15.06 | 3.32 | 1.26 | 1.26 | 2.66 |
| 1993 | 3.19 | 1.24 | 0.29 | — | 13.48 | 0.35 | 1.51 | 0.28 | 1.13 |
| Average | 1.037 | 1.11 | 0.15 | 0.37 | 7.43 | 2.35 | 0.99 | 0.55 | 1.14 (0.62) |

^a Seizure figures for Germany combined East and West Germany prior to 1988.

^b The average for the whole of Europe is an average of the country average weights available—not all countries report the number of seizures and so the European average cannot be calculated as the division of total amount by total number of seizures.

^c The average seizure weight of cocaine for all Europe in 1991 (and the average) is skewed by Poland, the Czech Republic and Bosnia-Herzegovina that reported 4, 2 and 3 seizures respectively averaging 25 kg, 55 kg and 20 kg respectively.

Seizures by country for heroin are shown in Table 3, and average seizure weights in Table 4. Twelve countries account for the bulk of all seizures: Belgium, Bulgaria, France, Germany, Greece, Italy,⁷ Netherlands, Spain, Switzerland, Turkey, the former Yugoslavia, and the UK.⁷ With respect to average weight seized, Bulgaria and Turkey are the only countries that consistently report seizures on average over 1 kg. The Netherlands, and the former Yugoslavia are the only other countries that have ever reported averages over 1 kg, though not consistently. The Turkish and Bulgarian average seizure weights are many times greater than those of other European countries.

Interpretation

The rising seizure trends in Fig. 1 are open to different interpretations. They may be due to reporting and/or recording changes, though these were analysed in detail in a preliminary paper (Farrell 1994), and it was concluded that they are not a large contributing factor. Change is not due to an increasing number of reporting countries. Some of the change is undoubtedly attributable to increased law enforcement effort, but, as the discussion below elucidates, the larger amount is probably attributable to increased trafficking.

The rapidly rising trend for the amount of cocaine seized is consistent with the commonly held belief that the US cocaine market has become saturated, and so traffickers moved to the largely unexploited European market. The large amounts seized in Spain and Portugal, and the high average seizure weights, would correspond with an interpretation of transatlantic trafficking, since Spain and Portugal, as well as having long and accessible coastlines, have cultural, linguistic, and sometimes family ties with the Latin American countries where the bulk of cocaine is produced (Colombia, Peru, and Bolivia). If cocaine is moved from Spain and Portugal through France by land before distribution to the rest of Europe, then this may account for the high French average seizure weight. During the 1980s, the average weight of a European cocaine seizure also increased. The implication of this is that the size, as well as the number, of cocaine shipments was increasing. The cause of the apparent stabilization of the trends from 1990 onwards is unidentified: perhaps the law enforcement effort had reached a ceiling or the cocaine market had reached (current) saturation levels. Alternatively, perhaps substitution took place if new users began to use other recreational drugs such as MDMA (ecstasy) where previously they might have used cocaine.

The rapid rise in the amount of heroin seized in the second half of the 1980s corresponds with a number of studies that charted the rapid spread of heroin in Europe (for the UK see Parker, Bakx, and Newcombe 1988, and Pearson 1991 for an overview). One of the more startling points of interest is the average seizure weights of Bulgaria and Turkey that are radically higher than those for other countries. This corresponds exactly with an interpretation that heroin comes overland from South-East Asia via the Balkan Route, where Turkey and Bulgaria will be the major transit and distribution countries. Turkey is believed to be a heroin producer, as well as a

⁷ Austria also reported large amounts of heroin seized in some years—over 100 kg in each of 1985, 1988, and 1991. Recent data for the former Yugoslavia are those reported by Bosnia-Herzegovina.

TABLE 3 *Weight Seized in Countries Accounting for the Bulk of Heroin Seized in Europe, 1980-1993 (to Nearest Kilogram)*

| Year | Belgium | Bulgaria | France | Germany | Greece | Italy | Netherlands | Spain | Switzerland | Turkey | UK | Yug/Bosnia H. ^a | All Europe |
|-------|---------|----------|--------|---------|--------|-------|-------------|-------|-------------|--------|-------|----------------------------|------------|
| 1980 | 34 | 23 | 74 | 272 | 0 | 197 | 116 | 6 | 17 | 131 | 38 | 301 | 1,295 |
| 1981 | 14 | 41 | 74 | 96 | 0 | 142 | 173 | 34 | 20 | 167 | 93 | 157 | 1,094 |
| 1982 | 60 | 24 | 100 | 204 | 52 | 230 | 225 | 86 | 17 | 71 | 195 | 78 | 1,407 |
| 1983 | 91 | 5 | 168 | 268 | 15 | 314 | 150 | 109 | 49 | 288 | 247 | 57 | 1,824 |
| 1984 | 134 | 36 | 209 | 273 | 7 | 457 | 144 | 203 | 38 | 265 | 362 | 13 | 2,265 |
| 1985 | 92 | 42 | 278 | 211 | 10 | 276 | 364 | 253 | 56 | 102 | 366 | 2 | 2,234 |
| 1986 | 77 | 4 | 220 | 159 | 55 | 333 | 553 | 407 | 82 | 172 | 222 | 28 | 2,436 |
| 1987 | 140 | 31 | 213 | 279 | 73 | 323 | 518 | 413 | 70 | 1,332 | 188 | 110 | 3,784 |
| 1988 | 113 | 133 | 221 | 542 | 54 | 576 | 510 | 480 | 44 | 1,050 | 257 | 271 | 4,425 |
| 1989 | 92 | 156 | 295 | 729 | 35 | 685 | 494 | 713 | 50 | 1,181 | 351 | 72 | 5,111 |
| 1990 | 291 | 136 | 405 | 846 | 84 | 903 | 532 | 886 | 186 | 1,040 | 603 | 205 | 6,290 |
| 1991 | 186 | 145 | 561 | 1,594 | 273 | 1,540 | 406 | 471 | 81 | 1,351 | 493 | 181 | 7,875 |
| 1992 | 107 | 159 | 327 | 1,438 | 161 | 1,353 | 570 | 672 | 243 | 1,053 | 513 | 181 | 7,343 |
| 1993 | 76 | 557 | 386 | 1,095 | 153 | 630 | 916 | 605 | 179 | 2,193 | 683 | 160 | 8,620 |
| Total | 1,507 | 1,492 | 3,531 | 8,006 | 972 | 7,959 | 5,671 | 5,338 | 1,132 | 10,396 | 4,611 | 1,816 | 53,614 |

^a Data refer to the former Yugoslavia and then to Bosnia Herzegovina.

TABLE 4 *Average Seizure Weight in Countries Accounting for the Bulk of Heroin Seized in Europe, 1980-1993 (Kilograms)*

| Year | Belgium | Bulgaria | France | Germany | Greece | Italy | Netherlands | Spain | Switzerland | Turkey | UK | Yug/Bosnia H. ^a | All Europe |
|---------|---------|--------------------|--------|---------|--------|-------|-------------|-------|-------------|--------|------|----------------------------|------------|
| 1980 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1981 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1982 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1983 | 0.48 | 4.50 ^b | 0.08 | 0.03 | 0.10 | 0.09 | 1.06 | — | 0.04 | — | 0.13 | 0.79 | 0.71 |
| 1984 | 0.45 | 3.63 | 0.07 | 0.02 | 0.06 | 0.10 | 0.05 | 0.13 | 0.03 | — | 0.12 | 0.30 | 0.37 |
| 1985 | 0.29 | 14.13 ^b | 0.08 | — | — | 0.08 | — | 0.13 | 0.04 | 0.89 | 0.12 | 0.06 | 1.09 |
| 1986 | 0.18 | 2.05 ^b | 0.08 | — | — | 0.08 | — | 0.12 | 0.07 | 1.02 | 0.08 | 0.34 | 1.03 |
| 1987 | 0.28 | 2.37 | 0.06 | — | 0.10 | 0.05 | — | 0.07 | 0.05 | 6.50 | 0.97 | 1.62 | 0.59 |
| 1988 | 0.13 | 6.65 | 0.05 | — | 0.07 | 0.07 | — | 0.07 | 0.03 | 4.56 | 0.29 | 1.76 | 0.77 |
| 1989 | 0.10 | 4.58 | 0.07 | — | 0.04 | 0.07 | — | 0.10 | — | 6.35 | 0.13 | 0.91 | 1.42 |
| 1990 | — | 5.91 | 0.14 | — | 0.09 | 0.09 | — | 0.14 | 0.09 | 4.24 | 0.23 | — | 0.84 |
| 1991 | 0.11 | 5.01 | 0.16 | — | 0.28 | 0.14 | — | 0.09 | — | 5.04 | 0.19 | 3.42 | 1.92 |
| 1992 | 0.03 | 5.68 | 0.07 | — | 0.19 | 0.12 | 9.66 | 0.08 | 0.04 | 4.72 | 0.67 | 0.94 | 3.37 |
| 1993 | 0.02 | — | 0.08 | 0.10 | 0.22 | — | 13.47 | 0.06 | 0.02 | 11.48 | 0.75 | 0.50 | 2.63 |
| Average | 0.21 | 5.45 | 0.09 | 0.05 | 0.13 | 0.09 | 6.06 | 0.10 | 0.05 | 4.98 | 0.33 | 1.06 | 1.34 |

^a Data refers to the former Yugoslavia and then to Bosnia Herzegovina.^b Indicates an average calculated from less than 10 seizures.

principal distribution point for trafficking by motor vehicle into the rest of Europe (see below).

At a more general level it is also worth noting that the seizure statistics suggest the European cocaine market is concentrated amongst a smaller number of countries than the European heroin market, a point that might be worth further investigation but is outside the scope of this article. To the reader experienced in international drug issues, much of the interpretation so far is not new, but confirms earlier findings and conclusion drawn from cross-national data sources. It sets the context for the ensuing sections that present related data on prices and methods of illicit transportation, in an attempt to shed light on trafficking risks and law enforcement practices.

Trends in Drug Prices

In what follows, retail prices are given per gram and wholesale prices per kilogram. All prices are in US dollars adjusted for inflation to 1983 prices (source for adjustment: Economist Intelligence Unit 1993). Prices were not available prior to 1983, and prices are not adjusted for drug purity.⁸ Where countries have reported a maximum and a minimum price, the midpoint was used in the analysis. After 1988 reports are presented for a united Germany, but pre-1988 prices are for West Germany.⁹ No prices were available for Bulgaria, so it is absent from the price analysis. Only wholesale heroin prices were available for Turkey, almost certainly reflecting Turkey's wholesale-transit-distribution role in heroin trafficking along the Balkan Route. Since this role sets Turkey apart from the other countries that serve as consumer markets, and given the lack of price data for Turkey, reported prices for Turkey have been included in the wholesale-heroin Table 8, but Turkey is excluded from the analysis of European average prices.

All price data have been given in the tables so that the interested reader can conduct further analysis where required. We shall now look briefly at price variations by country to indicate any major anomalies or countries that deviate significantly from the European average price, before discussing European average prices.

Price variations by country

Retail and wholesale prices of cocaine and heroin by country are presented in Tables 5 to 8 for 11 countries; the seven countries that are major seizers of both cocaine and heroin (Belgium, France, Germany, Italy, Netherlands, Spain, and the UK), plus Portugal (major cocaine seizer) and Greece, Turkey, and Switzerland (major heroin seizers). As mentioned, only heroin wholesale prices were available for Turkey.

For retail-level purchasers, Switzerland is the most expensive country in Europe in which to buy heroin and cocaine. There might be an argument for correlating heroin and cocaine prices across countries with consumer price indices for licit goods.

⁸ Ideally in this analysis, prices would be per pure gram or kilogram of heroin or cocaine. The purity data were both much less comprehensive and much more variable than the seizure and price data, with variation seemingly unrelated to price, and so were not included in the analysis. Nevertheless it is a difficult issue, and if the price trends analysed here are influenced by purity levels, then this is an area for further analysis.

⁹ East German prices were rarely available, and the reported amounts seized were negligible compared to West Germany.

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TABLE 5 *Retail Prices of Cocaine (US\$ per Gram) in Europe 1983-1993*

| Year | Belgium | France | Germany | Greece | Italy | Netherlands | Portugal | Spain | Switzerland | UK |
|------|---------|--------|---------|--------|-------|-------------|----------|-------|-------------|-----|
| 1983 | 120 | 79 | 110 | 120 | 81 | 70 | 94 | 112 | 168 | 107 |
| 1984 | 108 | 65 | 130 | — | 51 | 50 | 86 | 72 | 112 | 81 |
| 1985 | 140 | 55 | 96 | — | 45 | — | — | 72 | 137 | — |
| 1986 | 73 | 77 | 144 | — | 58 | — | — | 96 | 113 | 110 |
| 1987 | 119 | 75 | — | — | 63 | — | — | 92 | 160 | 128 |
| 1988 | 102 | 72 | — | — | 81 | — | — | 84 | — | 118 |
| 1989 | 56 | 67 | — | — | 68 | — | — | 65 | — | 108 |
| 1990 | — | 76 | 92 | — | 83 | 51 | 48 | 84 | 136 | 100 |
| 1991 | 66 | 87 | 76 | — | 88 | — | 42 | 73 | 106 | 93 |
| 1992 | 48 | 100 | 79 | 75 | 117 | 53 | 43 | 71 | 134 | 49 |
| 1993 | 67 | 107 | 66 | 38 | — | 46 | 40 | 44 | 95 | 86 |

TABLE 6 *Retail Prices of Heroin (US\$ per Gram) in Europe 1983-1993*

| Year | Belgium | France | Germany | Greece | Italy | Netherlands | Portugal | Spain | Switzerland | UK |
|------|---------|-------------------------------------|---------|--------|-------|-------------|----------|--------------------------------------|-------------|-----|
| 1983 | 160 | 105 | 180 | 228 | 112 | 59 | 119 | 140 | 312 | 122 |
| 1984 | 117 | 71 ^a 142 ^b | 157 | 158 | 93 | 45 | 104 | 120 | 194 | 95 |
| 1985 | 140 | 66 | 116 | — | 80 | — | — | 120 | 205 | — |
| 1986 | — | — | 148 | — | 102 | — | — | 128 | 176 | 113 |
| 1987 | 106 | 112 | — | — | 113 | — | — | 134 | 290 | 128 |
| 1988 | 89 | — | — | 107 | 125 | — | — | 145 | — | 143 |
| 1989 | 65 | — | — | 97 | 105 | — | — | 110 | — | 114 |
| 1990 | — | — | 80 | 92 | 128 | 38 | 64 | 134 | 239 | 120 |
| 1991 | 77 | 112 | 87 | 128 | 109 | — | 60 | 154 ^b 117 ^a | 162 | 105 |
| 1992 | 75 | 107 | 84 | 45 | 100 | 39 | 51 | 143 ^b 114 ^a | 176 | — |
| 1993 | 54 | 89 | 52 | 31 | — | 34 | 44 | 98 ^b 78 ^a | 88 | 94 |

^a Signifies heroin type 3, typically from the Golden Crescent.

^b Signifies type 4 heroin hydrochloride, typically from the Golden Triangle, purer than type 3 heroin and retailing at a higher price.

Switzerland is reputedly the most expensive country in Europe for most things, not just heroin and cocaine. Swiss wholesale prices appear to rise significantly between 1990 and 1992 for both substances, whereas in the 1980s they had only been slightly above the average.¹⁰

The Netherlands seems to be the cheapest European country in which to make retail purchases of heroin, and possibly for cocaine, though prices are only available for a few years. In the Netherlands, rather than consumer price indices, prices may be driven more by the generally more lenient Dutch drug law enforcement policy (see Leuw 1991 for an overview), so that more suppliers are competing for the same consumers, thereby bringing prices down. The problem area here is that the policy might be intended to impact differentially upon wholesale and retail prices since, as Leuw

¹⁰ Note that the national average reported here by Swiss authorities may differ from the prices that existed in the Zurich scene where different risk factors may have influenced prices (see e.g. Huber 1994 for a discussion of the Zurich market).

TABLE 7 *Wholesale Prices of Cocaine (\$US per Kilogram) in Europe 1983-1993*

| Year | Belgium | France | Germany | Greece | Italy | Netherlands | Portugal | Spain | Switzerland | UK |
|------|---------|---------|---------|--------|--------|-------------|----------|--------|-------------|--------|
| 1983 | 50,000 | 32,750 | 64,000 | — | 35,000 | 35,100 | 72,250 | 84,000 | — | 53,550 |
| 1984 | 45,000 | 32,450 | 61,200 | — | 33,000 | 30,908 | 65,550 | 42,000 | 60,200 | 43,875 |
| 1985 | 54,000 | 33,000 | 61,050 | — | 30,000 | — | — | 48,000 | 39,000 | — |
| 1986 | 27,390 | 89,474 | 69,845 | — | 38,346 | — | — | 63,910 | 45,194 | 39,716 |
| 1987 | 36,960 | 104,720 | — | — | 42,240 | — | — | 52,800 | 60,984 | 38,962 |
| 1988 | 48,645 | 93,483 | — | — | 40,608 | — | — | 53,298 | — | 43,738 |
| 1989 | 22,596 | 78,683 | — | — | 33,894 | — | — | 45,192 | — | 46,879 |
| 1990 | — | 89,622 | 52,854 | — | 41,364 | 20,299 | 30,257 | 49,90 | 48,947 | 36,653 |
| 1991 | 17,616 | 28,076 | 38,975 | — | 35,232 | — | 28,835 | 44,040 | 69,180 | — |
| 1992 | 27,272 | 32,085 | 42,994 | 67,735 | 67,022 | 21,034 | 23,529 | 39,215 | 82,886 | — |
| 1993 | 19,600 | 26,775 | 37,899 | 25,200 | — | 18,550 | 18,900 | 24,500 | — | 30,247 |

TABLE 8 *Wholesale Prices of Heroin (\$US per Kilogram) in Europe 1983-1993*

| Year | Belgium | France | Germany | Greece | Italy | Netherlands | Portugal | Spain | Switzerland | Turkey | UK |
|------|---------|----------------------|---------|---------|--------|-------------|----------|----------------------|-------------|--------|--------|
| 1983 | 34,000 | 36,025 | 58,000 | 144,000 | 49,000 | 21,060 | 93,500 | 126,000 | — | 9,375 | 45,900 |
| 1984 | 40,500 | 21,240 ^a | 90,900 | — | 42,000 | 19,020 | 86,250 | 72,000 | 90,300 | 7,800 | 40,500 |
| 1985 | 45,000 | 23,650 | 54,450 | — | 37,500 | — | — | 78,000 | 68,250 | 6,000 | — |
| 1986 | — | 153,384 ^b | 80,116 | — | 47,933 | — | — | 83,083 | 72,811 | 5,478 | 26,021 |
| 1987 | 49,500 | 89,474 ^a | — | — | 52,800 | — | — | 91,250 | 75,504 | 7,920 | 37,545 |
| 1988 | — | 115,056 | — | 71,064 | 50,760 | — | — | 98,982 | — | 8,798 | 40,557 |
| 1989 | 28,245 | 121,050 ^b | — | 67,788 | 42,368 | — | — | 106,524 | — | 7,263 | 31,675 |
| 1990 | — | 84,735 ^a | 34,470 | 68,940 | 51,705 | 18,269 | 38,300 | 122,560 ^b | 95,175 | 4,596 | 41,318 |
| 1991 | 22,020 | 96,516 ^a | 33,562 | 51,380 | 44,040 | — | 40,370 | 80,430 ^a | 110,650 | 5,138 | 32,252 |
| 1992 | 20,321 | 62,390 ^b | 37,023 | 24,955 | 77,004 | 18,930 | 33,273 | 117,440 ^b | 167,109 | 8,983 | — |
| 1993 | 18,620 | 57,040 | 24,645 | 19,600 | — | 16,695 | 22,050 | 66,060 ^a | — | 7,700 | 30,247 |
| | | 44,625 | | | | | | 114,080 ^b | | | |
| | | | | | | | | 60,605 ^a | | | |
| | | | | | | | | 83,300 ^b | | | |
| | | | | | | | | 44,100 ^a | | | |

^a Signifies heroin type 3, typically from the Golden Crescent.^b Signifies type 4 heroin hydrochloride, typically from the Golden Triangle, purer than type 3 heroin and retailing at a higher price.

(1991) describes, the law enforcement emphasis is at the wholesale rather than the retail level. We do not have an explanation for this anomaly. Similarly, the tolerance is intended primarily for cannabis rather than cocaine and heroin. The lower Dutch retail prices may provide evidence that law enforcement in other countries may raise prices to above what they would be in a free market. This has been shown elsewhere: for the US market, Moore (1990:124) estimates heroin prices to be 70 times, cocaine 8 times, and marijuana 15 times, their price in a legal market. However, the important factor for current policy is to determine whether under present conditions, enforcement could be expected to force prices even higher in order to reduce consumption and drug-related social cost. In short, lowering prices by enforcing less is almost certainly easier than raising prices through enforcing more, since prices are already at artificially high levels. The extent to which law enforcement would be expected to experience diminishing marginal returns would be the crucial issue in this respect.¹¹

Price trends in Germany are worth a brief mention. Whilst there are no price data for 1987-9 inclusive, there is a drop in price in all four tables for Germany between the preceding and ensuing periods. This reflects the fact that the earlier years used data for West Germany, and the later years for a united Germany. Price would be expected to drop either if heroin and cocaine were more freely available in East Germany or, if prices are related to consumer price indices, due to cheaper East German prices.

With respect to heroin wholesale prices, Turkey is an outlier with extremely low prices reflecting its status as a major transit route and producer, and possibly again reflecting lower Turkish prices for many goods in relation to the other countries in the study. Aside from Turkey, the Netherlands again appears to be the cheapest place to purchase at the wholesale level. This is true for both cocaine and heroin, though data are fragmentary.

Wholesale cocaine prices in France were the highest during the mid-late 1980s after a steep rise in 1985, though they then dropped sharply after 1990. A similar but less distinct pattern is true for French wholesale heroin prices. This similarity in the trend between the wholesale prices of each drug may indicate that prices for each are being driven by similar factors, though the possibility of an influence due to reporting and recording factors cannot be excluded. While no explanation is offered here, the apparently higher French prices for wholesale cocaine do not appear to be reflected at the retail level. Such discrepancies might be a function of the number of hands through which the drugs pass, which may differ between countries, each trader taking a mark-up and increasing price (for a description of the role of vertical integration in the distribution system as a price determinant, see Boyum 1993).

Wholesale heroin prices in Spain remain consistently amongst the highest in Europe, and to some less marked extent also at the retail level. Spanish cocaine prices do not appear unusually high, and this inter-substance discrepancy may

¹¹ In brief, initial investment in enforcement where previously there was no enforcement might be expected to have high returns per unit input, but the rate of return per unit might be expected to decline as enforcement increases. The rate of change of the output per unit input (the marginal return) determines the potential effectiveness of increasing investment in an activity. Where the marginal return is equal to the marginal cost is the optimum level of investment, after which further costs (investment in more enforcement) outweigh further gains (reduction in drug-related social costs).

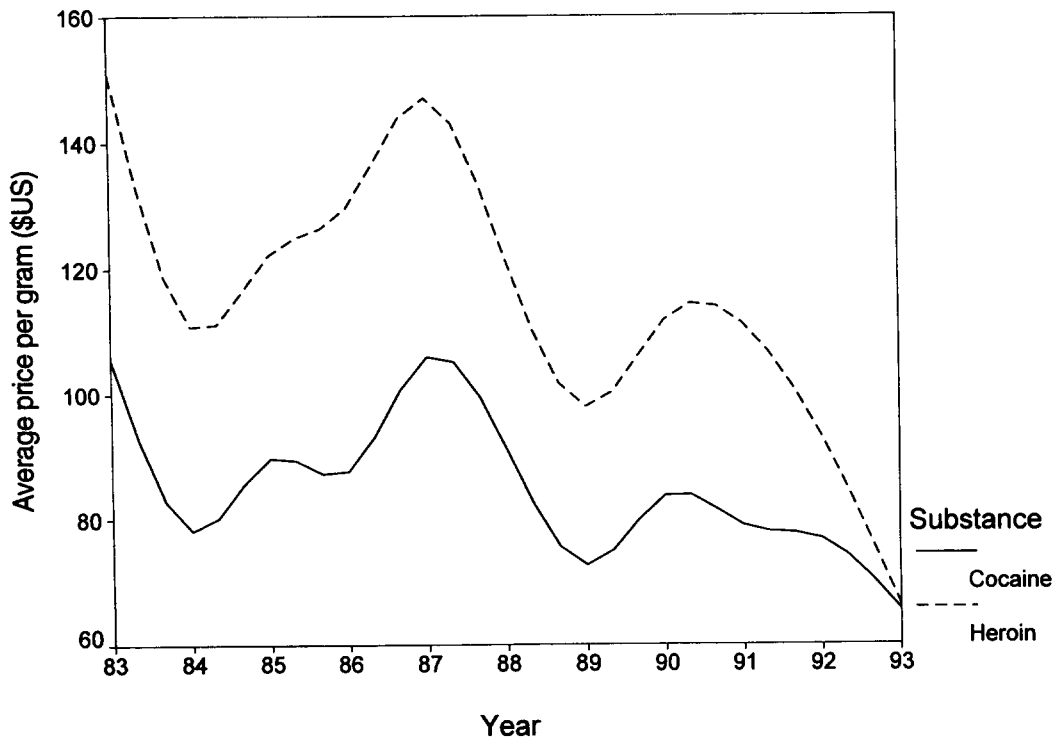
reflect the fact that Spain is a major recipient of imported cocaine from Latin America, whilst in European terms it is geographically more distant from heroin being trafficked from Asia.

Average European prices

Aside from the points mentioned above, many of the prices and trends are broadly similar across countries. This is shown by the standard deviations and coefficients of determination of European average prices, discussed in the next section.

For reasons outlined above, Bulgaria and Turkey are not included in the calculation of average European prices, leaving 10 countries for this analysis: Belgium, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, and the UK.

Figures 2 and 3 show the average retail and wholesale prices of cocaine and heroin for 1983 to 1993.¹² Tables 9 and 10 show annual standard deviations and coefficients of

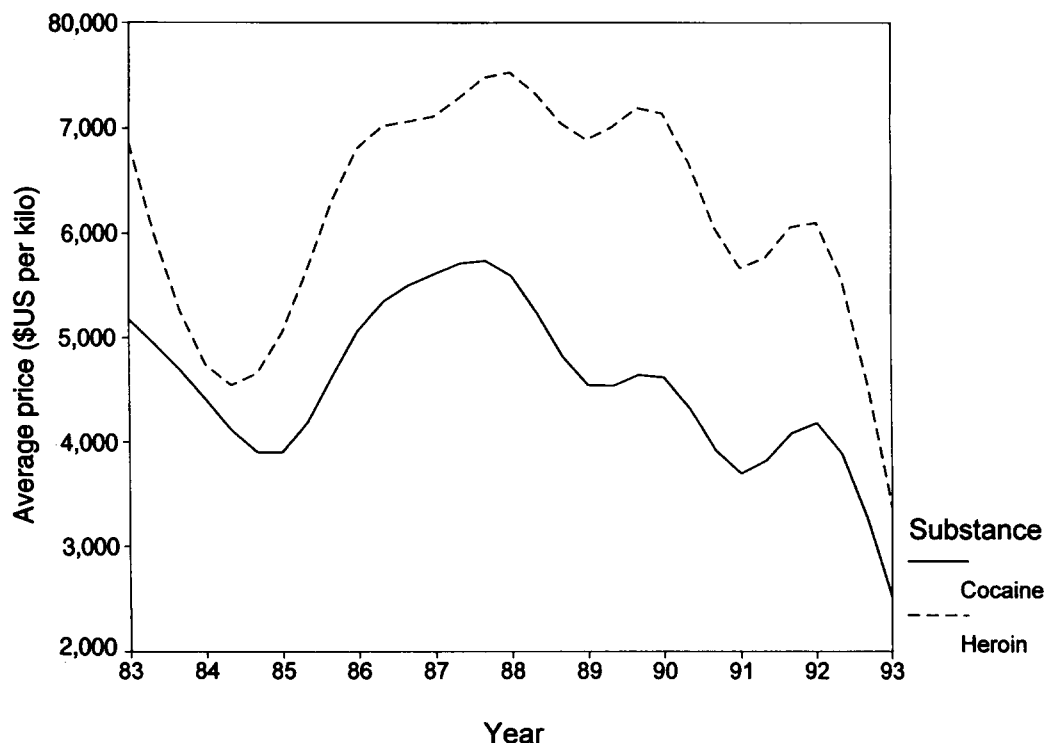


Source: UN ARQs

FIG. 2 Trends in European retail prices

¹² The data are averages across the number of countries that provided data in a particular year. Some countries that reported did not report prices for all years. This may have an influence on some of the specific fluctuations in Figs. 2 and 3 (eg. when the Netherlands is absent the average price may increase since Dutch prices are typically beneath the average). However, where a country's prices are absent for one year it is usually for both drug types, so that the relationship (tracking) of the averages across drug types is not greatly affected, and neither is the longer-term downward trend.

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Source: UN ARQs

FIG. 3 Trends in European wholesale prices

variation of wholesale and retail prices for cocaine and heroin respectively:¹³ national price differences give a standard deviation of European retail prices usually around \$25–50 for both drugs, and average coefficients of variation of 31 and 38 for cocaine and heroin respectively. Standard deviation of wholesale prices are correspondingly higher since prices are per kilogram, and that of heroin larger than cocaine since the price is typically higher. Whilst these suggest aggregation across countries is not perfect (it would be a bigger surprise if it was), if the outlier countries discussed above are excluded, it might be expected that standard deviation and the coefficients of variation would decline in magnitude. Accounting for cross-national differences in purchasing power might also reduce both indicators. The indicators do not suggest that it is misleading to aggregate the data at this level. To test how robust the patterns are, the analyses for Figs. 2 and 3 were also run without Germany (which had higher than average prices before unification and lower later) but this did not greatly affect the patterns. Further, an earlier version of the analysis used only data for the eight major cocaine seizing countries, that is, excluding Switzerland and Greece, and the same basic patterns held.

¹³ The coefficient of variation is calculated as (S.D./mean) × 100.

TABLE 9 *Standard Deviation and Coefficient of Determination of Average Cocaine Prices for 10 European Countries, 1983–1993*

| Year | Retail price per gram (US\$) | | Wholesale price per kilogram (US\$) | |
|---------|------------------------------|---------------------|-------------------------------------|---------------------|
| | S.D. (n ^a) | Coeff. of variation | S.D. (n) | Coeff. of variation |
| 1983 | 30 (9) | 28 | 19,939 (7) | 38 |
| 1984 | 23 (8) | 29 | 12,859 (8) | 29 |
| 1985 | 45 (5) | 50 | 7,649 (5) | 20 |
| 1986 | 22 (6) | 25 | 27,141 (7) | 62 |
| 1987 | 36 (6) | 34 | 25,498 (6) | 45 |
| 1988 | 18 (5) | 20 | 21,527 (5) | 38 |
| 1989 | 20 (5) | 27 | 20,990 (5) | 46 |
| 1990 | 28 (8) | 33 | 20,667 (8) | 45 |
| 1991 | 19 (8) | 24 | 15,224 (8) | 41 |
| 1992 | 31 (10) | 40 | 23,117 (10) | 55 |
| 1993 | 26 (9) | 39 | 6,600 (8) | 29 |
| Average | 27 (7) | 31 | 18,292 (7) | 41 |

^a n = number of countries for which prices available.

TABLE 10 *Standard Deviation and Coefficient of Determination of Average Heroin Prices for 10 European Countries, 1983–1993*

| Year | Retail price per gram (US\$) | | Wholesale price per kilogram (US\$) | |
|---------|------------------------------|---------------------|-------------------------------------|---------------------|
| | S.D. (n) | Coeff. of variation | S.D. | Coeff. of variation |
| 1983 | 76 (9) | 50 | 46,318 (8) | 67 |
| 1984 | 42 (11) ^a | 38 | 26,084 (10) | 55 |
| 1985 | 55 (5) | 45 | 22,313 (5) | 44 |
| 1986 | 32 (4) | 25 | 48,833 (7) | 72 |
| 1987 | 71 (6) | 48 | 30,737 (6) | 43 |
| 1988 | 24 (5) | 20 | 31,498 (5) | 42 |
| 1989 | 20 (5) | 20 | 36,810 (7) | 53 |
| 1990 | 61 (8) | 55 | 38,595 (11) | 54 |
| 1991 | 32 (10) | 29 | 31,114 (11) | 55 |
| 1992 | 44 (10) | 47 | 47,629 (10) | 78 |
| 1993 | 26 (10) | 66 | 21,309 (9) | 63 |
| Average | 44 (8) | 40 | 34,658 (8) | 57 |

^a n = number of cases of price data used. For some of the tabular cells for heroin, this may go above 10 if both heroin Type 3 and Type 4 have been included for a single country.

Whilst there are differences between Figs. 2 and 3, two main points are of immediate interest: (1) *the apparent general decline in prices*, particularly retail prices, with all prices seeming to drop sharply in 1993 but with heroin prices falling at a greater rate; (2) *the manner in which cocaine and heroin prices track each other across the decade*, particularly at the retail level, then almost converge in 1993. Before tackling these points, we need to provide a brief overview of price elasticities of demand to show why evaluating the impact of law enforcement upon drug prices may be important.

The price elasticity of demand for heroin and cocaine

The price elasticity of demand for illicit drugs is only important for policy if it can be determined that enforcement can influence the price of the drug. Otherwise, whether consumer demand is elastic or inelastic to a change in price has no relevance. This paper concentrates on whether or not enforcement can influence price, but a brief foray into why or whether this might be important will give a more complete picture.

The price elasticity of demand is the percentage by which demand for a drug will change with a 1 per cent change in price. For example, if heroin had a price elasticity of -1 , then a 1 per cent increase in price will cause a 1 per cent decrease in demand (and thereby in aggregate consumption—implying, correctly or not, a similar impact upon drug-related social cost). If the elasticity were -0.1 , then it would require a 10 per cent increase in price to produce a 1 per cent decrease in demand (i.e. inelastic). Perfect inelasticity and perfect elasticity exist primarily as theoretical limiting cases, but elasticities for different goods and conditions range between inelastic (little influence upon demand) to elastic (significant influence of prices upon demand). Typical influences upon price elasticity are the extent to which a good must be purchased by consumers, and the availability of substitute goods.

Reliable empirical estimates of price elasticities for cocaine and heroin appear non-existent. Evidence is mainly theoretical or drawn from studies of other goods and transferred to the context of the cocaine and heroin market and its characteristics, both those of users and of drugs. Perfect price inelasticity cannot exist for drugs: nor has it been found for any good that has been studied to date, including alcohol and tobacco (other 'dependent' substances) (see Moore 1990: 114). That demand is fairly inelastic, but the extent remains unknown, is the more common conclusion. The addictive nature of drugs (i.e. consumers are 'driven' to purchase, and price is a less important consideration) is the most common argument to suggest high inelasticity. A second and weaker argument sometimes proposed is that certain 'types' of people will take the drugs regardless. Moore (1990) criticizes both arguments: addiction is not nearly as compelling as often thought—drug users can and do stop use—and users do vary consumption with the amount of money they have available (Moore 1990: 114). Further, with respect to experimental users who are not yet addicted, the addiction-driven-purchase argument would not apply (however, heavy users probably account for most consumption, though this may vary with type of drug). The second argument—that there are certain types of people who will always use drugs, is crude at best, and does not reflect the widely changing patterns of drug use across the 1960s, 1970s, and 1980s in response to tastes, prices, and availability.

Reuter and Kleiman (1986) overview price elasticities for heroin, cocaine, and marijuana, taking into account the relative costs and nature of each drug. The price elasticity of marijuana is concluded to be low around its current price level. In brief, average expenditure on marijuana is a small proportion of disposable income, with fewer negative side effects than alcohol (if they are competitors), so that only a massive increase in price could be expected to have a significant impact upon demand levels. Cocaine is thought to have low short-term price elasticity, but a moderate long-term elasticity. Cocaine is expensive. Heavy use takes a significant proportion of disposable income. In the short term, current users who are dependent

will change consumption little, but in the longer term, higher prices may discourage the flow of persons into the heavy user category. However, reducing consumption through reducing initiates has a long time-lag before any significant impact is felt upon overall consumption, in which time many other factors may have changed. It is usually assumed that the greater addictiveness of heroin makes demand highly price-inelastic. However, since heavy use is so expensive, and often funded by crime, the difficulties in raising the money may make demand relatively elastic. Further, heroin users can cease use with or without medical assistance: Bennett's (1986) evidence from the Cambridge Study of Opiate Users suggests use can be a conscious choice or 'rational decision' for many users, with great variations in usage over time. The demand for heroin may therefore be fairly elastic in response to price changes—Reuter and Kleiman (1986) suggest it may be as much as -1 for heavy users.

Other models suggest that the price elasticity of demand may vary over price ranges. Occasional users may be more price-elastic than addicts when prices rise, reducing or stopping consumption. At high prices, addicts may have a higher price elasticity if they cannot fund their use, and may be more likely to resort to treatment programmes. It has also been suggested that prices can have an unexpected or 'asymmetrical' effect to that originally expected. For example, when prices fall, initiates may begin drug use which they cannot stop when prices rise. As a second example, if prices increase, substitution of one drug for another might increase the price elasticity of demand for a drug, though it may not decrease the overall extent of drug use (for an overview of many of these later points, see Wagstaff and Maynard 1988).

This has been only a brief overview of some of the aspects of price elasticities. The picture is not always clear and without contradictions (especially around the definition, existence and effects of 'addiction'). The intention has been to put the present analysis in a wider scenario. The crucial issue for the present paper is whether or not law enforcement could expect to impact upon price, a step which comes prior to determining the knock-on impact of price change upon demand, consumption, and drug-related social cost.

Interpretation of Trends in Prices

Why have prices declined?

Switching back to Figs. 2 and 3, basic laws of supply and demand suggest that the fall in prices across Europe is either because of a decrease in demand or because of an increase in supply. Few would claim that demand for drugs in Europe decreased in the late 1980s and early 1990s. The falling prices are therefore almost certainly a reflection of increased supply. Further to this, retail prices of illicit drugs may operate on an 'upward ratchet effect'. Dealers will increase prices when they are predetermined higher up the chain of trafficking, or when drugs are scarce. However, when the price could fall, with an increase in supply for example, dealers may prefer to keep the price high and keep the extra profit. Whilst local users will transfer price information between each other, this will be a less efficient means of information transfer than that for a licit good where prices are freely available and advertised. This may give a slight price-fixing advantage to the dealers. As a consequence, illicit

drug prices may be more stable than they might otherwise be in a perfectly operating market (potential falls being absorbed to some extent), and would be expected to usually manifest increases rather than decreases. A further factor that gives greater price stability is the tendency of dealers to vary the purity level rather than the price of a drug when the drug is scarce (though purity may return to previous levels if the reduction in supply is short-term). For a general trend of decreasing prices to emerge, such as that in Figs. 2 and 3 (more generally in Fig. 2 and post-1987 in Fig. 3), in a period when increasing illicit drug use is often cited, the volume by which supply into the market increased must have been extremely large. Increased competition amongst traffickers and dealers could have the effect of slowly driving down the market price if supply was increasing at a greater rate than demand. The large drop in 1993 heroin prices corresponds with a renewed increase in seizures in 1993, both of which may indicate a resurgence in the heroin supply trade, perhaps corresponding with both less European Community border controls, and an adjusted Balkan Route trafficking system, both of which are touched on later in the paper.

Why do cocaine and heroin prices track each other?

Cocaine and heroin derive from different sources: cocaine primarily from Latin America (Bolivia, Peru, Colombia), and heroin primarily from the Golden Triangle (Thailand, Myanmar, Laos) and the Golden Crescent (Pakistan and Afghanistan, Iran, Turkey and India¹⁴), though there are some other sources: The first European seizure of heroin allegedly produced in Latin America was made in Avila, Spain in May 1994, and it has been suggested that as much as 10 per cent of global opium poppy cultivation in 1993 was in Latin America, primarily Colombia (US Department of State 1994). The illicit drugs travel by different ways and means under the auspices of different illicit organizations. In general, heroin comes to Europe via the Balkan Route overland, and cocaine by ship or air perhaps via the US or Africa (discussed in more detail later). It would not be automatically expected that their market prices would track each other: perhaps especially since the seizure data suggest cocaine trafficking increased at a greater rate than, and by weight remained above, that of heroin. However, as market goods, the factor that cocaine and heroin have in common and in opposition to most other goods is their illegality. For most (licit) goods, the market price is determined largely by factor costs: mainly the costs of raw materials and the production process (labour, overheads etc.) and advertising. Illicit drug prices are believed to be determined much more by risk: usually termed a marginal cost, but in this instance more than marginal. Risk, largely determined by the actual or perceived efficiency of law enforcement effort at different stages in the chain between production and final sale to consumer, plays a major role in determining the market price of illicit drugs.

The next section will review a study of US cocaine and heroin risks and prices, and then suggest why the relationship for the two drugs may be different for the European market.

¹⁴ The last three of these are not officially acknowledged by their respective governments as producers of heroin. Iran acknowledges itself as a transit country but claims to have eradicated production, but in contrast, the 1994 US National Drug Control Strategy (White House 1994), estimates annual Iranian production at some 300 tonnes.

Risks and prices in the US

Reuter and Kleiman (1986) provide a comprehensive review of risks and prices in relation to illicit drugs and US law enforcement effort and only a brief overview can be given here (see also Reuter 1988). They suggest that US law enforcement can impact upon the price of heroin due to the routes by which it is currently trafficked, but that law enforcement can only be expected to have a marginal impact upon the retail price of cocaine. The prices of the two goods would not be expected to track each other. Cocaine is often trafficked to the US via small fast speedboats. The chances of being caught are small (most Coastguard money is spent waiting for them), and when one is apprehended it represents only a small proportion of the total drug trafficked. The labour involved in cocaine trafficking is relatively unskilled, cheap, and readily replaceable since the pay is far greater than that of legitimate activity at the same skill level. For heroin on the other hand, the major current trafficking route is via small private aeroplanes. Shipments are larger and less frequent, pilots are skilled, in shorter supply, and could probably make a good, if lower, legitimate income. Reuter and Kleiman conclude that the impact of doubling law enforcement effort to reduce cocaine trafficking would add, perhaps, 0.2 per cent to the retail price. The impact upon heroin prices of a doubling effort to reduce heroin trafficking could be greater in the short run due to the different structure of the trafficking. The rider that they add to this is that it would be primarily a short-run effect, since the profit to be made would ensure that new and innovative methods of trafficking heroin would soon occur.

Risks and prices in Europe

If the element of risk in Europe is similar for both cocaine and heroin, and is determined by the extent and nature of law enforcement effort, then the prices of both drugs could display similar fluctuations. The other explanation would be that another factor plays a major role in determining the price of both goods. To determine the probability of law enforcement exacting the same degree of risk for each drug, the means and routes of trafficking must be considered for each drug.

Tables 11 and 12 show the methods of transport of cocaine and heroin into Europe. The data source is significant individual seizures reported to the United Nations by member states. Computerized data were only available for 1988 to 1991 inclusive. The totals do not equal those of the annual reports used in the analysis of seizures, for reporting reasons as well as the fact that possession offences are largely excluded from the definition of 'significant' seizure (see UNDCP 1994 for further explanation). Similarly, the data are far from comprehensive, and some seizures will not be reported. Other factors need to be considered in their interpretation such as the 'self-fulfilling prophesy'.¹⁵

However, whilst they will give extreme underestimates of the extent of trafficking, if they are not a heavily skewed sample, the data will give some indication of the

¹⁵ The 'self-fulfilling prophesy' of seizures may skew seizure data to reflect enforcement rather than trafficking. For example, based on intuition, customs allocate more officers to search TIR trucks. Ten customs officers searching TIR trucks find more than one officer would. The ensuing rise in seizures appears to give credence to the original hypothesis that the problem was TIR trucks.

TABLE 11 *Percentage Distributions of Known Methods of Transport of Cocaine into Europe, by Number and Weight of Seizures, 1988-1991*

| Means of transport | 1988 (n = 216) | | | 1989 (n = 544) | | | 1990 (n = 687) | | | 1991 (n = 892) | | |
|------------------------------------|-----------------------------|--------------------------------|--|-----------------------------|---------------------------------|--|-----------------------------|----------------------------------|--|---------------------------|----------------------------------|--|
| | Seizures % | Weight (kg) % | | Seizures % | Weight (kg) % | | Seizures % | Weight (kg) % | | Seizures % | Weight (kg) % | |
| Bus | — | — | | 0.3 | 0.0 | | 0.2 | 0.0 | | 0.2 | 0.0 | |
| Land freight | — | — | | 0.1 | 6.8 | | — | — | | 0.2 | 4.5 | |
| Land mail | 1.8 | 1.0 | | 1.8 | 0.1 | | 0.4 | 0.0 | | 0.5 | 0.3 | |
| Motor vehicle | 7.1 | 3.7 | | 9.5 | 15.4 | | 13.2 | 34.0 | | 9.4 | 8.5 | |
| Motorcycle | — | — | | — | — | | 0.1 | 0.0 | | 0.2 | 0.0 | |
| On foot | — | — | | 0.9 | 0.0 | | 0.7 | 0.0 | | 0.4 | 0.0 | |
| Train | 6.1 | 3.0 | | 2.8 | 1.0 | | 2.6 | 0.2 | | 3.7 | 0.7 | |
| Truck | 0.4 | 0.0 | | 0.5 | 4.9 | | 0.2 | 1.5 | | 0.2 | 1.9 | |
| Land subtotal (number/weight) % | (34) 15.4 | (71 kg) 7.9 | | (87) 15.9 | (1,472 kg) 28.2 | | (121) 17.4 | (2,892 kg) 35.7 | | (133) 14.8 | (1,574 kg) 15.9 | |
| Air freight | 0.9 | 3.3 | | 0.3 | 0.0 | | 0.1 | 0.0 | | 0.1 | 0.3 | |
| Aircraft | 78.6 | 66.5 | | 81.5 | 28.6 | | 79.2 | 25.6 | | 81.4 | 25.6 | |
| Air mail | 2.3 | 0.1 | | 0.1 | 0.0 | | 0.8 | 0.1 | | 1.5 | 0.3 | |
| Light aircraft | — | — | | 0.1 | 1.0 | | 0.1 | 4.3 | | — | — | |
| Air subtotal (number/weight) % | (173) 81.8 | (619 kg) 69.9 | | (438) 82.0 | (1,534 kg) 29.6 | | (546) 80.2 | (2,424 kg) 30.0 | | (730) 83.0 | (2,577 kg) 26.2 | |
| Private boat | 0.4 | 0.4 | | 0.9 | 12.2 | | 0.2 | 0.0 | | — | — | |
| Sea freight | 0.4 | 19.7 | | 0.5 | 20.1 | | — | — | | 0.2 | 5.5 | |
| Ship | 0.4 | 1.0 | | — | — | | 2.6 | 36.1 | | — | — | |
| Other vessel | 2.7 | 2.0 | | 2.0 | 9.7 | | — | — | | 3.0 | 52.4 | |
| Sea subtotal (number/weight) % | (9) 3.9 | (207 kg) 23.1 | | (19) 3.4 | (2,175 kg) 42.0 | | (20) 2.8 | (2,903 kg) 36.1 | | (29) 3.2 | (5,710 kg) 57.9 | |
| Total (number/weight) % | (216) 101.1 ^a | (897 kg) 100.9 ^a | | (544) 101.3 ^a | (5,182 kg) 99.8 ^a | | (687) 100.4 ^a | (8,091 kg) 101.8 ^a | | (892) 101 ^a | (9,861 kg) 100.0 ^a | |

Source: Individual seizure reports to the United Nations by Member States.

Some cells have zero values if the actual value represented less than 0.1% of the total.

^a Percentage may not equal 100 due to rounding.

TABLE 12 *Percentage Distributions of Known Methods of Transport of Heroin into Europe, by Number and Weight of Seizures, 1988-1991*

| Means of transport | 1988 (n = 202) | | | 1989 (n = 577) | | | 1990 (n = 600) | | | 1991 (n = 560) | | |
|-------------------------------|----------------------------|-------------------------------|--|-----------------------------|---------------------------------|--|-----------------------------|----------------------------------|--|-----------------------------|----------------------------------|--|
| | Seizures (no.) % | Weight (kg) % | | Seizures (no.) % | Weight (kg) % | | Seizures (no.) % | Weight (kg) % | | Seizures (no.) % | Weight (kg) % | |
| Animals | — | — | | 0.1 | 3.5 | | — | — | | — | — | |
| Bus | 0.4 | 1.1 | | 0.7 | 1.4 | | 0.6 | 0.1 | | 2.0 | 2.2 | |
| Land freight | — | — | | 0.1 | 0.9 | | — | — | | 0.9 | 8.0 | |
| Land mail | 1.9 | 0.3 | | 0.5 | 0.5 | | 0.6 | 0.1 | | 0.3 | 0.0 | |
| Motor vehicle | 30.6 | 67.9 | | 23.8 | 39.4 | | 38.6 | 65.1 | | 45.3 | 58.5 | |
| Motorcycle | — | — | | 0.5 | 0.2 | | 0.6 | 0.2 | | 0.3 | 0.0 | |
| On foot | — | — | | 0.5 | 0.3 | | 0.8 | 0.2 | | 0.5 | 0.0 | |
| Public transport | — | — | | — | — | | 0.1 | 0.0 | | — | — | |
| Train | 2.9 | 0.3 | | 5.7 | 2.4 | | 6.2 | 2.3 | | 11.8 | 2.1 | |
| Truck | 0.9 | 3.2 | | 2.6 | 27.3 | | 1.9 | — | | 1.6 | 7.1 | |
| Land subtotal (number/weight) | (75) 36.7 | (581 kg) 72.8 | | (196) 34.5 | (1,788 kg) 75.8 | | (296) 49.4 | (2,057 kg) 75.3 | | (351) 63.4 | (3,075 kg) 83.2 | |
| Air freight | — | — | | — | — | | 0.3 | 0.0 | | 0.1 | 0.0 | |
| Aircraft | 59.9 | 20.2 | | 66.8 | 23.6 | | 49.4 | 25.6 | | 36.5 | 15.0 | |
| Air mail | 0.4 | 0.0 | | — | — | | 0.3 | 0.1 | | 0.3 | 0.0 | |
| Light aircraft | — | — | | — | — | | — | — | | — | — | |
| Air subtotal (number/weight) | (122) 60.3 | (161 kg) 20.2 | | (375) 66.8 | (556 kg) 23.6 | | (297) 50.0 | (664 kg) 24.3 | | (204) 36.9 | (556 kg) 15.0 | |
| Private boat | — | — | | — | — | | — | — | | — | — | |
| Sea freight | — | — | | — | — | | — | — | | 0.1 | 0.1 | |
| Ship | 2.4 | 6.6 | | 1.0 | 0.5 | | 1.1 | 1.3 | | 0.7 | 1.8 | |
| Other vessel | — | — | | — | — | | — | — | | — | — | |
| Sea subtotal (number weight) | (5) 2.4 | (53 kg) 6.6 | | (6) 1.0 | (12 kg) 0.5 | | (7) 1.1 | (37 kg) 1.3 | | (5) 0.8 | (72 kg) 1.9 | |
| Total (number/weight) | (202) 99.4 ^a | (795 kg) 99.6 ^a | | (577) 102.3 ^a | (2,356 kg) 99.9 ^a | | (600) 100.5 ^a | (2,758 kg) 100.9 ^a | | (560) 101.1 ^a | (3,703 kg) 101.1 ^a | |

^a Percent does not equal 100 due to rounding. Other notes as for Table 11.

principal methods of transport. Since the findings differ widely between the same methods for the two drug types, this suggests that the differences may be real rather than due to differential law enforcement emphasis or due to a difference in reporting or recording practices across countries. In short, the data are gross underestimates in absolute terms but may be good indicators with respect to pattern recognition.

The divisions between categories of transport shown in Tables 11 and 12 are not perfect: the category 'motor vehicle' may include cars as well as trucks. Similarly, 'aircraft' does not sufficiently distinguish between drops from small private aircraft and individual couriers on public transport, though they are almost certainly primarily the latter (suggested by average seizure weight—see below). The groupings must be supplemented by other sources of knowledge. However, even with such imperfect data, a comparison between the two drug types shows distinct patterns that confirm earlier suspicions: Table 13 summarizes Tables 11 and 12, and aggregates the data across four years into the principal categories of land, air and sea trafficking. The distinctions are much clearer, and average seizure weights are also included. It should be noted that the average seizure weights in Table 13, derived from the individual seizure data, are much higher than those reported in Tables 2 and 4 since 'possession' offences are not included in the definition of significant seizures—possession offences add much to number of seizures and little to weight seized.

Table 13 shows patterns of trafficking that differ by number of seizures and amount seized, suggesting variations in average seizure weight as would be expected. Over 80 per cent of cocaine seizures are related to air transportation but these only account for 29.6 per cent of the weight seized. As expected this accords with an explanation of a flood of small scale drug couriers in international air traffic—both directly and via Africa (prison population data for the UK suggest that West African traffickers have played a large role in trafficking: see for example Maden *et al.* 1992), with a small average weight (3.79 kg). A significant proportion of cocaine seized by amount is by sea transport—but these are only 3.3 per cent of seizures. This accords with an interpretation of a very small number of huge sea shipments, and the average seizure weight is 142.79 kg, nearly 40 times the average weight of cocaine trafficked by air.

With respect to heroin, almost 80 per cent of heroin by weight comes overland, though this accounts for only half of seizures. The majority of the remainder of heroin comes by air—only 20 per cent by weight, but over half of seizures. Average seizure weight of heroin trafficked overland is greater (8.18 kg), as might be expected in cars and other vehicles when compared to amounts carried by air couriers (1.94 kg). Less than 2 per cent of heroin by number and amount seized was transported by sea.

TABLE 13 *Four-Year Totals of Methods of Transport of Cocaine and Heroin into Europe*

| Method of transport | Cocaine 1988–1991 | | | Heroin 1988–1991 | | |
|---------------------|-------------------|------------|---------------------|------------------|------------|---------------------|
| | Seizures (%) | Weight (%) | Average weight (kg) | Seizures (%) | Weight (%) | Average weight (kg) |
| Land | 16.0 | 24.9 | 16.02 | 47.3 | 78.0 | 8.18 |
| Air | 80.7 | 29.6 | 3.79 | 51.4 | 20.1 | 1.94 |
| Sea | 3.3 | 45.5 | 142.79 | 1.3 | 1.8 | 7.05 |
| Total | 100.0 | 100.0 | 10.33 | 100.0 | 99.9 | 4.96 |

Comparing average seizure weights across type of drug, the smaller average heroin weights for each method of transport probably reflect its greater retail and wholesale values (see Figs. 2 and 3), so that less needs to be transported to generate the same revenue.

Method of transport affects risk, affects prices

If anything, the means of trafficking of the two drugs are effectively reversed from the US situation. The major route of heroin trafficking is overland via the Balkan Route, mainly through Turkey since it provides the overland link between Europe and Southeast Asia and Southwest Asia.¹⁶ The European heroin cars and trucks are the equivalent of Reuter and Kleiman's cocaine speedboats to the US discussed earlier. Each one is small in relation to the total so that risks are distributed (the eggs are in many baskets), and most will slip through undetected. In contrast, most cocaine reaching Europe will have crossed the Atlantic at some point. This incurs more risk since the flow of legitimate traffic will be less. The seizure statistics described above suggested that much cocaine goes via Spain and Portugal. Cocaine may also go by air to Africa and then overland, or directly into major European airports, though perhaps via the US or Africa, as well as directly from divergent Latin American countries including Brazil and Argentina as well as the main producers (legitimate traffic is heaviest from these countries and therefore may provide the best cover). The immense significance by weight of the small number of cocaine seizures at sea may suggest that this would be the point to try and emphasize for enforcement, though the low frequency of such shipments suggests it would be a frustrating task.

The ready supply and the low skill level of the majority of drug couriers may be the factor that the trafficking of both drugs into Europe have in common. Drivers trafficking heroin by land may need a driving qualification, but they are not highly skilled or in short supply. They can earn a living by licit trafficking of goods, but by no means the same as they can from illicit trafficking. Both cocaine and heroin couriers or mules who bring the drugs via air need few qualifications (though the more officially qualified middle class couriers may be less conspicuous), and again they can be readily substituted if intercepted. In short, whilst crime displacement effects for many crimes may be less than total (see e.g. Barr and Pease 1991 for a review), with respect to preventing drug trafficking at the individual level they might be expected to be almost total and to occur rapidly.

The differential impact of US law enforcement upon illicit drug prices was identified as due to the different types of couriers and differential aversion to risk. For the European market this difference may not exist to such a great extent, since the majority of couriers are fairly unskilled, and easily replaced by others wanting to earn far more money than they could through legitimate means.

The above may go some way to explaining why the prices of the two drugs appeared to track each other across a decade. However, what it does not do is explain variations

¹⁶ Changes in Balkan Route trafficking routes are allegedly occurring, due both to changes in the former Eastern Europe and in the former Yugoslavia, but, with adjustment for a time-lag, these changes may only marginally affect the present study.

in the prices of both. Whilst there is a general downward trend which corresponds with the increase in seizures, both suggesting increased supply, no explanation has been forwarded for the short-term price fluctuations. It is possible that the rise in the prices of both drugs in the mid-1980s was a response to increased demand. As mentioned in the introduction, demand-side indicators are acknowledged as the weakness of the present analysis, and this would be an area for future cross-national research. If increased demand was the case, then the large increase in trafficking could be a response to both supply-side (desire to exploit a new European market) and demand-side market pressure. If increased European demand in the first half of the decade led to a price increase for both drugs, and this was then gradually met in the second part of the decade, it could explain the trend. However, it seems relatively implausible without an explanation of why such an increase in demand would occur for both drug types.

Discussion, Conclusions, and Future Work

Cross-national trend comparisons can be informative

At the most general level, the analysis suggests that cross-national comparisons of trends in the illicit drug industry may be an informative and useful approach to the problem. Several areas for future research have been highlighted through this overview analysis: testing the present hypotheses against demand-side data of varying types; further country-level analysis of the data on heroin; introducing other economic indicators to the price analyses (e.g. controlling for cross-national differences in purchasing power); and further specific investigation of why Dutch wholesale as well as retail prices appear to be lower.

Consumption is influenced by factors in addition to price

Whilst price is a primary determinant of consumption, Moore (1979) identified the search-time of consumers as a possibly influential determinant of consumption. Enforcement of street markets can directly influence the chances of dealers and would-be purchasers making contact, and this would not necessarily be reflected in price. Hence consumer expenditure can include time, risk, and effort in making contacts. Cross-national variation in these aspects of enforcement and differing degrees of success might not necessarily be evident in the data presented here. UNDCP are conducting further analysis of the data, with respect to mark-up differentials between wholesale and retail prices, and this may give some indication of law enforcement effectiveness along the distribution system. In addition to enforcement impact upon availability and prices, demand-side factors such as fashion and peer-group pressure can obviously influence the decision to consume illicit drugs, and, if influencing consumption upwards, may act to counter any decrease in consumption that enforcement can impose via price increases.

Irony of increased seizures as a performance indicator

With regard to seizure data, there is an irony in using them as indicators of law enforcement activity. An increase in amount seized does provide a positive indicator of law enforcement work. However, at the same time it can also indicate that greater amounts of illicit drugs are passing through the law enforcement net. The general decline in drug prices supports such a hypothesis.

Findings may hold true despite recent macro-level socio-economic change

Drug trafficking patterns may have changed considerably in Europe in the 1990s. Three major examples have produced macro-level change: war in the former Yugoslavia has undoubtedly affected heroin trafficking along the Balkan Route; political change in the former Eastern block countries will continue to influence different aspects of drug production, trafficking, and consumption patterns; the lowering of many internal Western European border controls may facilitate internal drug movement (see for example, Dorn and South 1993). However, for cocaine and heroin, the basic message may remain the same, and, whilst some of the specific patterns presented here may now represent a historical overview, it is expected that some of the analysis will have continuing relevance to the manner in which heroin and cocaine-related costs are addressed through interception. It is possible that the renewed upward trend in heroin seizures and decline in price in 1993 is a time-lagged increase in supply as a result of some of these changes.

Routine activities and drug trafficking

Routine activity theory (Cohen and Felson 1979) is recognized as an important contribution to understanding patterns and trends in crime rates, but is seldom applied to drug trafficking. Increases in licit international trade and communications provide opportunities for illicit trafficking in ways to which interception by enforcement agencies can only be reactive. If the volume of international trade increases more quickly than the methods and technology of interception, then the chances of finding the illicit needle in the haystack decrease whilst the profitability of trafficking increases. This is through no fault or failure of customs practices. Cross-national variations in customs effectiveness may vary around a mean chance of interception that is determined largely by exogenous socio-economic factors. Following this hypothesis, it would be expected that rates of interception would decrease over time. Future research might examine the relationship between trends in international licit and illicit trade.

Means of transport and skill-level of traffickers is important

As for other goods, illicit drug prices are useful indicators of market mechanisms. For illicit drugs the market mechanisms are somewhat different from most goods, with risk being a primary price determinant. An initial exploration of illicit drug prices in Europe has been presented, and the attempt made to provide an explanation in relation to seizure statistics and other knowledge of illicit trafficking patterns. It

seemed contrary to expectations that fluctuations in the average European prices of the two drugs correlated well. This was explained in terms of the influence of the profession of the individual drug couriers: the principal methods of transport, the level of skill they require, and the degree to which they can be easily replaced: in essence, the greater likelihood of crime displacement in this specific instance. This may present a current difference between the European and US illicit drug systems.

Reuter and Kleiman (1986) have argued that, in the US, a law enforcement impact upon heroin prices would be more effective than upon cocaine (heroin having a higher price elasticity of demand). They also argued that this would be more feasible due to the manner in which a large part of the US heroin market was supplied (fewer large air shipments using skilled and less easily replaced labour so that increased risk has greater impact). With respect to the European market however, whilst further investigation of short-term price fluctuations is needed, increasing risk due to enforcement at the level of the individual courier would not be expected to impact greatly upon the market price or consumption levels. Focusing upon the small number of large cocaine shipments is potentially more fruitful, and though it is almost certainly akin to finding a needle in a haystack, it could deserve further investigation. The further irony may be that even increasing the interception rate will have little impact upon prices and consumption if demand is price inelastic, or if supply is increased—either or both of which are not implausible. Since the European market is small in relation to the US market, then for cocaine at least, increasing supply would not have production constraints. In the light of such findings, perhaps consideration might be given as to what would be the effects of shifting drug-policy resources from enforcement to alternative methods of reducing overall costs.

A bleak future for European border interception?

The positive suggestion of the article is that prices of illicit drugs are almost certainly far above what they would be in a licit market. This is nothing new, but remains important. However, the implications of the analysis for increasing the effectiveness of European law enforcement are not encouraging. The balance of evidence suggests increasing enforcement will impact only marginally upon prices due to rapidly diminishing marginal returns. The exact point at which optimum allocation of enforcement resources is reached is not determined here: some countries may increase efficiency through more, some through less, and some through a different mix of enforcement strategies. This seems a simplistic note on which to end, but it is important because the traditional notion of enforcement is that more is usually better. More is not necessarily better if it becomes increasingly less efficient per unit of resource input. The notion of varying the level and mix of enforcement, and the grudging toleration of illicit drugs, with a view to maximizing returns from finite resources, is a notion that is gaining increasing ground.¹⁷

To influence consumption levels, the aim of law enforcement is to restrict supply and thereby raise market prices. The implicit aim of reducing consumption is to reduce the overall level of drug-related cost in society. Regarding cocaine and heroin in Europe,

¹⁷ Kleiman's 1992 book *Against Excess* is one of the best examples of the notion of grudging toleration (Kleiman 1992a, see also Kleiman 1992b).

however, interdiction which imposes relatively little cost upon trafficking, since low skill-level traffickers are easily replaced and the replacement value of seized drugs is far less than their street value, seems unlikely to make progressive inroads into illicit trafficking.

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