

151446

MARYLAND STATE POLICE CRIMINAL INTELLIGENCE DIVISION

NCJRS

NOV 22 1994

ACQUISITIONS

DRUG AVAILABILITY INDEX ANNUAL ASSESSMENT

1993

151446

U.S. Department of Justice
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February 1994
Z-97-00223

The Drug Availability Index (DAI)

The Drug Availability Index (DAI) was designed to estimate the current level of drug availability by measuring certain indicators. By tracking the index over time, changes in availability may be monitored.

The availability of a drug is defined as the total amount of the drug in the State during a given time period. Clearly, it is not possible to actually measure this number, due to the clandestine nature of the illicit drug trade. However, changes in availability can be observed through its effect on data that can be measured. For example, an increase in the amount of drugs present in the State should have an effect on the price of drugs.

This information is most important to decision makers: has the availability of drugs increased or decreased, and on some scale, by how much? The value of a data set does not say how much of a drug is present in the State at a given time. Rather, changes in the data set reflect changes in availability, and these movements can be followed over time.

In order to better determine availability, a number of data sets are examined, since no one set is a perfect indicator and each can measure a different aspect of availability. Once the appropriate data sets are selected, they are refined for a particular drug. These data sets, now referred to as indicators, are weighted against each other using statistical techniques. This process assigns more importance to those indicators that appear to better follow changes in availability.

These weights are then used to combine the indicators into one number, the Drug Availability Index, or DAI. The DAI is designed so an increase in availability is reflected as an increase in the DAI, while a decrease in availability will lead to a decline in the DAI. As with the indicators themselves, the value of the DAI has no intrinsic meaning. The current level of the Index and how it has changed over time is what is important.

To summarize, the DAI measures the current level of availability of certain drugs in the State through the effect it has on indicators. These indicators are refined for each drug, then combined into one index that can be followed over time.

A data set included in the Drug Availability Index (DAI) must meet several criteria. First is the cause and effect relation between availability and the indicator- a change in availability should directly affect the indicator.

The indicators chosen should reflect current availability. Developing a current indicator provides an understanding of the present situation and the discovery of leading indicators.

Another requirement is the stability of the relationship between availability and the indicator over time. Otherwise, a change in the indicator could be unrelated to availability. For example, the number of entries in the Drug Enforcement Coordinating System (DECS), a database containing information relating to drug investigations, may be related to availability. But since the number of entries is expanding due to increased participation in the system, determining this relationship is not possible.

The indicators must be objectively measurable, meaning that a value can be assigned to the indicator and everyone measuring the indicator agrees on that number. This eliminates data sets such as surveys, due to the problems of clearly defining responses. The indicators must be available on a timely basis, since reporting on availability with a long time lag is of little use.

The variability of the indicators can not be excessive, since it is difficult to interpret changes. Finally, the data sets should be randomly generated and influenced as little as possible by considerations such as changing law enforcement policies. For example, targeted police actions can greatly influence arrest data. However, these increases are not related to changes in availability during that time period.

These considerations lead to the choice of the following eight indicators. All have a direct correlation to current availability, and the relationship is expected to remain stable in the future. They are all measurable and available within six weeks after the event. While not immune, the indicators are not determined by law enforcement efforts.

Price - According to the law of supply and demand, an increase in supply leads to a decrease in price and visa versa. Since an increase in availability should be reflected by an increase in the DAI, the inverse of the price is used in the index.

Price is determined through undercover purchases of drugs. The actual amount received is compared to the actual amount paid. Regressions analysis is then used to determine the price for typical user purchase amounts. Also, street-level buys are most sensitive to changes in availability. The purchase amounts used are different for each drug and are based on intelligence and anecdotal information. Using this technique, a fluctuation in price is evident from a change in the actual price paid for a given amount, or a variation in the amount received at a given price.

Purity - Changes in purity reflect the dealers attempt to match supply with demand. If availability goes down, dealers reduce purity in order to stretch supply. A rise in purity is an indication of abundant supply.

Number of Seizures During Routine Investigations - Two types of events fall into this category. The first is a Highway Interdiction: an officer stops a vehicle for a traffic violation, and during the stop the officer discovers drugs in a vehicle. The second type of event is an Observation: an officer on routine patrol stops to investigate some type of suspicious activity. During this investigation, the officer finds drugs. Currently, only interdictions and observations for the Maryland State Police are included.

The difference between an interdiction and observation is that the first begins with a traffic violation, while the second may or may not involve a vehicle. In both cases, the officer did not have prior knowledge that drugs were present and their original intention was not to discover drugs.

The number of seizures are divided into two categories: user-sized seizures and dealer-sized seizures. The dividing line is based on intelligence as well as anecdotal information. The division is necessary since user and dealer seizures represent different aspects of the availability.

If availability rises, the drug may be easier to obtain. If so, users may obtain the drug more often. The probability of officers finding the drug during routine stops rises. This may increase the number of user-seized seizures.

The number of dealer-sized seizures is a reflection of the volume of drugs being brought into the State. The more drugs that are brought into the State, the more likely they will be found during random events.

Average Amount of Drugs Seized During Routine Investigations - As with the number of seizures, the average amount is determined for user-sized and dealer-sized seizures. If availability increases, users may obtain more of the drug when they buy it. This should increase the average amount of seizures. The average amount of dealer seizures is determined each period but is not included in the DAI because the number is too volatile.

Number of Laboratory Submissions - Only the laboratory submissions for the Maryland State Police Crime Laboratory are currently considered in the DAI. The more common a drug, the more likely it will be sent to the laboratory for analysis. However, not all laboratory submissions are considered. The submissions due to routine investigations are not included, since this would result in double counting. Submissions resulting for search and seizure warrants or other undercover operations are not included in the DAI, since they lag changes in availability and are influenced by changes in police initiatives.

The remaining submissions are from non-MSP agencies for routine seizures and recoveries. These events are similar to the number of seizures during routine investigations for the MSP. The average amount of the submissions is not considered. It is common practice for an officer to submit only a portion of the seized drug to the laboratory for analysis. Therefore, the average amount of the drugs submitted is not the same as the average amount of the drugs seized.

Percentage of Total Laboratory Submissions - The percentage of laboratory submissions is an indicator of the relative availability of different drugs. Should one drug become more popular, this may be reflected in an increase in the percentage of submissions.

These data sets - price, purity, the number and average amount of seizures, the number of laboratory submissions and the percentage of total submissions - are the indicators used in the DAI. Currently, a monthly index is produced for marijuana, cocaine HCl and crack cocaine. Each indicator is refined for the particular drug:

Marijuana - Price is determined for 1/8-ounce and 1/4-ounce purchases; 75 percent of the purchases Statewide

are for these amounts. The purity, or in the case of marijuana, potency, is not included due to lack of data. The dividing line between user and dealer seizures is 16 grams, or slightly over 1/2-ounce. A natural break occurs in the data at this point, and intelligence information suggests that this is the dividing line between the user and dealer level.

Cocaine HCl - Price is determined for 1/2-gram and 1-gram amounts. Information from law enforcement as well as drug education and treatment agencies suggests that most users do not buy more than one gram of cocaine at a time. The average purity is based on all samples seized, regardless of the amount seized or how the cocaine was obtained. Contrary to popular belief, there is not a relationship between the amount seized and purity. The dividing line between user and dealer seizures is 2 grams. Again, intelligence shows that larger quantities are bought by dealers who then repackage the cocaine into smaller amounts for resale.

Crack Cocaine - When users buy marijuana and cocaine, both price and the amount received can be negotiated. A slightly larger or smaller amount has a commensurate change in price. This is not faced by users of crack cocaine. At the street level, price is fixed, usually at \$20 or \$40, and the buyer accepts whatever the dealer gives. Therefore, changes in availability are measured by the average amount received for \$20 and \$40 purchases of crack.

The average purity is based on all samples seized. As with cocaine HCl, there is no relationship between amount and purity. This is expected since crack is a purified form of cocaine. There is no dividing line between user and dealer quantities of crack. Users typically smoke the crack as soon as possible. Therefore, it is unusual to find user amounts of crack during routine investigations.

An analysis of the DAI for marijuana, cocaine HCl and crack cocaine follows. The values of the indicators are shown for the past year, while the charts show the DAI since July 1990.

Marijuana Availability

Table 1 shows the indicators used to create the marijuana DAI for the last year, while Chart 1 illustrates the DAI for the last three and a half years. There are seasonal effects related to marijuana availability. The most significant development is that there appears to be a fundamental increase in availability, which may reflect an increase in the popularity and use of marijuana.

The availability of marijuana declined in October, November and December of 1992, which is evident across all indicators. Prices rose, while the number and average amount of interdictions declined as did the number and percentage of laboratory submissions. The pattern of declining availability during these months has also been observed over the last three years. This coincides with the end of the growing season in this region of the county.

Availability of marijuana increased in January, February and March of 1993, again a pattern that has been observed over the last three years. Prices declined while seizure and laboratory data reflected an increase in availability. This is related to the marijuana harvest season in the southwestern United States and Mexico, which runs from November through December.

There is no significant change in the availability during April, May and June 1993; the same pattern has been observed the last two years. This is indicative of a stable supply.

A slight decline in availability occurred during July, August and September of 1993. In the past three years there has been a drastic decline in availability during this time period. During 1993 the decline was minimal. This is a significant development. Anecdotal information suggests that the popularity of marijuana is increasing and use is on the rise. The lack of the usual seasonal decline in availability tends to corroborate this point.

Other data sets can help corroborate the changes seen in the DAI. Chart 2 compares the DAI for marijuana with DC pretrial drug test data on juveniles. The drug test data shows the number of juveniles who tested positive for marijuana. There are similarities between the two sets of data. From the period May 1991 through December 1991, there was a steady decline in the DAI, which coincides with a steady decline in the number of juveniles testing positive for marijuana use.

From August 1992 through January 1993, there was also a consistent drop in the DAI. However, the decline lasted for a shorter period of time and it was less dramatic. During the same period of time, the continuous rise in the number of juveniles testing positive for marijuana ceased.

As indicated above, availability usually declines in July, August and September. In 1993 a significant decline did not occur in the DAI during these months, and the number of juveniles testing positive for marijuana did not drop during this time period.

This correlation between the DAI and number of juveniles testing positive for marijuana has several implications. First, a seasonal effect is observed in both indicators in 1991 and 1992. Second, the seasonal decline observed in both indicators has been getting smaller each year. In 1991 both the DAI and the number of positive tests declined for eight months. In 1992 there was a six - month decline in the DAI and the number of positive tests stopped rising. In 1993 there was little if any seasonal decline in the DAI and the number of positive tests continued to increase.

These indicators corroborate the idea that the popularity and use of marijuana is on the rise. The indicators in the DAI show that marijuana prices are not rising significantly, officers are finding larger quantities more often during routine investigations, the laboratories are seeing it more often and more juveniles are testing positive for marijuana during pretrial testing.

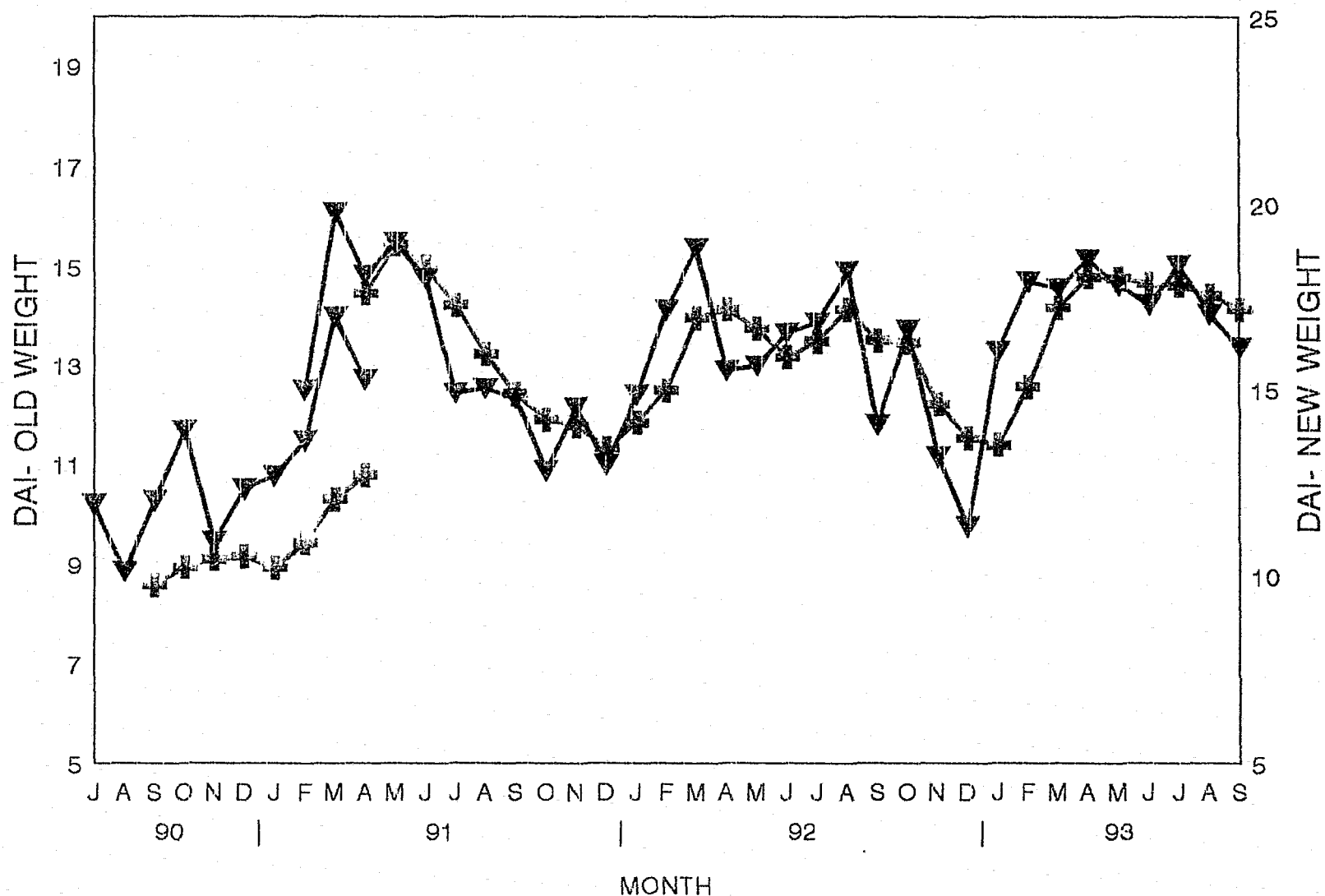
Table 1
Indicators for the Marijuana Drug Availability Index
October, 1992 Through September, 1993

Indicator	Sep 93	Aug 93	Jul 93	Jun 93	May 93	Apr 93	Mar 93	Feb 93	Jan 93	Dec 92	Nov 92	Oct 92
Price, 1/4 Oz	57	58	58	50	65	57	52	69	61	90	59	66
Price, 1/8 Oz	46	32	36	36	50	35	32	34	37	42	35	40
Number, User Seizures	75	88	93	86	100	116	97	99	95	51	61	85
Ave Amt, User Seizures	3.5	3.5	3.3	4.0	3.9	2.9	4.3	3.9	3.2	3.0	3.4	3.8
Number, Dealer Seizures	9	8	20	14	15	17	9	15	15	9	6	23
Number, Non-MSP Lab Submissions	69	49	72	50	43	20	23	22	18	29	29	48
Percent of Total Non-MSP Lab Submissions	59.9	38.3	48.6	48.5	54.4	35.1	42.6	52.4	28.6	31.2	34.1	43.2
DAI	16.1	17.0	18.4	17.3	17.8	18.5	17.7	17.9	16.0	11.3	13.2	16.6
DAI - 3 Month Moving Average	17.2	17.5	17.8	17.9	18.0	18.0	17.2	15.1	13.5	13.7	14.6	16.3

CHART 1 - MARIJUANA DRUG AVAILABILITY INDEX (DAI)

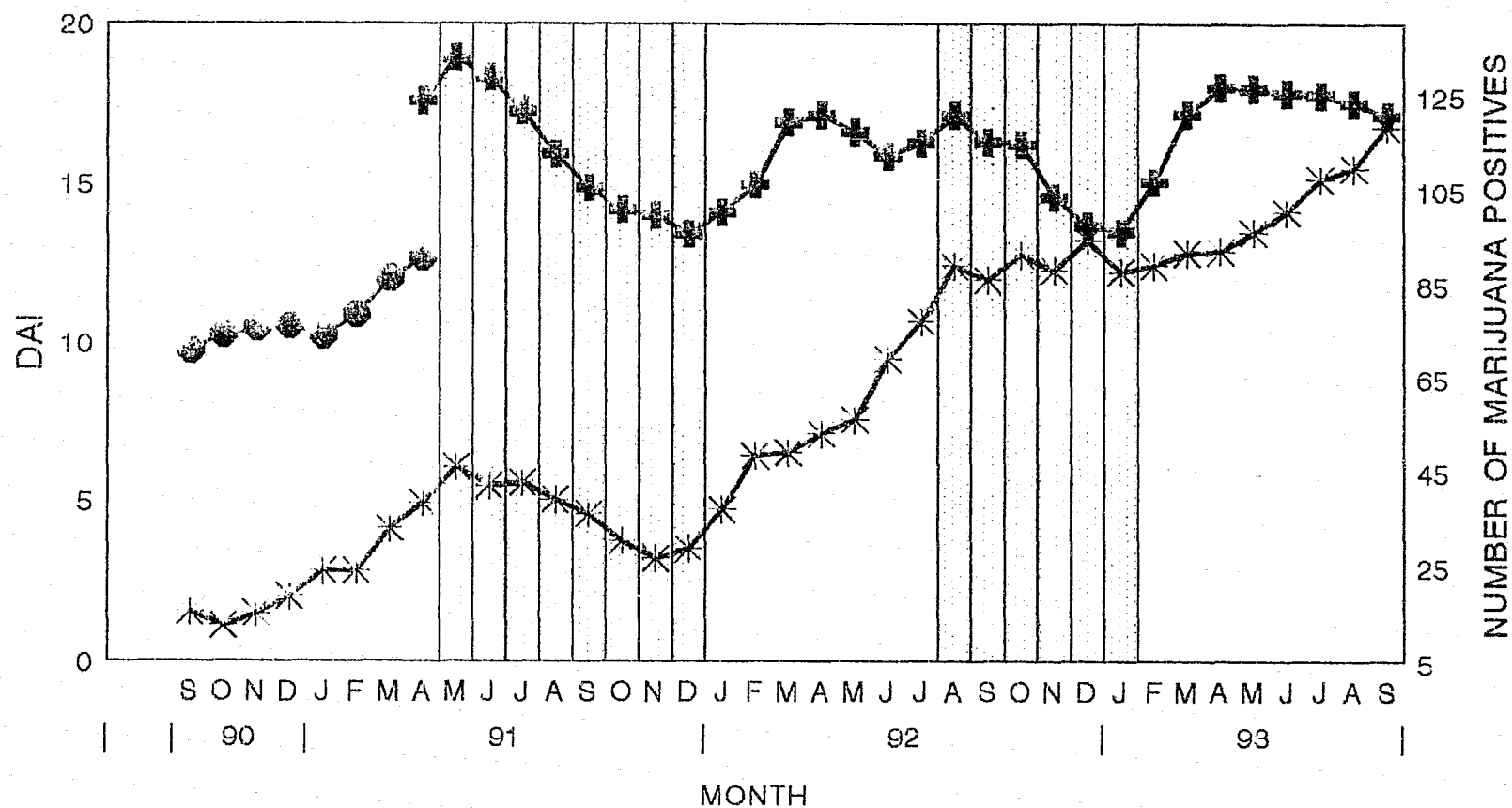
JUNE 1990 TO SEPTEMBER 1993

MONTHLY DATA AND 3-MONTH MOVING AVERAGE



MONTHLY DATA IN BLACK, 3-MONTH MOVING AVERAGE IN RED
OLD WEIGHT ON LEFT SCALE, NEW WEIGHT ON RIGHT

CHART 2 - MARIJUANA DRUG AVAILABILITY INDEX (DAI)
VERSUS DC PRETRIAL DRUG TEST DATA ON JUVENILES
FOR NUMBER OF MARIJUANA POSITIVES



SYMBOLS

● DAI, OLD WEIGHT + DAI, NEW WEIGHT * NUMBER, MJ POSITIVES

NOTE: THE BREAK IN THE DAI DATA IS A RESULT OF THE
INCLUSION OF ADDITIONAL DATA (LABORATORY SUBMISSIONS) IN THE INDEX.
SHADED AREAS INDICATE PERIODS OF DECLINE IN THE DAI

Cocaine HCl Availability

Table 2 shows the indicators and the availability of Cocaine HCl for the last year, while Chart 3 shows the availability of Cocaine HCl for the last three and a half years. There is no seasonal effect associated with the availability of cocaine. However, there has been a definite trend. Over the last three years, there was a definite, steady decline in cocaine availability. Within the past six months, however, the rate of decline has decreased.

From June 1992 through April 1993, prices have been declining. Usually, a decline in price is an indication of increased availability. In this case, a protracted decrease in price is an indication of a decline in the popularity of the product. As the popularity declines, dealers lower the price in an attempt to attract new customers and sell the remaining inventory to the existing customers.

A decline in availability can also be seen in a decline in purity, which lasted from September 1992 to April 1993. Usually a decline in purity is related to a shortage of supply, but in this instance, the decline may be related to other factors. There may have been fewer cocaine users, forcing dealers to reduce the price. The lower prices lead to lower profits. This forced some dealers out of the market in search of higher profits. The remaining dealers maintained their profits by reducing the purity of cocaine. They may have bought the same amount of cocaine, but increased the number of units by reducing purity. The purity could remain low since there were fewer dealers and less competition.

A decline in availability, reflected in lower prices and purity, has also been seen in other indicators. Although it is a volatile number, the number of dealer seizures as well as the number and percentage of total laboratory submissions for cocaine declined over the same time period. The number and average amount of user seizures did not show a clear pattern.

Since April 1993, the patterns have been changing. Generally availability continues to decline, but at a slower rate. Prices have been rising while purity has stopped declining, and is fluctuating monthly between increases and decreases.

The number and average amount of user seizures remains stable, except for two anomalous months. Since April, the number of dealer seizures has been on the rise. There is no trend in the number and percentage of total laboratory submissions.

Chart 4 compares DC pretrial drug test data on the number of juveniles and adults testing positive for cocaine and the cocaine DAI. The drug test results do not distinguish between the use of

cocaine HCl and crack cocaine, since they are chemically identical.

The DAI increased from July 1990 through April 1991, followed by an overall decline in cocaine availability through September 1993. There was an increase in availability between June 1992 and December 1992. The number of juvenile and adult positives closely follow each other. The pattern resembles changes in the cocaine DAI. However, the number of positives seems to rise and fall before changes in the DAI.

Chart 5 attempts to adjust for this. The number of juvenile and adult positives is plotted in the month of occurrence, while the DAI is plotted three months in arrears. For example, the number of positives for June 1991 is plotted against the DAI for September 1991. The result is a much better fit between the DAI and the number of adult and juvenile positives, particularly since the summer of 1991.

This suggests that changes in the number of adult and juvenile positives for cocaine can be used as a leading indicator of changes in availability and the DAI. If this holds true, the data in Chart 5 suggest that cocaine HCl availability will rise in the future.

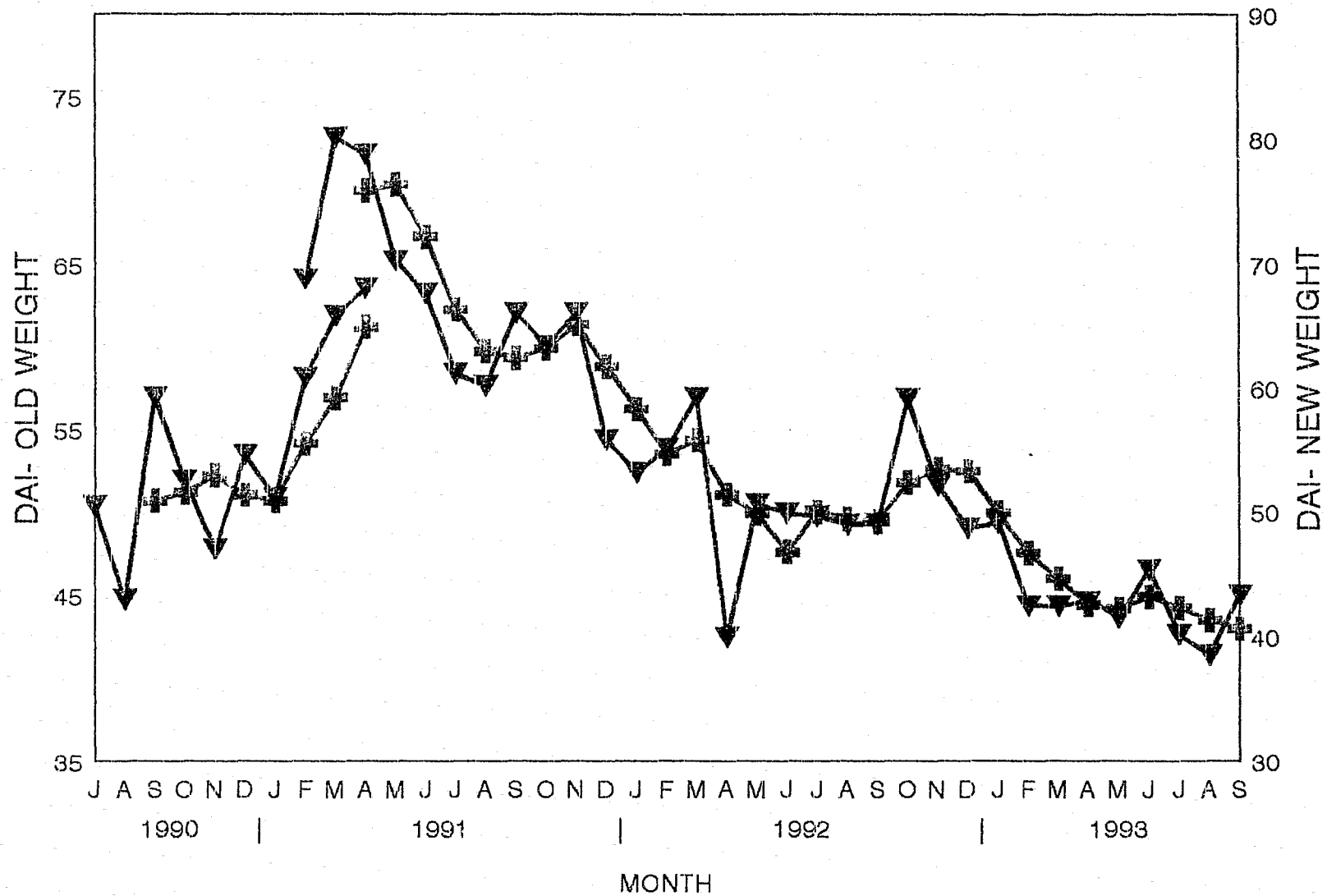
Table 2
Indicators for the Cocaine HCl Drug Availability Index
October, 1992 Through September, 1993

Indicator	Sep 93	Aug 93	Jul 93	Jun 93	May 93	Apr 93	Mar 93	Feb 93	Jan 93	Dec 92	Nov 92	Oct 92
Price, 1 Gr	82	101	85	81	87	66	70	81	83	92	87	91
Price, 1/2 Gr	45	53	61	42	44	38	38	43	44	48	45	46
Purity	61.3	49.1	54.4	66.7	55.8	52.5	58.6	59.9	62.6	66.1	69.4	79.2
Number, User Seizures	5	15	15	2	12	15	11	13	17	12	9	10
Ave Amt, User Seizures	0.13	0.48	0.32	0.09	0.37	0.32	0.16	0.66	0.12	0.46	0.60	0.25
Number, Dealer Seizures	10	6	5	8	4	5	3	6	13	4	9	12
Number, Non-MSP Lab Submissions	6	9	9	5	6	6	3	2	8	11	12	17
Percent of Total Non-MSP Lab Submissions	5.2	7.0	6.1	4.9	7.6	10.5	5.6	4.8	12.7	12.0	14.1	15.3
DAI	43.3	38.5	40.1	45.4	41.5	42.8	42.4	42.5	49.1	48.7	52.1	59.1
DAI - 3 Month Moving Average	40.7	41.3	42.3	43.2	42.2	42.6	44.7	46.8	50.0	53.3	53.4	52.4

CHART 3 - COCAINE DRUG AVAILABILITY INDEX (DAI)

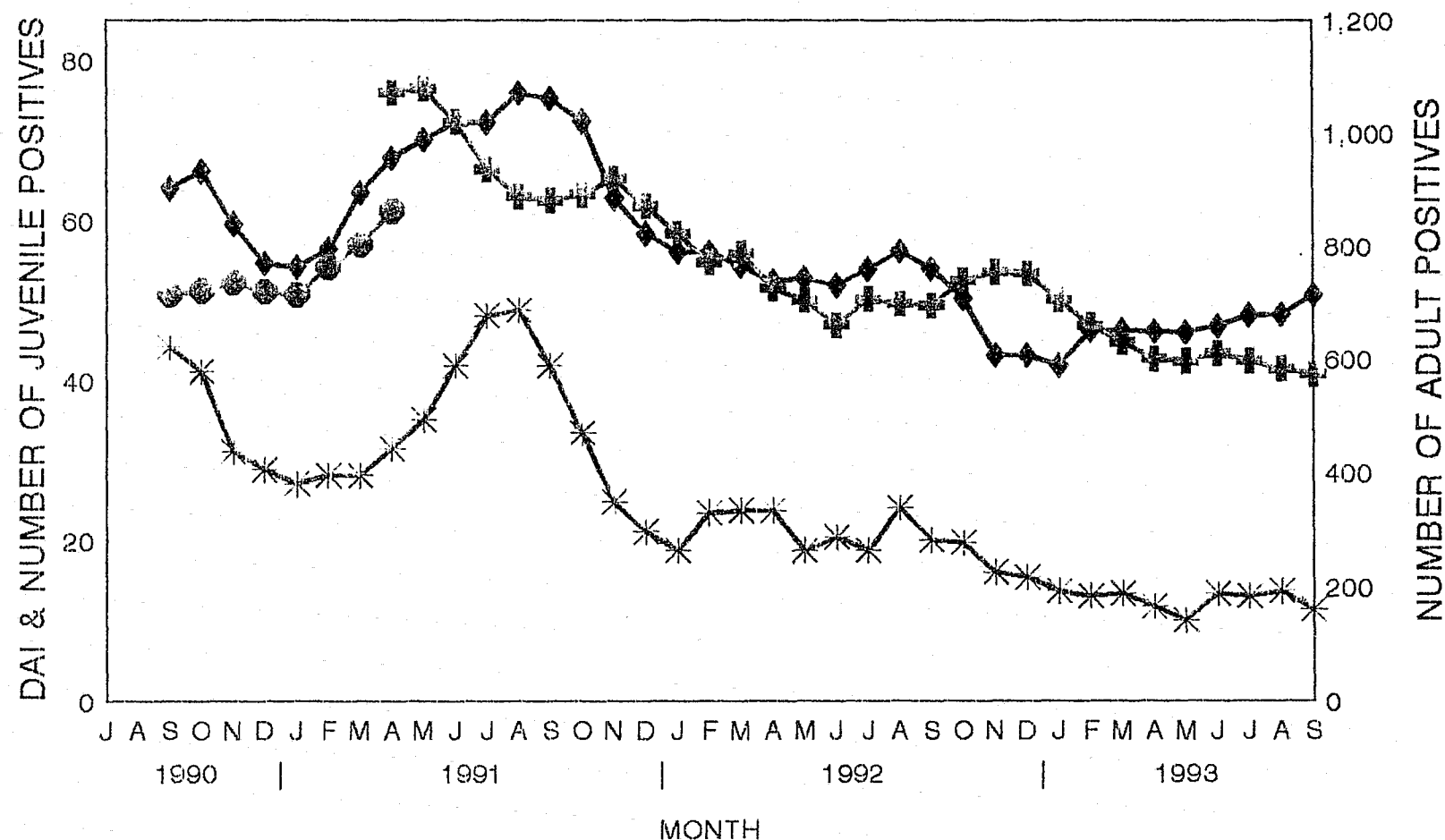
JULY 1990 TO SEPTEMBER 1993

MONTHLY DATA AND 3-MONTH MOVING AVERAGE



MONTHLY DATA IN BLACK, 3-MONTH MOVING AVERAGE IN RED
OLD WEIGHT ON LEFT SCALE, NEW WEIGHT ON RIGHT

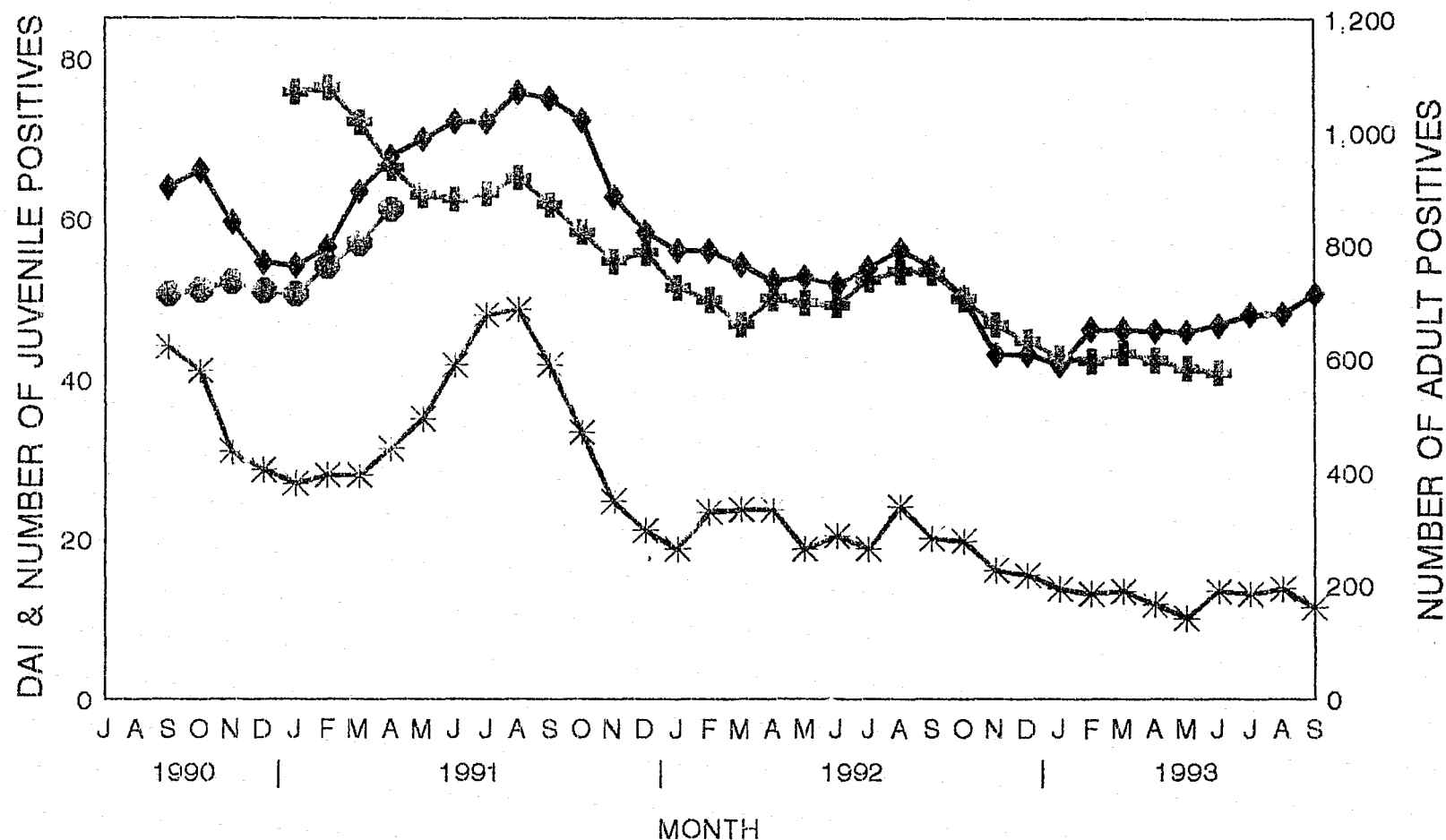
CHART 4 - COCAINE DRUG AVAILABILITY INDEX (DAI)
VERSUS DC PRETRAIL DRUG TEST DATA ON JUVENILES AND ADULTS
FOR NUMBER OF POSITIVES FOR COCAINE



● DAI, OLD WEIGHT ■ DAI, NEW WEIGHT * NUMBER, JUVENILE ◆ NUMBER, ADULT

NOTE: THE BREAK IN THE DAI DATA RESULTED FROM THE
INCLUSION OF ADDITIONAL DATA (LABORATORY SUBMISSIONS) IN THE INDEX

CHART 5 - COCAINE DRUG AVAILABILITY INDEX (DAI), 3 - MONTH ADJUSTED DATA
VERSUS DC PRETRAIL DRUG TEST DATA ON JUVENILES AND ADULTS
FOR NUMBER OF POSITIVES FOR COCAINE



● DAI, OLD WEIGHT ■ DAI, NEW WEIGHT * NUMBER, JUVENILE ◆ NUMBER, ADULT

NOTE- THE BREAK IN THE DAI DAT, RESULTED FROM THE
INCLUSION OF ADDITIONAL DATA (LABORATORY SUBMISSIONS) IN THE INDEX

Crack Cocaine Availability

Table 3 shows the indicators and the availability of crack cocaine for the last year, while Chart 6 shows the availability of crack cocaine for the last three and a half years. While crack availability declined for most of 1992, availability has been increasing since the beginning of 1993. This suggests a resurgence in the availability and popularity of crack cocaine.

The average amount received for purchases of crack was stable in October, November and December 1992. Generally, the amount received declined from January 1993 to April 1993. From October 1991 through May 1993, purity steadily declined. By May 1993, purity was 68 percent, 10 percentage points below the historical average. The amount received for purchases as well as purity then rose steadily from May 1993 through September 1993.

Generally, the number of seizures fluctuated within a narrow range, with no overall trend apparent. While the average amount of seizures is a volatile number, there appears to be a slight decrease until 1993, followed by an overall increase in 1993. The number of laboratory submissions shows the same general trend as prices, a small drop in January and February of 1993, then an almost steady rise until September 1993. The percentage of total submissions for crack has risen since the summer of 1992.

The crack cocaine DAI was also compared to the DC pretrial drug test data on juveniles and adults for the number of cocaine positives. This is shown in Chart 7. Again, the drug test does not distinguish between cocaine HCL and crack cocaine, since they are chemically identical.

The crack DAI rose to a peak around October 1991, then generally declined until April 1993. Since then, crack availability has been slowly, but steadily, rising.

The number of juvenile and adult positives closely follows each other and the crack cocaine DAI. The number of positives for both adults and juveniles peaked around the same time and followed the same gradual decline until February 1993. Since then, the number of juvenile positives has not changed significantly while the number of adult positives has steadily risen. This corroborates the idea that crack availability is increasing.

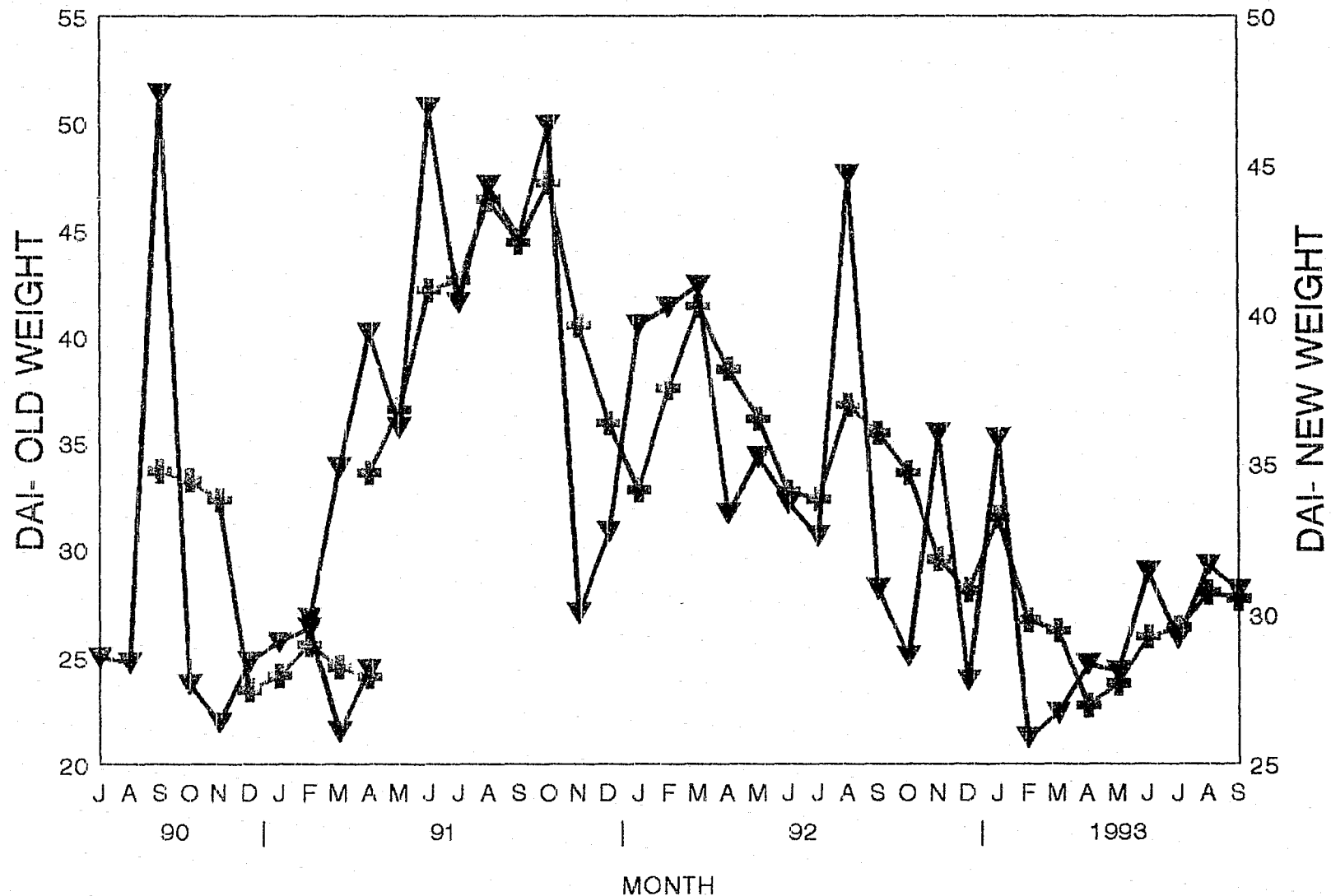
Table 3
Indicators for the Crack Cocaine Drug Availability Index
October, 1992 Through September, 1993

Indicator	Sep 93	Aug 93	Jul 93	Jun 93	May 93	Apr 93	Mar 93	Feb 93	Jan 93	Dec 92	Nov 92	Oct 92
Amount, \$20 Purchase	0.24	0.13	0.14	0.13	0.12	0.10	0.17	0.22	0.14	0.18	0.17	0.18
Amount, \$40 Purchase	0.30	0.41	0.27	0.32	0.24	0.28	0.30	0.36	0.34	0.22	0.22	0.25
Purity	78.2	77.3	72.7	74.9	68.4	72.5	70.3	73.2	78.2	77.4	79.0	83.4
Number, User Seizures	10	16	9	9	14	12	15	12	14	15	12	14
Ave Amt, User Seizures	34.6	26.3	35.9	52.6	85.5	21.1	25.6	11.7	93.3	11.3	130.0	32.8
Number, Non-MSP Lab Submissions	34	36	38	33	17	28	20	15	27	33	26	27
Percent of Total Non-MSP Lab Submissions	29.3	28.1	25.7	32.0	21.5	49.1	37.0	35.7	42.9	35.9	30.6	24.3
DAI	30.8	31.6	29.2	31.4	28.1	28.3	26.7	25.9	35.8	27.8	36.0	28.6
DAI - 3 Month Moving Average	30.5	30.7	29.6	29.3	27.7	27.0	29.5	29.8	33.2	30.8	31.8	34.7

CHART 6 - CRACK COCAINE DRUG AVAILABILITY INDEX (DAI)

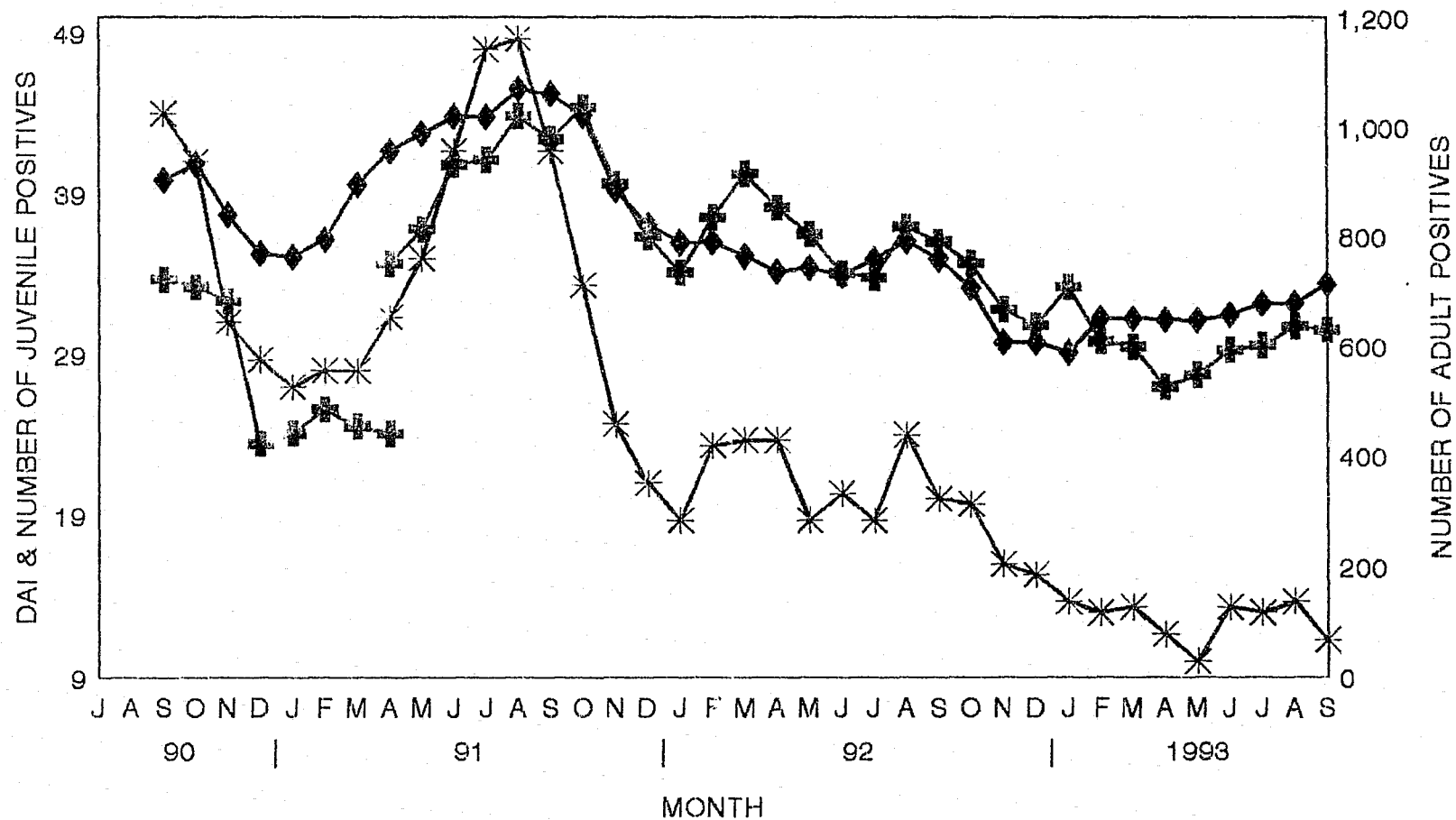
JUNE 1990 TO SEPTEMBER 1993

MONTHLY DATA AND 3-MONTH MOVING AVERAGE



MONTHLY DATA IS IN BLACK, 3 - MONTH MOVING AVERAGE IN RED
OLD WEIGHT ON LEFT SCALE, NEW WEIGHT ON RIGHT

CHART 7 - CRACK COCAINE DRUG AVAILABILITY INDEX (DAI)
VERSUS DC PRETRIAL DRUG TEST DATA ON JUVENILES AND ADULTS
FOR NUMBER OF COCAINE POSITIVES



SYMBOLS

⊕ DAI, OLD WEIGHT ⊞ DAI, NEW WEIGHT * NUMBER, JUVENILE ◆ NUMBER, ADULT

NOTE: THE BREAK IN THE DAI DATA RESULTED FROM THE INCLUSION OF
OF ADDITIONAL DATA (LABORATORY SUBMISSIONS) IN THE INDEX

State of Maryland
William Donald Schaefer, Governor
Melvin A. Steinberg, Lt. Governor

**Department of Public Safety
and Correctional Services**
Bishop L. Robinson, Secretary