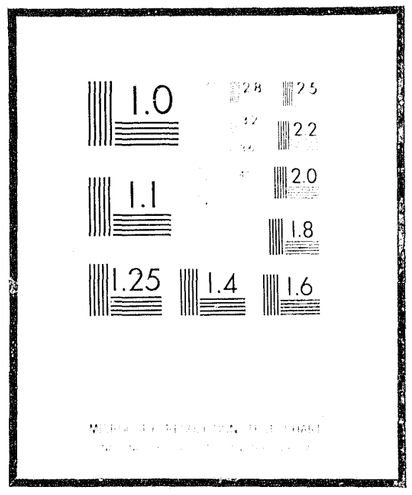

USING TIME SERIES ANALYSIS TO EVALUATE THE IMPACT OF TEAM POLICING

A Discussion Paper for the Charlotte Police Department

December 6, 1973

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This paper discusses several issues involved in deciding whether time series should be used as the basis for evaluating the impact of team policing: (1) When should time series be considered as a way of evaluating police programs? (2) How can short-range forecasts serve as a standard for evaluating team policing? (3) What problems need to be considered in comparing actual data with short-range forecasts? (4) How can a likely range of variance be established for a short-range forecast? (5) How can a decision be made as to whether there has been a real change in the time series attributable to team policing?

A time series is a group of data organized chronologically. For example, the number of burglaries reported to the Charlotte Police Department for each month from 1963 to 1973 is a time series. In working with time series, one should keep in mind that statistical techniques developed for this purpose assume that whatever patterns existed in the past will continue into the future and that forecasts based upon a time series project the past pattern into the future. In fact, the accuracy of such predictions is much more likely to be good in the short term, say, three to six months, than it is in the long term, say, over two years.

When Should Time Series Be Considered as a Way of Evaluating Police Programs?

In evaluating the impact of a program, we want to be able to determine the difference between the results of the program and what would have occurred if the program had not been implemented. A good way to test the results of a new program would be to try the program out in some districts but not in others. If the ten districts were randomly split into two groups and the program was implemented in one of the groups while the other group of districts was designated as a control group, then it might be assumed that

the differences between the two groups of districts in the amount of change in a program indicator between the time the program started and the subsequent point in time, say six months or a year, could be attributed to the new program. Before-and-after tests comparing control and experimental groups are easier to interpret than are results based solely upon time series.

But in cases where a new program must be implemented citywide, making it impossible to use control groups, it might be helpful to look at time series of phenomena that the program is designed to affect in determining whether a change occurred. Although use of a time series may be the next best thing to using a control group, being able to show that there was a change in a time series does not necessarily mean that the change was caused by the new program. Problems in isolating change and in attributing change to a given program are discussed below.

How Can Short-Range Forecasts Serve as a Standard for Evaluating Team Policing?

If a purpose of team policing is to reduce crime, then looking at the amount of crime over time may be a useful indicator of one of the program's impacts. For purposes of discussion, we will consider time series on reported offenses for three crimes - burglary, larceny, and robbery. Since the Police Department routinely summarizes by month and by crime type the offenses reported to it, it would be easy to construct time series reflecting reported offenses during the period that team policing was in effect. What is not easy is constructing a time series showing the number of offenses that would have been reported had team policing not been in effect. It is possible, however, to base a short-range forecast upon a time series reflecting the patterns that existed before team policing was implemented. The

forecast assumes that whatever caused a particular level of crime and pattern of crime over time in the past will continue to influence crime in the same manner in the future. If we are willing to make this assumption, then we can use the forecast as the estimate of the amount of crime that would have occurred in the absence of team policing.

In forecasting, it is usually helpful to look at the change in a time series and break the change down into different types. The most common types of change are long-range trend (trend-cycle), seasonal variation, and irregular factors. The trend component reflects those factors that are stable over a period of several years. For the four offenses considered here, the trend has been upward for the past ten years. For larceny under $50.00, the average increase has been about 7% a year; for robbery the average annual increase has been about 29%*. A seasonal variation is a change that occurs within a single year but repeats itself from year to year with some regularity. For burglary in Charlotte, the peak months are August, December, and January. February, March, and April are low months. The third type of change is reflected in the irregular component of the time series. These unpredictable changes might include factors such as riots, inconsistencies in reporting procedures, power failures, or a temporary crackdown on truants.

Table 1 shows the relative importance of these three components to the change that occurred during a ten-year period for reported burglaries and larcenies under $50.00. For a short period of time (three months), the seasonal variation contributed 35% of the variation in the case of

*The X-11 Seasonal Adjustment Program, developed by the U. S. Bureau of the Census, was used to produce the statistics included in this paper. A multiplicative relationship (the components are related to each other) was assumed. An additive relationship would mean that the components are independent of each other.

Table 1

Relative Contribution of Time Series Components to Change in Reported Offenses for Charlotte-Mecklenburg, North Carolina - 1963-73

	Burglary		
Component	3-Month Span	6-Month Span	12-Month Span
Trend-cycle	18%	46%	75%
Seasonal	35	26	0
Irregular	47	28	25
	Larceny under $50		
Trend-cycle	18%	36%	63%
Seasonal	47	45	0
Irregular	35	19	36

burglary and 47% in the case of larceny under $50.00. Since seasonal variation repeats itself each year, when a longer time span of twelve months is considered, the contribution of seasonal variation to annual change amounts to zero. During a twelve-month span, the irregular component accounted for one fourth of the variation in the burglary series and a third of the variation in the larceny under $50.00 series.

In forecasting reported offenses, we will in all cases want to take into account the trend-cycle. The trend-cycle component enables us to estimate an average increase and to break this down by year, quarter, or month. If we are interested in short-range predictions of less than a year, then we will also want to take into consideration seasonal variations for those offenses that have a stable seasonal pattern. The seasonal pattern was determined to be stable at the 99% confidence level for burglary and for larceny under $50.00. It was determined to be stable, at the 95% confidence level (but not at the 99% confidence level), for robbery and larceny over $50.00. This means that there is a 5% chance that what appears to be a stable seasonal variation for robbery and larceny over $50 is not really a seasonal variation.

Seasonal variation is expressed as a percentage of an estimate based on trend-cycle alone. Table 2 shows the seasonal factors derived for reported burglaries for 1972. For January the seasonal factor is 106.9%. If we knew the estimate for January based on the trend-cycle, then we could obtain a seasonally adjusted estimate by multiplying the trend estimate times 106.9%. Figure 1 shows seasonally adjusted estimates for the last half of 1973. These estimates are based upon the pattern contained in the time series for reported burglaries from January 1963 through June 1973 (Figure 2). The average increase attributable to the trend-cycle component for a six-month period was 5.78%. By multiplying

Table 2

Seasonal Variation for Reported Burglaries for 1972
Charlotte-Mecklenburg, North Carolina

Month	Actual Number of Burglaries	Trend-Cycle	Seasonal Factor
January	532	500	106.9%
February	463	499	90.2
March	470	495	96.2
April	434	487	92.3
May	496	479	98.8
June	372	474	96.5
July	486	472	103.7
August	508	475	110.2
September	464	481	98.2
October	530	489	101.5
November	452	497	94.4
December	572	506	110.8

FIGURE 1

Estimated Number of Reported Burglaries Based Upon Actual Offenses from
January 1963 through June 1973
Charlotte-Mecklenburg, N. C.

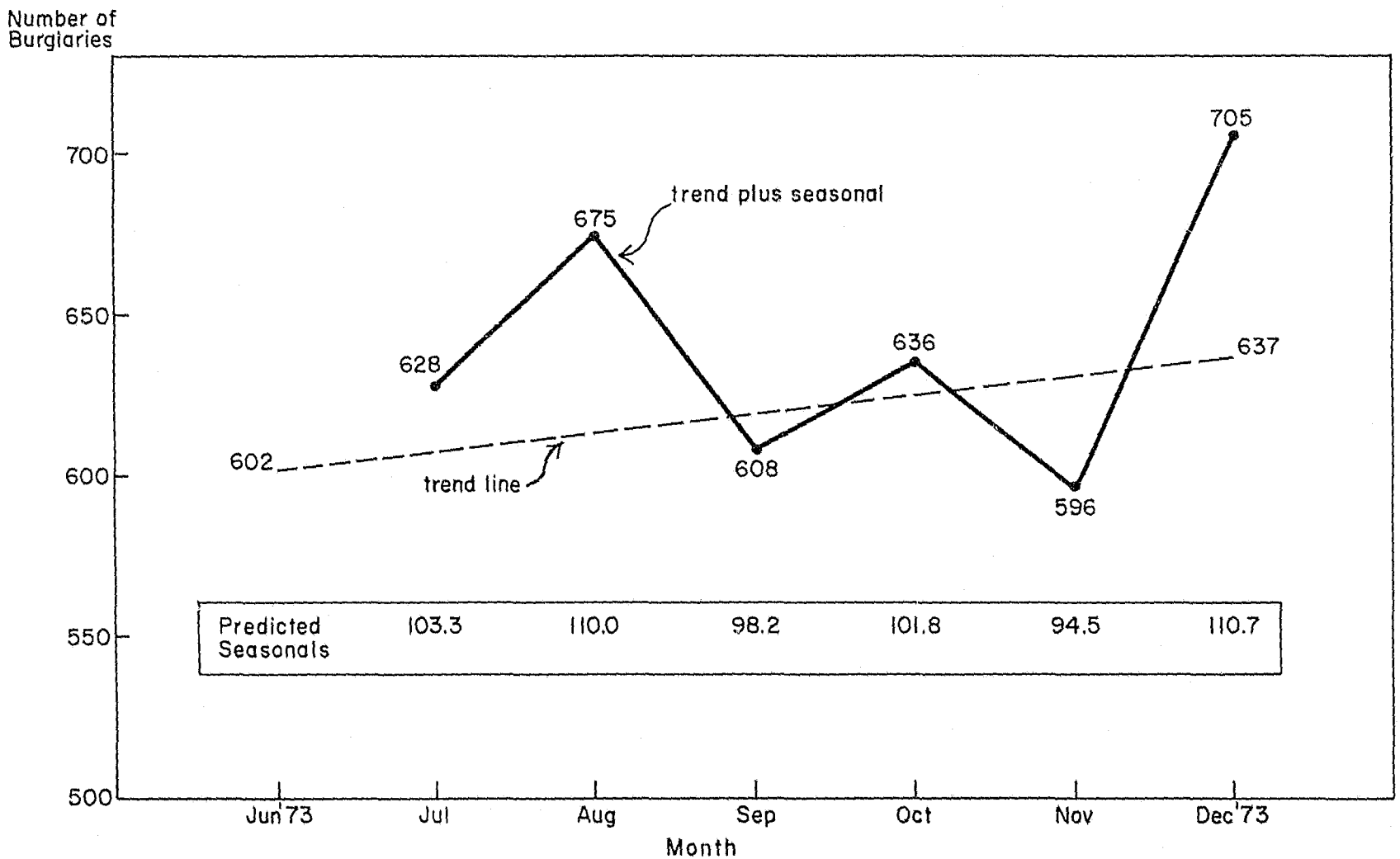


Table 3

SEASONALLY ADJUSTED ESTIMATE OF REPORTED BURGLARIES FOR JULY THROUGH DECEMBER, 1973 (BASED UPON ACTUAL OFFENSES FROM JANUARY, 1963 THROUGH JUNE, 1973) CHARLOTTE-MECKLENBURG, NORTH CAROLINA

Month	Trend-cycle Estimate	Predicted Seasonal	Seasonally Adjusted Estimate
July	608	103.3	628
August	614	110.0	675
September	619	98.2	608
October	625	101.8	636
November	631	94.5	596
December	637	110.7	705

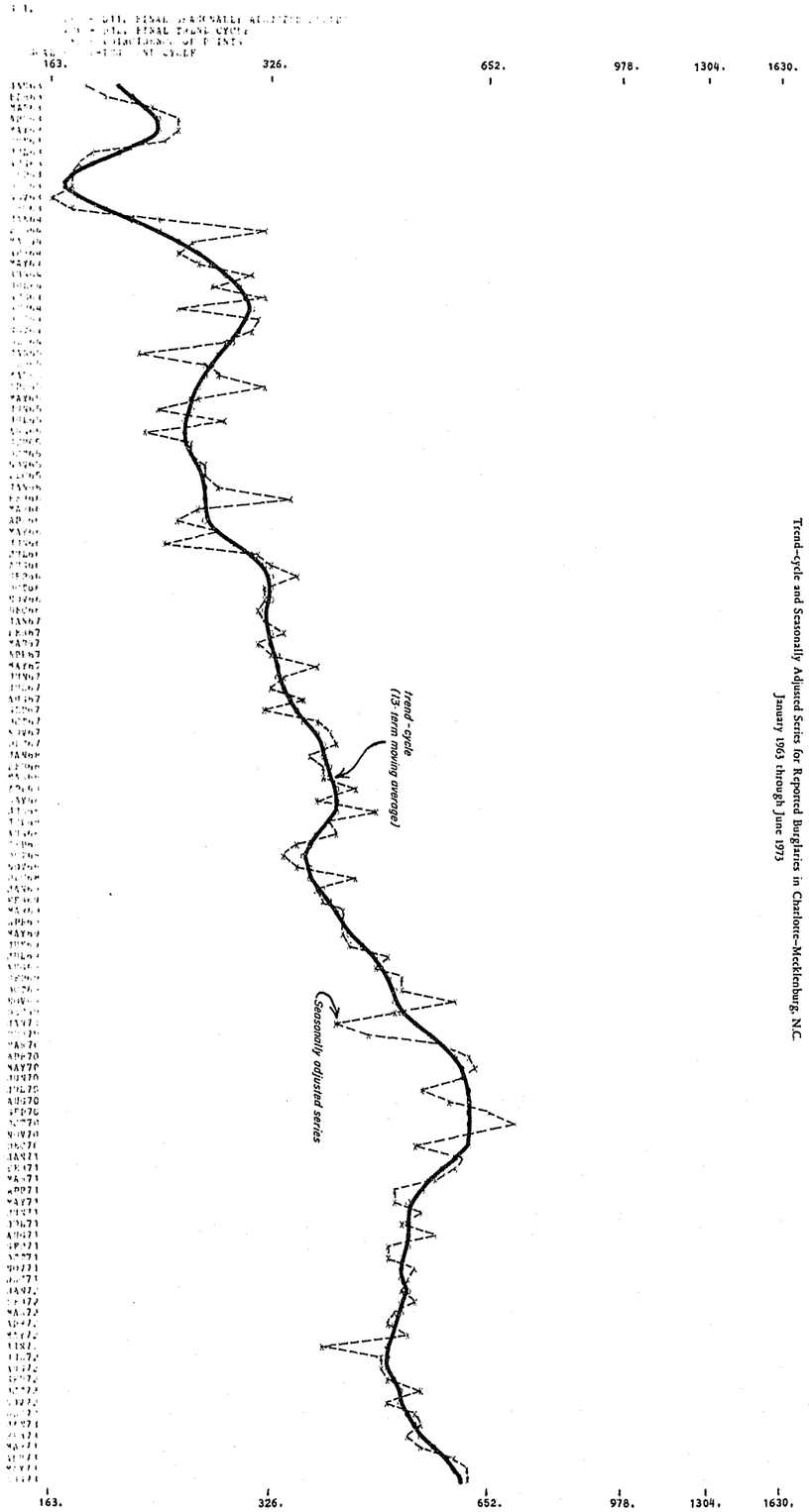


FIGURE 2
Trend-cycle and Seasonally Adjusted Series for Reported Burglaries in Charlotte-Mecklenburg, N.C.
January 1963 through June 1973

this average trend-cycle increase times the trend figure for June 1973 (602), we obtain an estimated increase of 35 burglaries per month by December 1973. Figure 1 shows the estimated trend line running from 602 burglaries in June 1973 to 637 burglaries in December 1973. To obtain the seasonally adjusted estimate for each month we multiply the trend estimate for that month times the predicted seasonal factor. For July 1973 the trend-cycle estimate is 608 burglaries. Multiplying this figure by 103.3% yields a seasonally adjusted estimate of 628 burglaries. It can be seen from Figure 1 that seasonal adjustments are important if estimates are needed for individual months rather than for an average month.

The six-month forecast illustrated above could serve as a standard for evaluating a new program begun in July, 1973. The same method could be used to derive a seasonally adjusted forecast for larceny under $50.00. A simple trend estimate might be more reliable for those offenses not having a stable seasonal pattern. Both the simple trend method and the seasonally adjusted method of forecasting ignore the irregular component of a time series. Problems that must be faced in dealing with the irregular component are discussed below.

What Problems Need to Be Considered in Comparing Actual Data with Short-Range Forecasts?

Table 4 compares a seasonally adjusted forecast for burglary based on a ten-year time series with the actual number of reported burglaries for the first six months in 1973. Note that the predicted number of burglaries for February and March is quite close to the actual number, but the predictions for April, May, and June are less accurate. For

Table 4

SIX-MONTH FORECAST OF REPORTED BURGLARIES BASED UPON TIME SERIES FOR JANUARY, 1963 THROUGH DECEMBER, 1972
CHARLOTTE-MECKLENBURG, NORTH CAROLINA

Month in 1973	Predicted Trend Estimate	Predicted Seasonal Factor	Seasonally Adjusted Forecast	Actual Number of Reported Burglaries	Difference Between Forecast and Actual	
					No.	%
January	509	104.7	533	568	+ 35	6.2
February	514	90.0	463	461	- 2	0.4
March	518	97.3	504	504	0	0
April	523	91.8	480	538	+ 58	10.8
May	527	98.2	518	598	+ 80	13.4
June	532	96.1	511	584	+ 73	12.5

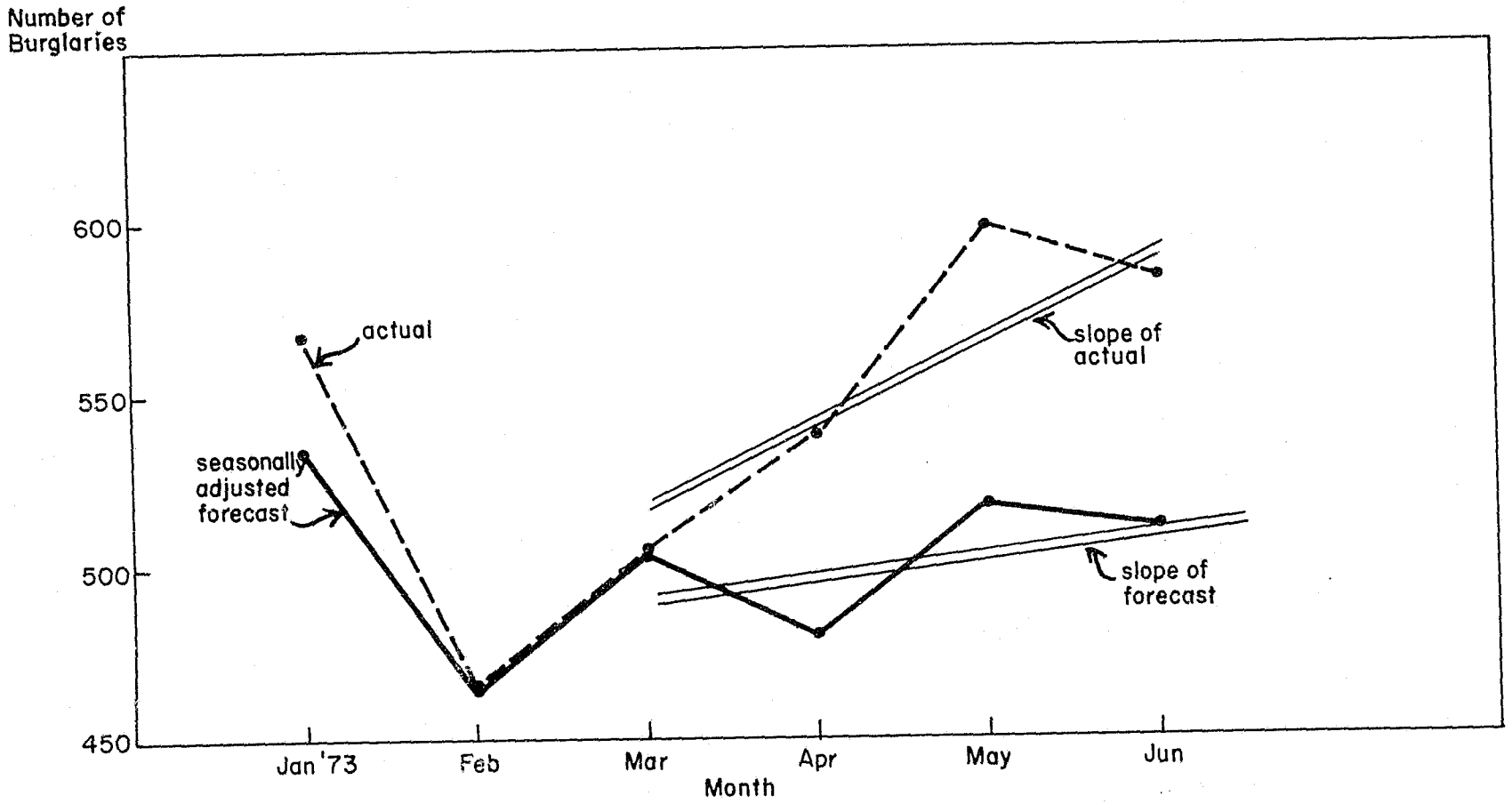
these three months the forecast is between 10 and 13% below the actual number of burglaries reported. This section of the paper concerns itself with the sorts of events that can cause errors of this sort in forecasting based on time series.

Provided there is no shift in the seasonal variation, there are generally two types of events that would cause a forecast to diverge from the actual number of offenses. Divergencies may be caused by a temporary disturbance in the time series or by a change in the slope of the trend line. Looking at Figure 3, we can see that the divergencies between forecast and actual offenses for April, May, and June may signal a shift in the slope of the trend line. The actual figures are consistently higher than the forecast figures, suggesting that something may have happened that will in future months continue to affect the long-range trend. What could cause the trend line to shift? There are many events that might occur that would continue to exert a fairly stable influence on the number of reported offenses for a period of years. A few possibilities might be a change in police morale, a change in the public attitude toward crime reporting, the onset of an economic depression, or the implementation of a new crime prevention program. If team policing made a substantial impact upon the number of offenses reported, we would in future months expect to see a change in the slope of the trend line.

Team policing is but one factor that might affect the time series during the next year. The data used in this paper to illustrate the use of time series represent total reported offenses for both the city of Charlotte and Mecklenburg County. If figures for only the city were considered, then annexation of a substantial portion of a county population to the city would be expected to cause a jump in the city series

FIGURE 3

Comparison of Six-Month Forecast with Actual Number of Burglaries
January through June 1973
Charlotte-Mecklenburg, N. C.



but probably not a change in the slope of the trend line.

Team policing itself could affect the series of reported offenses in an unexpected manner. If team policing changed attitudes of the public toward the police and toward crime prevention, the effect might be to increase the percentage of actual offenses that are reported to the police. Is it possible for a change in the reporting rate to materially affect the total number of offenses reported? Table 5 gives the percentage of offenses that respondants in victimization surveys said they reported to the police. Although the Charlotte survey is based upon too few households to form a stable estimate, let us for purposes of illustration assume that 70% of the Charlotteans report to the police burglaries that occur in their homes. Assume further that, as a result of the team policing program, the rate of the reported burglaries increases from 70% to 80%. Since 51% of burglaries in Charlotte are residential and 49% are nonresidential,* about 298 of the 584 burglaries reported to the police in June, 1973 would have been residential burglaries. If these 298 burglaries represent 70% of total residential burglaries, then there would have been 425 residential burglaries including those reported and those unreported. A change from a 70% to an 80% reporting rate would increase the number of residential burglaries reported from 298 to 340, or an increase of 42 burglaries for the month of June. These 42 burglaries would increase the actual number of reported burglaries from 584 to 626, or an increase of 7%. It is possible then, that reductions in real crime due to more effective police work could to some extent be offset in a time series of reported crimes if the proportion

*Stevens H. Clarke, Burglary and Larceny in Charlotte-Mecklenburg: A Description Based on Police Data (Chapel Hill, North Carolina: Institute of Government, October 12, 1972), Table 1.

Table 5

PERCENTAGE OF OFFENSES REPORTED TO POLICE BASED UPON VICTIMIZATION SURVEYS

Offense	Percentage of Total Offenses Reported to Police		
	National Survey* (N = 10,000 households)	Charlotte Survey** (N = 133 households)	Dayton Survey*** (N = ?)
Stranger-to-stranger robbery	65%[a]	100%	79%
Robbery of business or institution			92
Non-stranger robbery	65[a]		71
Residential burglary	58	70	57
Business burglary			85
Other theft (except auto)	60 (over $50) 37 (under $50)	53	34
Forgery/worthless checks	26	25	
Consumer fraud	10	9	

[a]Not shown separately

*Philip H. Ennis, Criminal Victimization in the United States (Chicago: National Opinion Research Center, University of Chicago, May, 1967, p. 42).

**Survey conducted by the Institute of Research in Social Science, University of North Carolina at Chapel Hill, 1971.

***Dayton-Montgomery County Pilot Cities Program, Crimes, Victims, and Offenders: A Community Study; Appendix (Dayton, Ohio: Community Research Incorporated, October, 1973), pp. 24-25.

of total crimes reported were to change.*

A second type of event that might influence a time series is that class of events that make up the irregular component of the series. These events occur erratically and are of short duration. They may act either to increase or decrease the actual number of reported offenses below or above the offenses forecast. By their very nature these events are almost impossible to predict. For the burglary series from 1963 through 1972 the average month-to-month change in the irregular component amounted to 9%. During a six-month period, taking into account the fact that some of these changes were above the trend line and others were below the trend line, the average change over a six-month period was only .76%. Although variations due to the irregular component can seriously affect our ability to adequately forecast a particular month, over a period of several months this impairment is much less serious because the irregular variations tend to offset each other.

How Can a Likely Range of Variance Be Established for a Short-Range Forecast?

In evaluating the impact of team policing, we would want to know whether there has been a downward shift in the trend line of reported offenses and whether this downward shift was caused by team policing. If the shift in the trend line is large compared to the variance established for the forecast, such a shift can be seen by looking at a

*Citizen surveys could be used to monitor the percentage of crimes reported, but such surveys are expensive. It might be possible to devise a combination of indirect measures, such as the opinions of policemen and other groups who are aware of citizen concerns, of whether the reporting rate changes.

diagram similar to that of Figure 3. If the shift is small relative to the variance, mathematical techniques are available for determining whether a shift occurs. But the problem in either case is first to establish a variance or a range around the forecast. The size of this range depends upon the amount of uncertainty we have to deal with when considering seasonal variation and irregular variation.

Figure 4 shows a seasonally adjusted forecast for the last six months of 1973. The top and bottom dashed lines delimit a plus or minus 9% variation, which is the average percentage change for burglaries attributable to the irregular component. In 1974, we could plot the actual data on the same graph in order to compare it with the forecast. If there has been no change in the slope of the trend line, we would expect about half the data points for the actual series to fall inside the dashed lines. We would also expect about half the data points to be above the seasonally adjusted forecast line and the other half below. If the actual line ran either consistently above or consistently below the seasonally adjusted forecast, we would have reason to suspect a change in the slope of the trend line. Looking back at Figure 3, we can see that starting with April the data points are consistently above the seasonally adjusted forecast. Continuation of this pattern during the last six months of 1973 would be a pretty good indication of a change in the trend line.

It is possible to determine statistically whether the sequence of positive and negative deviations from the seasonally adjusted forecast is random in nature. For the first six months of 1973, there are five deviations on the high side and one zero deviation, forming the following pattern: + + 0 + + +. For series that are at least nine months in length, tables have been constructed that may be used to determine, at

FIGURE 4

Forecast of Reported Burglaries with Range (Based Upon Actual Offenses from January 1963 through June 1973)
Charlotte-Mecklenburg, N. C.

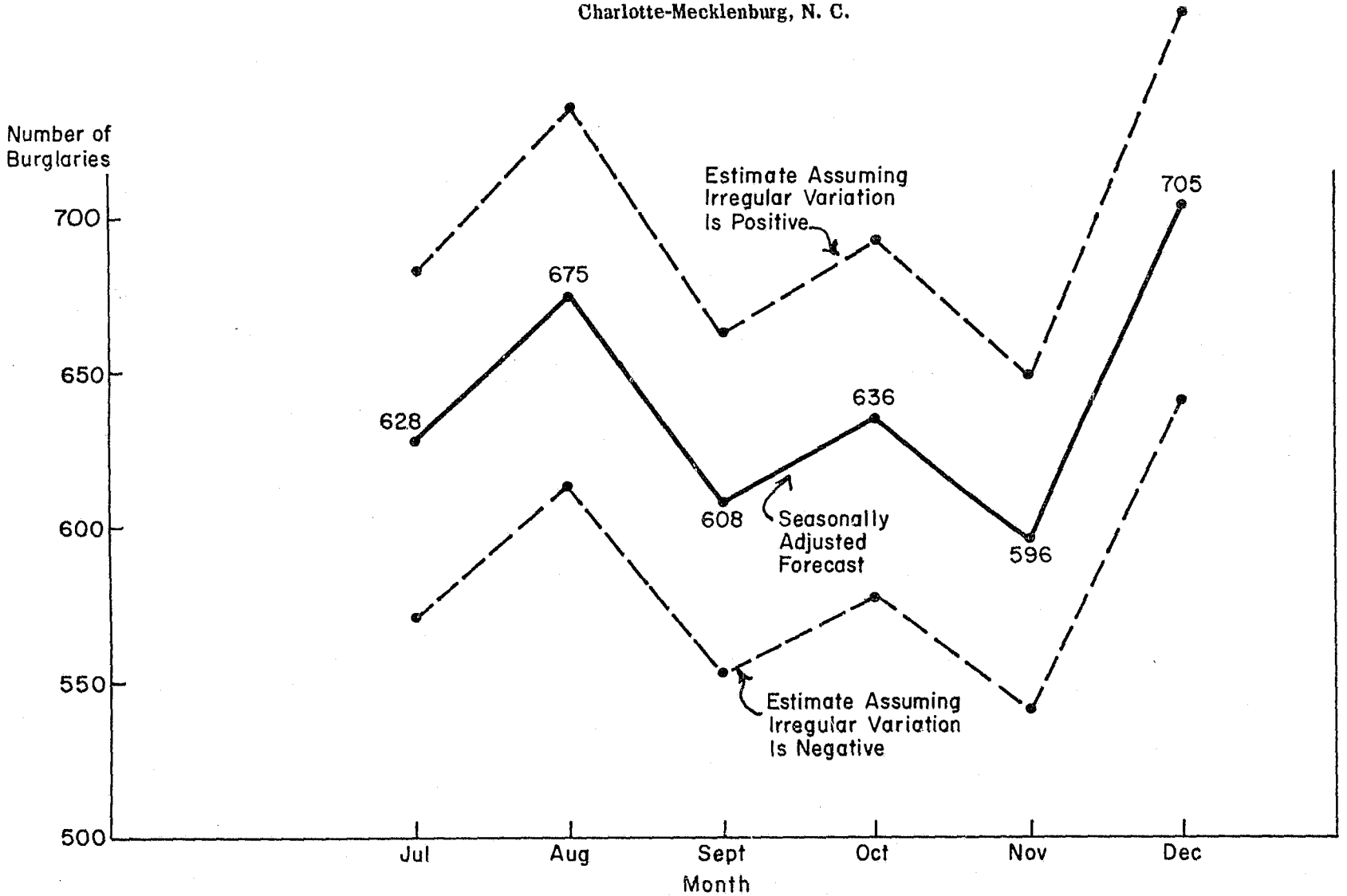


Table 6

SIX-MONTH FORECAST OF REPORTED BURGLARIES INCLUDING ESTIMATE FOR IRREGULAR VARIATION BASED UPON TIME SERIES FOR JANUARY, 1963 THROUGH JUNE, 1973
CHARLOTTE-MECKLENBURG, NORTH CAROLINA

Month in 1973	Seasonally Adjusted Forecast	Expected Average Irregular Variations	Seasonally Adjusted Forecast Bounded by Irregular Variation	
			High Estimate	Low Estimate
July	628	± 9%	684	571
August	675	± 9%	736	614
September	608	± 9%	663	553
October	636	± 9%	693	579
November	596	± 9%	650	542
December	705	± 9%	768	642

the 95% confidence level, whether the pattern of deviations is random.*

How Can a Decision Be Made as to Whether There Has Been a Real Change Attributable to Team Policing?

The steps required to assemble the information needed for determining whether or not there was a change in the time series and whether or not this change was attributable to team policing rather than to other factors are summarized below.

(1) Select the most appropriate time series to look at. Four series are included in this discussion paper, but burglaries, robberies, and larcenies may not be the crimes upon which team policing is expected to have the greatest impact. For any program indicator that is selected, we must be able to compile previous monthly statistics for a period of several years.

(2) Analyze the time series to determine the relative contribution of trend-cycle, seasonal, and irregular components to the variance in the total series.

(3) Develop a seasonally adjusted forecast bounded by the average monthly irregular variation.

(4) Decide how much risk you are willing to accept that the statistics will indicate a change when there actually was no change - 1%? 5%? 10%? These risk levels correspond to the 99%, 95%, and 10% confidence levels, respectively. The 99% and 95% confidence levels are most commonly used in the social science literature, but there appears to be no compelling reason for doing so.

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*See, for example, Edward J. Kane, Economic Statistics and Econometrics (New York: Harper and Row, 1968), pp. 422-3.

(5) Implement team policing.

(6) Compare the forecast with actual monthly data to determine whether there was a change in the slope of the trend line.

(7) List other events that might have substantially influenced the time series and that occurred at the same time that team policing was in effect. Decide whether the effects of these events would have been to increase or decrease the monthly totals and whether the effects were one-time disturbances in the series or changes in the trend line.*

Having completed these seven steps, we would have a forecast showing what the series would have been if the pattern of the past had continued; we would know the actual monthly totals; and we would know what events occurred in addition to team policing that might have influenced the size of these monthly totals. The final decision as to whether any change in the slope of the trend line was caused by team policing and not some other factor could not be determined statistically but rather would be based upon judgment.

Conclusion

Time series analysis may help in evaluating the impact of team policing, but the results will not be as clear-cut as they would be if experimental and control groups were used. When using a time series analysis without experimental and control groups, any attribution of cause must be based solely upon judgment.

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*These decisions depend upon one's judgment. One way of making such a judgment would be to pool the judgments of a small group of people who are familiar with the time series and the factors that influence it.

APPENDIX

Figures

Tables

Burglary

Larceny under $50

Larceny over $50

Robbery

Figure A

OFFENSES REPORTED TO CHARLOTTE-MECKLENBURG POLICE
QUARTERLY, 1964 - 1973

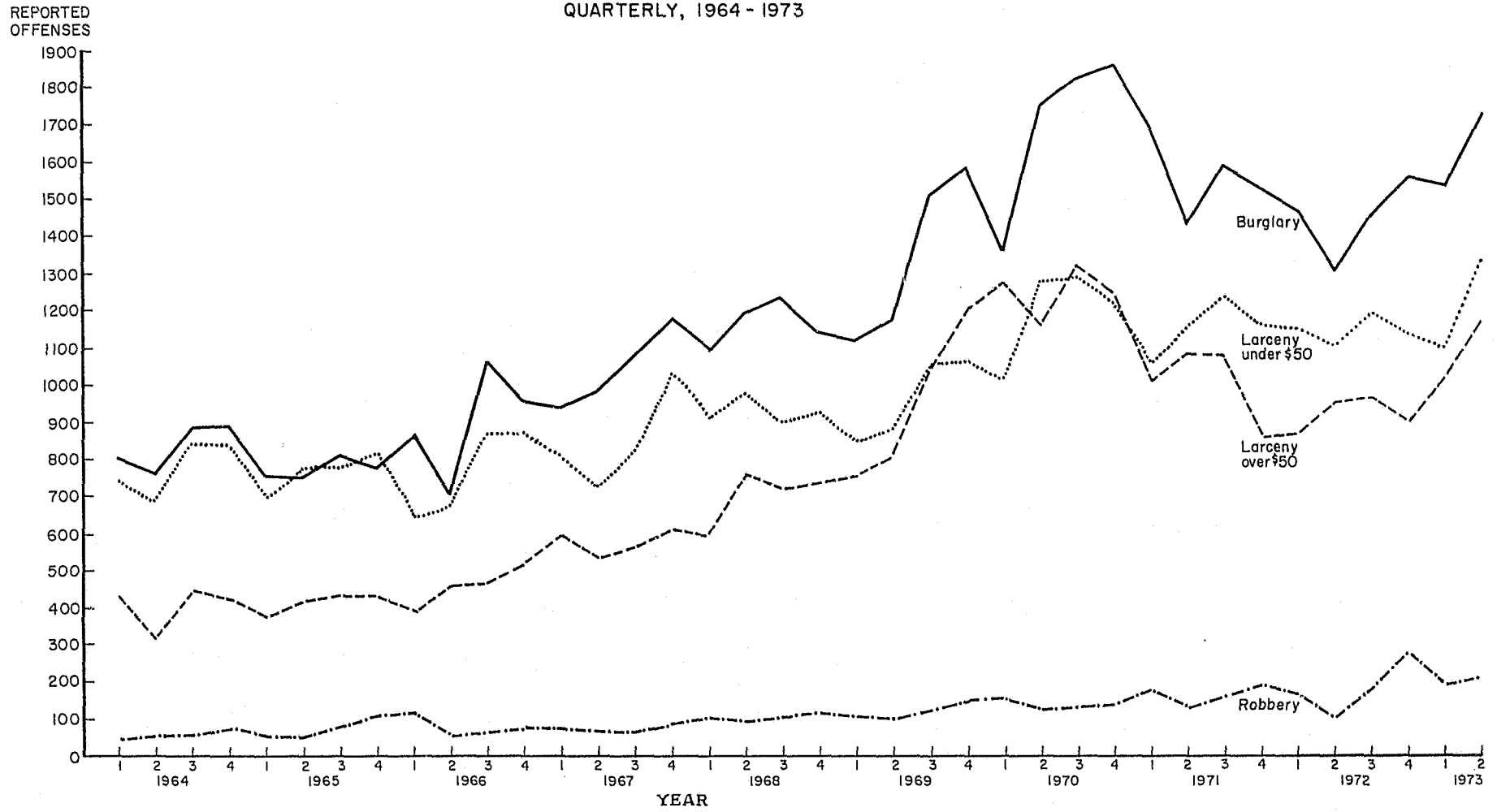


Figure 8

OFFENSES REPORTED TO CHARLOTTE-MECKLENBURG POLICE
AND CRIME SUSCEPTIBLE POPULATION,
QUARTERLY, 1964 - 1973

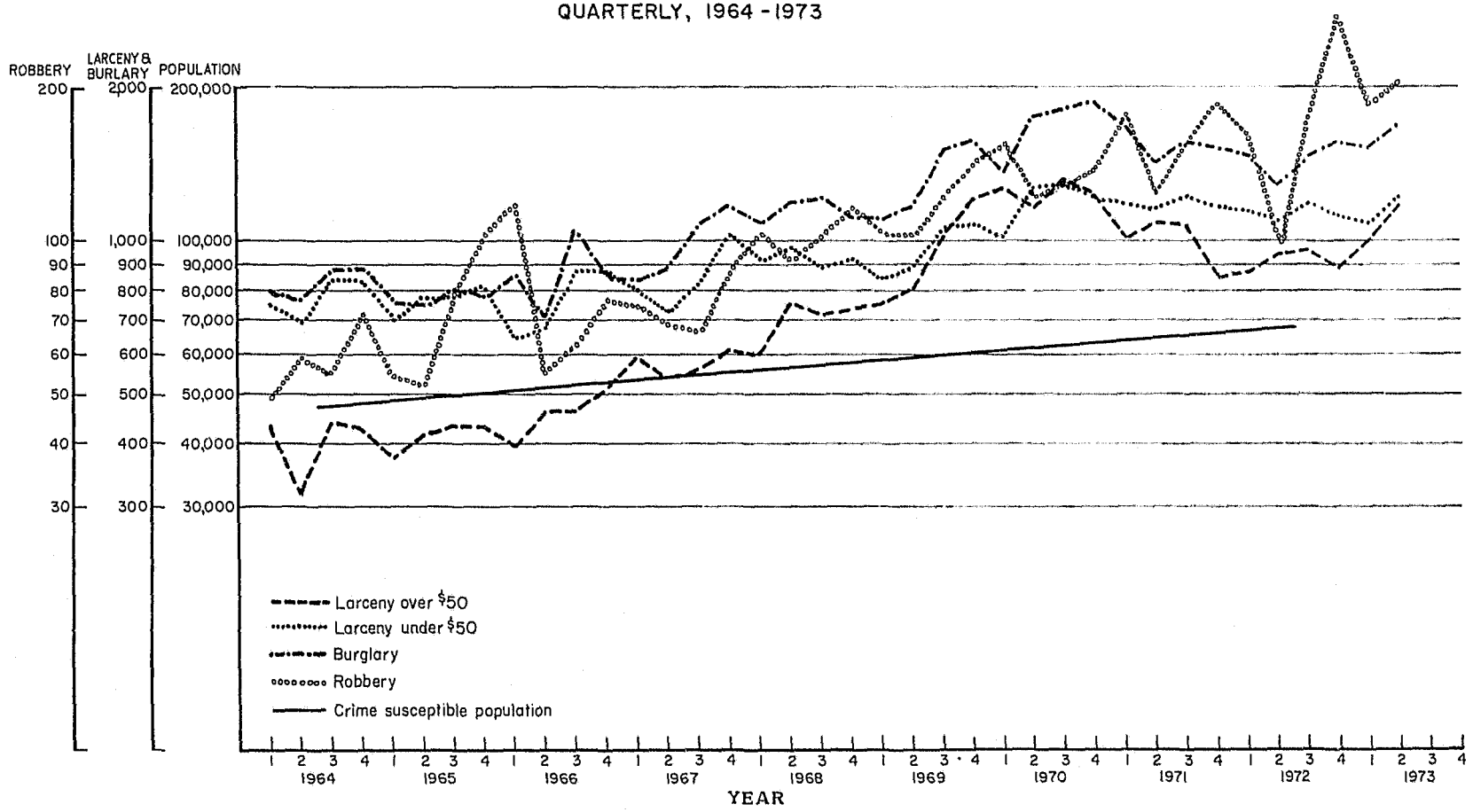


FIGURE C

Trend-cycle and Seasonally Adjusted Series for Reported Larcenies under $50
in Charlotte-Mecklenburg, N.C.
January 1963 through June 1973

FIGURE D

Trend-cycle and Seasonally Adjusted Series for Reported Larcenies over $50
in Charlotte Mecklenburg, N.C.
January 1963 through June 1973

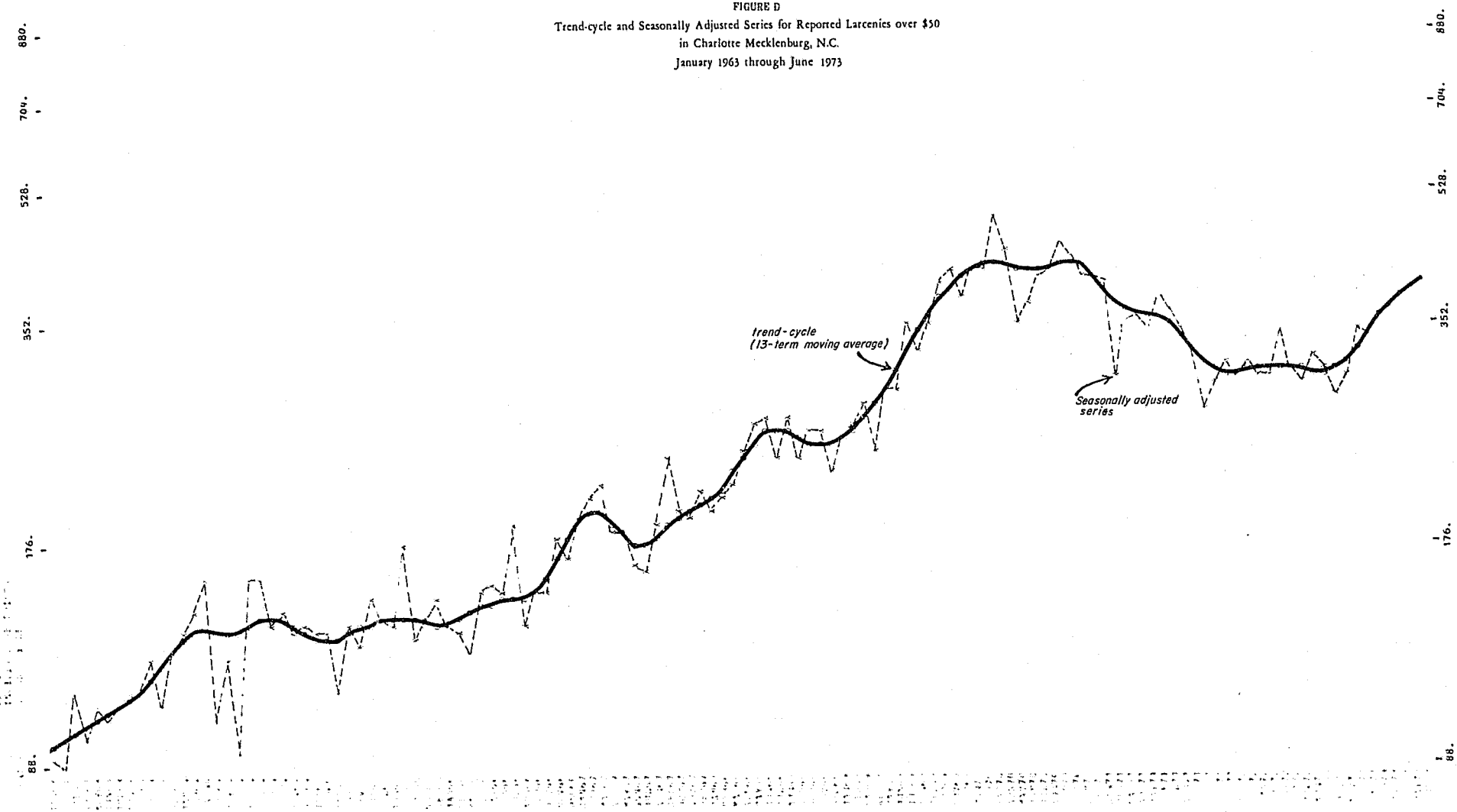
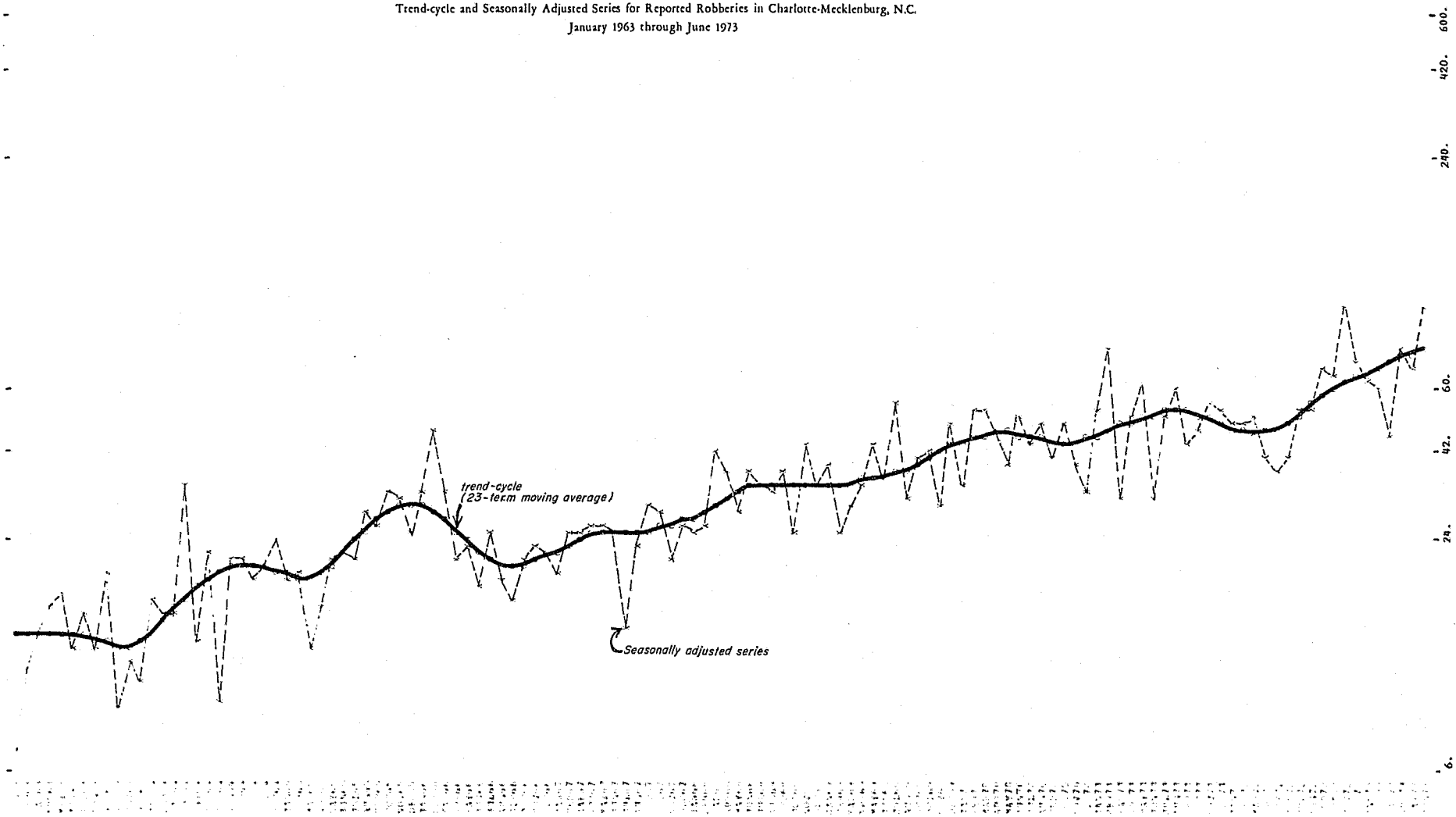


FIGURE E

Trend-cycle and Seasonally Adjusted Series for Reported Robberies in Charlotte-Mecklenburg, N.C.
January 1963 through June 1973



B 1. ORIGINAL SERIES -BURGLARY

TABLE A

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1963	196.	166.	247.	218.	235.	227.	192.	185.	189.	191.	149.	164.	2359.
1964	249.	273.	275.	217.	252.	294.	284.	335.	263.	339.	277.	267.	3325.
1965	231.	231.	291.	284.	248.	220.	296.	236.	272.	275.	242.	258.	3084.
1966	292.	305.	268.	221.	263.	220.	334.	352.	375.	340.	299.	318.	3587.
1967	330.	300.	313.	300.	364.	319.	352.	396.	335.	386.	370.	424.	4189.
1968	378.	337.	381.	400.	360.	432.	423.	447.	362.	342.	337.	458.	4657.
1969	381.	344.	396.	390.	394.	399.	509.	506.	494.	491.	557.	533.	5394.
1970	414.	395.	545.	576.	600.	576.	551.	639.	634.	707.	579.	573.	6789.
1971	633.	524.	535.	454.	470.	507.	522.	605.	462.	477.	482.	562.	6233.
1972	532.	463.	470.	434.	496.	372.	486.	508.	464.	530.	452.	572.	5779.
1973	568.	461.	504.	538.	598.	584.	*******	*******	*******	*******	*******	*******	3253.
AVGE	382.	345.	384.	367.	389.	377.	395.	421.	385.	408.	374.	413.	

TABLE TOTAL- 48649. MEAN- 386. STD. DEVIATION-, 129.

D10. FINAL SEASONAL FACTORS— BURGLARY TABLE B

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1963	108.4	85.6	110.5	89.3	97.4	97.3	104.5	103.6	109.2	110.1	90.9	93.6	100.0
1964	108.3	86.4	109.0	89.1	97.6	96.9	104.7	104.7	108.5	109.6	91.5	95.1	100.1
1965	107.9	87.5	106.4	89.1	97.0	96.1	105.8	107.1	107.3	107.9	92.7	98.6	100.3
1966	105.7	88.0	103.2	90.2	96.5	95.0	107.8	108.9	105.3	105.7	93.6	102.5	100.2
1967	104.0	88.4	100.4	91.8	96.1	94.6	108.8	110.7	104.1	103.2	94.2	105.9	100.2
1968	102.1	88.5	98.5	93.5	96.3	95.1	108.3	111.8	102.0	101.2	94.6	108.3	100.0
1969	102.1	88.9	97.7	94.4	96.5	96.2	106.6	112.4	100.1	100.2	94.4	110.1	100.0
1970	103.2	89.3	97.3	94.2	96.9	96.4	105.7	111.8	98.7	100.2	94.4	110.9	99.9
1971	105.0	89.7	96.9	93.4	98.0	96.5	104.6	110.6	98.4	100.9	94.2	110.9	99.9
1972	106.9	90.2	96.2	92.3	98.8	96.5	103.7	110.2	98.2	101.5	94.4	110.8	100.0
1973	107.7	90.6	95.8	91.4	98.9	96.7	*******	*******	*******	*******	*******	*******	96.9

TABLE TOTAL- 12588.4 MEAN- 99.9 STD. DEVIATION-, 7.0

D10A. SEASONAL FACTORS, ONE YEAR AHEAD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1973	*******	*******	*******	*******	*******	*******	103.3	110.0	98.2	101.8	94.5	110.7	103.1
1974	108.2	90.7	95.6	91.0	98.9	96.8	*******	*******	*******	*******	*******	*******	96.9

STABLE SEASONALITY TEST

	SUM OF SQUARES	DGRS.OF FREEDOM	MEAN SQUARE	F
BETWEEN MONTHS	3325.401	11	302.309	3.375**
RESIDUAL	10210.455	114.0	89.565	
TOTAL	13535.856	125.		

**STABLE SEASONALITY PRESENT AT THE 1 PER CENT LEVEL

F 2. SUMMARY MEASURES — BURGLARY

TABLE C

AVERAGE PER CENT CHANGE WITHOUT REGARD TO SIGN OVER INDICATED SPAN

SPAN IN MONTHS	B1 O	D11 CI	D13 I	D12 C	D10 S	A2 P	C18 TD	F1 MCD	E1 MOD.O	E2 MOD.CI	E3 MOD.I
1	12.06	9.94	9.17	2.32	8.15	0.0	0.0	2.72	12.60	7.99	7.24
2	14.45	11.58	10.01	4.56	8.07	0.0	0.0	4.73	12.52	9.06	7.41
3	15.82	13.78	10.58	6.64	9.14	0.0	0.0	6.67	14.64	11.33	7.96
4	15.75	13.95	9.08	8.52	9.16	0.0	0.0	8.46	15.09	12.24	6.90
5	15.75	14.21	8.59	10.23	8.27	0.0	0.0	9.86	15.61	12.86	6.26
6	18.12	15.50	9.11	11.77	8.78	0.0	0.0	11.03	17.43	14.10	6.74
7	18.36	16.74	9.55	13.25	8.16	0.0	0.0	12.10	18.25	15.46	7.39
9	19.33	17.90	9.14	15.54	8.96	0.0	0.0	13.98	19.83	16.91	6.64
11	21.43	20.05	9.13	17.33	8.11	0.0	0.0	15.89	22.03	18.62	7.05
12	21.11	21.08	10.59	18.37	0.99	0.0	0.0	16.78	19.73	19.66	7.64

RELATIVE CONTRIBUTIONS OF COMPONENTS TO VARIANCE IN ORIGINAL SERIES

SPAN IN MONTHS	D13 I	D12 C	D10 S	A2 P	C18 TD	TOTAL	RATIO (X100)
1	53.97	3.47	42.57	0.0	0.0	100.00	107.24
2	53.87	11.15	34.98	0.0	0.0	100.00	89.21
3	46.70	18.42	34.88	0.0	0.0	100.00	95.72
4	34.50	30.36	35.14	0.0	0.0	100.00	96.31
5	29.92	42.37	27.71	0.0	0.0	100.00	99.55
6	27.77	46.39	25.83	0.0	0.0	100.00	90.99
7	27.36	52.67	19.97	0.0	0.0	100.00	96.95
9	20.60	59.57	19.83	0.0	0.0	100.00	108.47
11	18.53	66.82	14.64	0.0	0.0	100.00	97.86
12	24.91	74.88	0.22	0.0	0.0	100.00	101.14

AVERAGE DURATION OF RUN

CI	I	C	MCD
1.79	1.56	8.33	2.57

I/C RATIO FOR MONTHS SPAN

1	2	3	4	5	6	7	8	9	10	11	12
3.95	2.20	1.59	1.07	0.84	0.77	0.72	0.63	0.59	0.52	0.53	0.58

MONTHS FOR CYCLICAL DOMINANCE 5

AVERAGE PER CENT CHANGE WITH REGARD TO SIGN AND STANDARD DEVIATION OVER INDICATED SPAN

SPAN IN MONTHS	B1 O AVGE	B1 O S.D.	D13 I AVGE	D13 I S.D.	D12 C AVGE	D12 C S.D.	D10 S AVGE	D10 S S.D.	D11 CI AVGE	D11 CI S.D.	F1 MCD AVGE	F1 MCD S.D.
1	2.02	15.69	0.81	11.99	0.92	2.89	0.44	10.27	1.76	12.68	0.86	3.54
2	3.48	18.45	1.10	13.67	1.88	5.67	0.48	9.49	3.10	16.04	1.73	6.17
3	4.47	20.63	1.19	14.53	2.86	8.24	0.42	10.47	4.25	18.59	2.65	8.52
4	5.17	20.38	0.86	12.29	3.82	10.54	0.50	10.66	4.90	18.18	3.59	10.49
5	5.68	19.46	0.70	11.69	4.79	12.58	0.38	10.33	5.64	18.68	4.60	12.17
6	7.07	22.69	0.76	12.90	5.78	14.38	0.60	11.54	6.57	19.83	5.64	13.27
7	8.01	22.56	0.95	13.44	6.83	15.95	0.51	10.09	7.71	20.79	6.72	14.14
9	10.07	24.25	0.86	12.32	9.10	18.38	0.39	10.46	9.82	22.06	8.87	15.77
11	12.51	25.90	0.97	12.80	11.37	19.87	0.44	10.25	12.23	23.71	10.68	17.39
12	13.49	24.73	1.17	14.11	12.41	20.31	0.02	1.28	13.46	24.59	11.50	17.90

B 1. ORIGINAL SERIES — LARCENY UNDER $50

TABLE D

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1963	262.	190.	301.	230.	244.	223.	313.	237.	148.	244.	197.	253.	2892.
1964	241.	243.	259.	238.	215.	232.	255.	270.	312.	300.	251.	283.	3099.
1965	247.	228.	218.	252.	240.	283.	288.	305.	183.	288.	259.	272.	3063.
1966	212.	201.	230.	255.	165.	255.	283.	303.	285.	329.	238.	303.	3059.
1967	303.	237.	261.	254.	224.	249.	249.	273.	304.	322.	320.	390.	3386.
1968	264.	308.	343.	324.	325.	331.	294.	338.	264.	298.	328.	303.	3720.
1969	285.	249.	310.	308.	283.	296.	361.	390.	303.	340.	355.	367.	3847.
1970	325.	301.	391.	433.	426.	421.	461.	424.	402.	431.	368.	420.	4803.
1971	344.	296.	414.	360.	373.	420.	419.	442.	377.	359.	366.	438.	4608.
1972	424.	366.	360.	378.	361.	360.	394.	445.	352.	372.	329.	433.	4574.
1973	335.	352.	412.	424.	392.	420.	*******	*******	*******	*******	*******	*******	2335.
AVGE	295.	270.	318.	314.	295.	317.	332.	343.	298.	328.	301.	346.	

TABLE TOTAL- 39386. MEAN- 313. STD. DEVIATION-, 70.

D10. FINAL SEASONAL FACTORS — LARCENY UNDER $50 TABLE E

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1963	96.5	91.3	98.7	94.9	91.2	97.0	105.4	109.1	95.5	114.0	96.8	110.0	100.0
1964	96.1	90.9	98.8	95.6	91.0	97.2	104.8	108.8	96.2	113.8	97.2	110.5	100.1
1965	95.1	90.3	98.6	96.6	90.7	98.0	103.6	108.8	96.9	113.1	98.6	110.8	100.1
1966	94.3	89.0	98.6	97.5	90.9	98.8	103.0	109.6	96.8	111.1	100.1	110.6	100.0
1967	93.4	87.3	98.9	99.0	92.0	99.2	103.2	110.9	96.4	109.0	100.5	109.7	100.0
1968	92.8	85.4	100.0	99.7	93.8	99.8	104.4	112.1	95.8	106.1	99.7	109.1	99.9
1969	92.3	84.5	100.8	100.0	95.8	100.3	105.7	113.8	95.3	103.8	97.6	108.6	99.9
1970	91.7	84.2	101.5	100.0	96.7	100.9	107.5	115.7	95.0	101.6	95.8	108.6	100.0
1971	90.5	84.3	101.4	100.6	97.5	101.3	108.6	117.0	95.1	100.8	93.8	108.8	100.0
1972	89.5	84.6	101.6	100.8	97.4	101.9	109.1	117.1	95.6	100.5	92.6	109.3	100.0
1973	88.9	84.9	101.6	100.4	97.5	102.5	*******	*******	*******	*******	*******	*******	96.0

TABLE TOTAL- 12574.6 MEAN- 99.8 STD. DEVIATION-, 7.6

D10A. SEASONAL FACTORS, ONE YEAR AHEAD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1973	*******	*******	*******	*******	*******	*******	109.4	117.1	95.9	100.3	92.1	109.6	104.1
1974	88.6	85.1	101.6	100.3	97.6	102.9	*******	*******	*******	*******	*******	*******	96.0

STABLE SEASONALITY TEST

	SUM OF SQUARES	DGRS.OF FREEDOM	MEAN SQUARE	F
BETWEEN MONTHS	6767.444	11	615.222	8.418**
RESIDUAL	8331.266	114.0	73.081	
TOTAL	15098.710	125.		

**STABLE SEASONALITY PRESENT AT THE 1 PER CENT LEVEL

F 2. SUMMARY MEASURES - LARCENY UNDER $50. TABLE F

AVERAGE PER CENT CHANGE WITHOUT REGARD TO SIGN OVER INDICATED SPAN

SPAN IN MONTHS	B1 O	D11 CI	D13 I	D12 C	D10 S	A2 P	C18 TD	F1 MCD	E1 MOD.O	E2 MOD.CI	E3 MOD.I
1	13.06	9.13	8.70	2.05	9.10	0.0	0.0	2.47	10.40	5.56	5.05
2	13.90	9.58	8.34	4.03	8.51	0.0	0.0	4.06	10.58	6.81	4.99
3	14.37	10.73	8.11	5.87	9.36	0.0	0.0	5.57	11.90	8.25	4.70
4	14.44	11.89	8.13	7.48	8.28	0.0	0.0	6.84	12.52	9.96	5.08
5	15.71	12.66	7.65	8.79	9.68	0.0	0.0	7.91	13.94	10.67	4.13
6	16.37	12.18	7.23	9.86	11.06	0.0	0.0	8.66	15.36	11.46	4.54
7	16.92	13.81	8.28	10.68	9.76	0.0	0.0	9.22	15.65	12.49	5.21
9	16.31	13.72	7.70	11.55	9.24	0.0	0.0	10.05	15.14	12.85	4.77
11	16.51	14.38	7.37	11.54	9.04	0.0	0.0	10.61	14.78	12.74	4.20
12	15.30	15.32	8.58	11.29	0.77	0.0	0.0	10.61	13.00	12.99	5.13

RELATIVE CONTRIBUTIONS OF COMPONENTS TO VARIANCE IN ORIGINAL SERIES

SPAN IN MONTHS	D13 I	D12 C	D10 S	A2 P	C18 TD	TOTAL	RATIO (X100)
1	46.56	2.59	50.85	0.0	0.0	100.00	95.40
2	43.93	10.29	45.78	0.0	0.0	100.00	81.83
3	35.00	18.36	46.64	0.0	0.0	100.00	90.96
4	34.69	29.37	35.94	0.0	0.0	100.00	91.44
5	25.50	33.65	40.85	0.0	0.0	100.00	93.02
6	19.25	35.79	44.96	0.0	0.0	100.00	101.49
7	24.66	41.08	34.26	0.0	0.0	100.00	97.00
9	21.32	47.97	30.70	0.0	0.0	100.00	104.53
11	20.18	49.48	30.34	0.0	0.0	100.00	98.68
12	36.49	63.22	0.30	0.0	0.0	100.00	86.07

AVERAGE DURATION OF RUN

CI	I	C	MCD
1.60	1.52	6.58	2.88

I/C RATIO FOR MONTHS SPAN

1	2	3	4	5	6	7	8	9	10	11	12
4.24	2.07	1.38	1.09	0.87	0.73	0.77	0.58	0.67	0.69	0.64	0.76

MONTHS FOR CYCLICAL DOMINANCE 5

AVERAGE PER CENT CHANGE WITH REGARD TO SIGN AND STANDARD DEVIATION OVER INDICATED SPAN

SPAN IN	B1 O		D13 I		D12 C		D10 S		D11 CI		F1 MCD	
MONTHS	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.
1	1.80	17.20	0.75	12.55	0.37	2.50	0.60	10.51	1.13	12.79	0.43	3.06
2	2.42	17.37	0.85	12.04	0.82	4.93	0.67	10.49	1.69	13.10	0.91	4.96
3	2.84	18.51	0.73	11.90	1.33	7.17	0.72	11.05	2.09	14.01	1.36	6.73
4	3.35	18.38	0.76	11.62	1.88	9.13	0.71	10.23	2.66	15.08	1.86	8.27
5	4.09	21.39	0.76	12.32	2.45	10.74	0.85	12.16	3.16	15.91	2.37	9.52
6	4.41	20.29	0.60	10.28	3.02	11.99	1.00	13.94	3.50	14.94	2.87	10.29
7	4.82	21.24	0.54	11.74	3.58	12.87	0.80	12.12	4.00	16.71	3.39	10.95
9	5.48	19.42	0.45	11.01	4.67	13.66	0.56	10.75	5.01	16.92	4.49	11.91
11	6.76	20.84	0.57	11.17	5.66	13.56	0.54	10.60	6.18	17.51	5.42	12.38
12	6.81	18.53	0.76	12.55	6.09	13.35	-0.01	0.98	6.82	18.44	5.81	12.41

B 1. ORIGINAL SERIES - LARCENY OVER $50

TABLE G

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1963	89.	86.	114.	99.	97.	107.	106.	113.	100.	130.	99.	135.	1275.
1964	132.	139.	164.	106.	114.	95.	159.	161.	123.	152.	126.	147.	1618.
1965	132.	130.	112.	142.	124.	153.	137.	139.	157.	138.	135.	157.	1656.
1966	135.	131.	127.	157.	152.	154.	185.	142.	136.	162.	180.	173.	1834.
1967	187.	198.	212.	186.	186.	164.	159.	195.	209.	207.	195.	210.	2308.
1968	187.	196.	211.	236.	264.	258.	227.	278.	215.	269.	251.	220.	2812.
1969	238.	245.	274.	235.	296.	278.	355.	352.	334.	420.	407.	375.	3809.
1970	395.	398.	482.	430.	364.	366.	412.	470.	439.	452.	387.	401.	4996.
1971	381.	282.	343.	344.	356.	381.	379.	388.	313.	273.	270.	310.	4020.
1972	280.	292.	291.	287.	355.	305.	299.	365.	297.	279.	271.	345.	3666.
1973	321.	337.	357.	366.	408.	403.	*******	*******	*******	*******	*******	*******	2192.
AVGE	225.	221.	244.	235.	247.	242.	242.	260.	232.	248.	232.	247.	

TABLE TOTAL- 30186. MEAN- 240. STD. DEVIATION-, 106.

D10. FINAL SEASONAL FACTORS — LARCENY OVER $50 TABLE H

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1963	98.9	97.3	103.5	103.4	92.2	104.4	100.4	102.5	89.8	106.2	92.9	108.1	100.0
1964	98.9	97.6	103.2	103.5	93.6	103.5	99.8	102.4	89.9	106.1	94.0	107.4	100.0
1965	98.8	98.2	101.6	103.9	95.8	102.7	98.7	102.8	89.8	105.9	96.7	105.7	100.0
1966	98.3	98.4	100.4	103.2	98.5	101.4	98.0	103.4	90.2	106.1	99.4	103.4	100.1
1967	97.5	97.8	99.5	102.5	101.4	99.5	98.0	104.5	91.3	106.7	101.4	100.3	100.0
1968	96.9	96.8	100.1	100.6	103.1	97.7	99.1	106.6	93.1	107.3	100.9	98.7	100.1
1969	96.0	95.8	100.0	98.9	104.0	97.2	100.4	109.9	95.0	106.6	98.6	98.1	100.0
1970	95.6	95.2	99.4	97.2	103.9	98.0	102.5	112.5	96.7	104.6	95.7	99.1	100.0
1971	95.1	94.7	98.2	96.9	104.4	99.2	103.6	114.2	98.1	102.1	93.2	100.1	100.0
1972	95.0	94.7	97.5	96.5	104.3	100.4	104.1	115.0	99.1	100.8	91.6	101.1	100.0
1973	94.9	94.7	96.8	96.5	104.4	101.7	*******	*******	*******	*******	*******	*******	98.2

TABLE TOTAL- 12592.0 MEAN- 99.9 STD. DEVIATION-, 4.7

D10A. SEASONAL FACTORS, ONE YEAR AHEAD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1973	*******	*******	*******	*******	*******	*******	104.3	115.3	99.6	100.1	90.8	101.6	102.0
1974	94.9	94.7	96.4	96.5	104.5	102.3	*******	*******	*******	*******	*******	*******	98.2

STABLE SEASONALITY TEST

	SUM OF SQUARES	DGRS.OF FREEDOM	MEAN SQUARE	F
BETWEEN MONTHS	2051.249	11	186.477	2.253
RESIDUAL	9435.515	114.0	82.768	
TOTAL	11486.764	125.		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PER CENT LEVEL

F 2. SUMMARY MEASURES - LARCENY OVER $50

TABLE I

AVERAGE PER CENT CHANGE WITHOUT REGARD TO SIGN OVER INDICATED SPAN

SPAN IN MONTHS	B1 O	D11 CI	D13 I	D12 C	D10 S	A2 P	C18 TD	F1 MCD	E1 MOD.O	E2 MOD.CI	E3 MOD.I
1	11.60	9.79	9.06	2.23	6.13	0.0	0.0	2.85	10.73	7.80	7.04
2	13.19	11.44	9.42	4.43	4.69	0.0	0.0	5.17	11.65	9.48	7.40
3	14.61	13.06	9.73	6.48	5.78	0.0	0.0	7.13	13.71	11.12	7.81
4	16.24	14.66	9.03	8.42	5.46	0.0	0.0	8.88	14.40	12.48	6.53
5	16.43	14.98	8.52	10.13	5.83	0.0	0.0	10.34	15.75	13.13	6.29
6	17.71	16.29	8.79	11.69	5.51	0.0	0.0	11.42	16.30	14.87	6.36
7	18.03	17.26	9.31	13.11	5.88	0.0	0.0	12.59	18.63	16.66	7.37
9	19.44	18.77	8.46	16.30	5.57	0.0	0.0	15.40	20.17	18.47	6.61
11	23.11	22.37	8.76	19.74	5.95	0.0	0.0	18.77	23.57	21.88	6.64
12	24.10	24.00	9.61	21.40	1.04	0.0	0.0	20.52	23.19	23.09	6.97

RELATIVE CONTRIBUTIONS OF COMPONENTS TO VARIANCE IN ORIGINAL SERIES

SPAN IN MONTHS	D13 I	D12 C	D10 S	A2 P	C18 TD	TOTAL	RATIO (X100)
1	65.85	3.98	30.16	0.0	0.0	100.00	92.69
2	68.05	15.05	16.90	0.0	0.0	100.00	74.99
3	55.68	24.67	19.65	0.0	0.0	100.00	79.70
4	44.75	38.90	16.34	0.0	0.0	100.00	69.05
5	34.71	49.02	16.26	0.0	0.0	100.00	77.56
6	31.63	55.94	12.44	0.0	0.0	100.00	77.85
7	29.54	58.67	11.79	0.0	0.0	100.00	90.13
9	19.43	72.14	8.43	0.0	0.0	100.00	97.43
11	15.31	77.64	7.05	0.0	0.0	100.00	93.92
12	16.76	83.04	0.20	0.0	0.0	100.00	94.95

AVERAGE DURATION OF RUN

CI	I	C	MCD
1.74	1.44	7.35	3.46

I/C RATIO FOR MONTHS SPAN

1	2	3	4	5	6	7	8	9	10	11	12
4.07	2.13	1.50	1.07	0.84	0.75	0.71	0.62	0.52	0.48	0.44	0.45

MONTHS FOR CYCLICAL DOMINANCE 5

AVERAGE PER CENT CHANGE WITH REGARD TO SIGN AND STANDARD DEVIATION OVER INDICATED SPAN

SPAN IN	B1 O		D13 I		D12 C		D10 S		D11 CI		F1 MCD	
MONTHS	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.	AVGE	S.D.
1	2.31	15.21	0.81	12.78	1.19	2.53	0.32	7.76	2.04	13.33	1.18	3.33
2	3.74	16.07	0.86	12.75	2.45	5.02	0.24	5.73	3.42	14.53	2.39	5.74
3	5.03	17.69	0.85	13.25	3.74	7.37	0.29	7.26	4.77	16.44	3.62	7.97
4	6.37	19.43	0.85	13.13	5.04	9.53	0.19	6.70	6.10	17.50	4.86	9.89
5	7.42	18.75	0.69	11.53	6.34	11.48	0.25	7.22	7.22	17.59	6.04	11.56
6	8.86	21.51	0.80	12.46	7.62	13.26	0.18	7.36	8.54	19.24	7.17	12.86
7	9.83	20.72	0.80	11.98	8.87	14.91	0.19	7.43	9.72	19.74	8.31	14.17
9	12.02	22.72	0.63	11.48	11.33	17.98	0.16	7.01	11.93	21.74	10.59	17.00
11	14.95	26.25	0.82	11.93	13.77	20.80	0.33	7.66	14.69	25.21	12.95	19.89
12	16.01	26.59	0.91	13.18	14.97	22.04	0.02	1.32	15.98	26.63	14.15	21.20

B 1. ORIGINAL SERIES - ROBBERY

TABLE J

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1963	8.	10.	13.	13.	18.	10.	17.	13.	21.	8.	15.	11.	157.
1964	20.	14.	15.	28.	13.	18.	10.	22.	23.	18.	27.	27.	235.
1965	22.	19.	13.	13.	21.	18.	23.	28.	28.	33.	41.	29.	288.
1966	38.	45.	36.	18.	22.	15.	27.	18.	18.	22.	29.	26.	314.
1967	22.	24.	29.	23.	24.	22.	14.	21.	32.	32.	25.	31.	299.
1968	27.	25.	51.	32.	27.	33.	33.	30.	39.	29.	46.	41.	413.
1969	41.	25.	37.	31.	39.	32.	53.	29.	42.	49.	30.	64.	472.
1970	37.	54.	64.	41.	34.	47.	40.	49.	41.	58.	37.	44.	546.
1971	58.	82.	36.	44.	52.	28.	48.	63.	44.	58.	54.	74.	641.
1972	53.	52.	56.	33.	29.	36.	50.	57.	71.	83.	96.	99.	715.
1973	70.	65.	50.	63.	53.	88.	*******	*******	*******	*******	*******	*******	389.
AVGE	36.	38.	36.	31.	30.	32.	32.	33.	36.	39.	40.	45.	

TABLE TOTAL- 4469. MEAN- 35. STD. DEVIATION-, 19.

D10. FINAL SEASONAL FACTORS - ROBBERY

TABLE K

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1963	116.5	89.6	94.0	79.2	100.3	78.6	109.4	101.0	102.5	91.0	129.9	106.8	99.9
1964	115.5	90.8	97.5	79.4	99.2	78.2	108.5	98.6	102.6	93.2	127.1	107.4	99.8
1965	114.9	92.7	103.1	80.1	94.8	79.3	105.5	95.3	103.2	97.0	125.5	110.2	100.1
1966	111.8	92.4	107.2	81.4	93.2	81.3	101.9	91.1	104.4	101.9	119.5	113.0	99.9
1967	108.3	92.8	114.0	83.5	90.3	84.1	98.9	88.2	103.9	106.6	112.9	116.3	100.0
1968	104.3	92.9	116.5	86.2	91.3	86.3	96.0	88.3	102.6	110.0	103.5	119.9	99.8
1969	103.3	95.4	118.6	87.4	87.9	87.4	93.2	91.3	101.4	112.7	98.5	125.3	100.2
1970	104.8	97.0	114.0	85.9	85.2	87.8	91.0	95.7	100.2	116.3	94.0	131.3	100.3
1971	105.4	100.3	111.8	82.8	79.4	87.3	90.2	99.6	99.2	120.2	92.7	134.4	100.3
1972	106.4	102.1	107.7	80.7	76.3	87.3	89.9	102.5	98.4	123.2	91.0	135.2	100.1
1973	107.0	103.7	106.3	80.0	74.1	86.6	*******	*******	*******	*******	*******	*******	93.0

TABLE TOTAL- 12562.0 MEAN- 99.7 STD. DEVIATION-, 13.4

D10A. SEASONAL FACTORS, ONE YEAR AHEAD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVGE
1973	*******	*******	*******	*******	*******	*******	89.7	104.0	98.0	124.7	90.2	135.6	107.0
1974	107.3	104.5	105.7	79.6	73.1	86.3	*******	*******	*******	*******	*******	*******	92.7

STABLE SEASONALITY TEST

	SUM OF SQUARES	DGRS.OF FREEDOM	MEAN SQUARE	F
BETWEEN MONTHS	14911.921	11	1355.629	2.233
RESIDUAL	69210.903	114.0	607.113	
TOTAL	84122.823	125.		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PER CENT LEVEL

F 2. SUMMARY MEASURES - ROBBERY

TABLE I

AVERAGE PER CENT CHANGE WITHOUT REGARD TO SIGN OVER INDICATED SPAN

SPAN IN MONTHS	B1 O	D11 CI	D13 I	D12 C	D10 S	A2 P	C18 TD	F1 MCD	E1 MOD.O	E2 MOD.CI	E3 MOD.I
1	30.85	27.51	27.03	2.65	14.60	0.0	0.0	5.09	27.75	22.04	21.81
2	30.78	28.90	26.79	5.27	12.00	0.0	0.0	7.68	27.25	24.04	21.75
3	34.99	29.68	26.21	7.91	16.71	0.0	0.0	10.20	31.58	24.29	20.91
4	35.53	31.86	26.20	10.36	16.74	0.0	0.0	12.60	31.98	26.77	20.97
5	40.27	34.50	27.45	12.73	19.11	0.0	0.0	14.67	35.37	28.76	20.90
6	42.20	34.90	25.62	14.90	17.65	0.0	0.0	16.58	35.86	28.60	19.43
7	42.03	35.08	26.12	16.84	19.09	0.0	0.0	18.13	39.92	31.40	20.87
9	40.15	35.69	23.28	20.10	17.09	0.0	0.0	21.52	38.47	32.54	19.00
11	40.61	38.14	24.10	22.92	14.16	0.0	0.0	24.14	38.17	33.64	19.08
12	43.90	44.24	28.33	24.16	2.41	0.0	0.0	25.37	38.92	39.31	23.81

RELATIVE CONTRIBUTIONS OF COMPONENTS TO VARIANCE IN ORIGINAL SERIES

SPAN IN MONTHS	D13 I	D12 C	D10 S	A2 P	C18 TD	TOTAL	RATIO (X100)
1	76.84	0.74	22.42	0.0	0.0	100.00	99.92
2	80.69	3.13	16.19	0.0	0.0	100.00	93.85
3	66.79	6.08	27.13	0.0	0.0	100.00	84.01
4	63.93	10.00	26.08	0.0	0.0	100.00	85.07
5	58.82	12.65	28.53	0.0	0.0	100.00	79.00
6	55.18	18.66	26.17	0.0	0.0	100.00	66.82
7	51.30	21.32	27.38	0.0	0.0	100.00	75.31
9	43.78	32.63	23.59	0.0	0.0	100.00	76.79
11	44.44	40.21	15.35	0.0	0.0	100.00	79.23
12	57.65	41.93	0.42	0.0	0.0	100.00	72.25

AVERAGE DURATION OF RUN

CI	I	C	MCD
1.44	1.44	8.93	2.35

I/C RATIO FOR MONTHS SPAN

1	2	3	4	5	6	7	8	9	10	11	12
10.21	5.08	3.32	2.53	2.16	1.72	1.55	1.40	1.16	1.13	1.05	1.17

MONTHS FOR CYCLICAL DOMINANCE 6

AVERAGE PER CENT CHANGE WITH REGARD TO SIGN AND STANDARD DEVIATION OVER INDICATED SPAN

SPAN IN MONTHS	B1 O AVGE	B1 O S.D.	D13 I AVGE	D13 I S.D.	D12 C AVGE	D12 C S.D.	D10 S AVGE	D10 S S.D.	D11 CI AVGE	D11 CI S.D.	F1 MCD AVGE	F1 MCD S.D.
1	8.47	37.71	6.35	34.51	1.47	2.93	1.30	17.85	8.00	35.69	1.02	6.53
2	9.72	38.36	6.32	36.53	3.04	5.85	0.66	14.22	9.69	38.75	3.19	9.80
3	12.88	43.18	6.66	35.97	4.70	8.69	1.42	19.76	11.96	39.70	4.34	13.20
4	15.07	47.96	6.12	36.65	6.42	11.38	1.64	19.45	13.48	43.92	6.66	15.91
5	17.42	50.91	6.00	38.47	8.19	13.84	2.46	23.70	15.23	46.33	8.56	18.36
6	20.06	56.72	5.68	37.06	9.99	15.99	2.27	21.76	16.97	48.45	10.55	20.51
7	21.45	54.94	5.34	35.13	11.80	17.78	2.89	24.26	18.15	44.23	12.42	21.49
9	23.30	49.81	4.53	31.81	15.36	20.10	2.22	20.37	21.03	42.95	15.34	22.90
11	26.70	50.10	5.60	33.48	18.72	20.78	1.55	17.24	25.87	48.47	18.64	23.34
12	29.02	49.68	7.02	36.05	20.28	20.65	-0.00	2.90	29.15	49.97	19.33	23.33

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