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**PART I: THE ANALYSIS OF THE UNITED NATIONS DATA SET ON CRIME  
TRENDS AND THE OPERATIONS OF CRIMINAL JUSTICE SYSTEMS**

Section I: Introduction and Background.

The United Nations has collected data on crime and criminal justice since the mid 1970s, but little systematic use has been made of the data, with some exceptions. The data were collected in a series of five sweeps, called by the UN "surveys". Thus the first survey covered 1970-74, the second 1975-80, the third 1980-86, the fourth 1986-90 and the fifth 1990-94. In this report the word "sweep" is used, so that the term "survey" can be retained for the activity as a whole. The sixth sweep, covering 1995-97 is being administered in early 1999. The exceptions known to the author are:

(i) by Dr. Freda Adler, in 1982, with an analysis which eventually formed the basis of her book "Countries not Obsessed with Crime". While that was an original and interesting attempt at a new approach to the analysis of crime data in the context of other socio-economic data, it suffered from the fact that the data available from the second sweep of the UN surveys were even less complete and reliable than Adler allowed for, thus making most of the conclusions at best tentative;

(ii) a series of analyses of the European regional data made by the Helsinki European Institute for Crime and Justice affiliated with the United Nations (HEUNI) for the third and each of the subsequent sweeps. Most of the output is descriptive, giving tabular and graphical representations of the data with various summary statistics. These reports are thorough and careful. As most of the countries, but not all, which supplied the best data in the UN surveys are West European, to follow the HEUNI model in this work would have been largely to replicate it. Readers are therefore referred to those reports as being one good way of using the UN data.

(iii) some individual articles by criminologists in professional journals on specific aspects within the data set.

(iv) most recently the Global Report on Crime and Justice, edited by Dr. Graeme Newman. This is in the final stages of publication as this report is written, and I believe that it makes extensive use of the data collected in the fifth sweep.

To the best of my knowledge no research worker had tried to survey the whole of the data

set, in all sweeps, and to consider the main patterns which may be seen, and, above all, the uses to which the whole data set could be put. I therefore made a proposal for a Visiting Fellowship to the National Institute of Justice and the Bureau of Justice Statistics in July 1996 to undertake that task.

In the proposal as accepted by NIJ/BJS, the original terms of reference proposed by the Fellow were to carry out a comprehensive analysis of the complete UN data set. As described in the next section, that turned out to be not feasible, and also of limited interest or value. In August 1997, therefore, I requested authorization for reformulating the objectives and outputs, and that request was approved. The new objectives and outputs are described on page 3, in Section II.

## SECTION II: THE NATURE OF THE DATA SET

The data set was provided by the Crime Prevention and Criminal Justice Division (as it then was) of the United Nations Office in Vienna. It was also available in the same format on the Internet. The different sweeps were all in SPSS+, the generation of the software package for use on MS DOS based machines. These were easily convertible into SPSS for Windows.

One of the first problems encountered was the general structure of the data set. The first and most critical factor to emerge was that analysis across sweeps was very difficult, because of the file structure which had been used. The second sweep had been entered using the SAS application on a main frame computer, as that was all that was available. The third sweep had been entered into SPSS+, which was the leading application at the time. One problem with the applications of that day, itself deriving from the limitations of space and power on the early micro computers, was that the size of files was limited. Therefore each file could contain only a relatively small number of variables by the standards of today. The file structure was built around the agencies of the system, and basically there was one file for each agency. Each variable within one agency file was described by coded letters. "nointh80" represented recorded non intentional homicides in

When the data from the fourth and fifth sweeps were added, the same file structure was retained, along with variable names constructed in the same way, although the improving technology through the early and mid 1990s would have made a more flexible file structure feasible. The outcome was that it was extremely difficult to create a mode of analysis which crossed the five or six years of each sweep, and that in effect there were four different sweeps which could be related to each other only in a clumsy, painstaking and limited manner. The data set in its previous form was described by one methodologist as not so much user-unfriendly as user-repellant. With the advice and assistance of Professor Helmut Anheier, of Rutgers and Johns Hopkins Universities, a specialist in the methodology of social surveys, the data set was reconfigured into its present form, which is a standard format for such survey data bases.

In its present configuration, there is a separate file for each year, and each file contains all

the variables and cases for that year. The variables are numbered so that they are the same for each year, but distinguishable by the year suffix, for instance total recorded non intentional homicide in 1980 now becomes V038-80. This makes it much easier to compare any variable for any year with that of any other year. This is not to say that any such comparison would be meaningful; it is a reasonable prediction that the majority would be meaningless however good the quality of the data; but such comparisons are feasible. The data set currently is in SPSS for windows, and can be manipulated and translated in any way that application allows.

The re-configuration took some considerable time, so that the nine months which the original proposal had foreseen was quite inadequate to carry out any extensive analysis. It did provide me with an opportunity, however, to think at some length what are and are not appropriate uses of the data set, and which are the types of questions which it can properly be used to answer, and which types of questions are inappropriate, as requiring other kinds of data. The conclusion of that meta analysis, that is the conceptual analysis of what type of data analysis would provide the most useful outcome of the fellowship led to a reformulation of the objectives of the fellowship, with the outputs being as follows:

1. the data set in a configuration which is easy to manipulate in any way, and as a seamless whole, not a series of unconnected sweeps;
2. an examination of the quality of the data, and a methodological account of the rationale and techniques by which the quality is assessed;
- 3 a review of the types of questions which can sensibly and appropriately be asked of such data;
4. a series of exemplary analyses, that is examples of the type of analysis needed to address and answer the questions identified in output 3 above;
5. (if possible) a set of purpose written small programs which will enable other users of the data set to carry out the analyses described, but on whichever variables and cases they wish. That would require further technical assistance from, or through, NIJ.
6. a set of recommendations to NIJ/BJA which they may refer to the United Nations if they consider it appropriate as to how to improve the quality and utility of data gathered in the future.

The emphasis in the work of the Fellow therefore changed over time, to the point where his task is seen now as preparing the material for others to use, and providing basic tools for those who are not themselves comfortable with statistical applications, and are more concerned with the results of the analysis rather than the methodology. The rationale for the change from the original objective of undertaking some form of comprehensive analysis was based on the growing appreciation of the number of possible analyses to be made, combined with the fact that any one of them would be of interest to only a certain proportion of those interested in the data set. Therefore the most desirable end state would be if as many users as possible could be encouraged to undertake their own analysis on whatever variables and cases interested them the most.

### SECTION III: THE QUALITY OF THE DATA

One major concern in the analysis of any data set must be with the quality of the data, traditionally evaluated by validity (the accuracy with which the data relate to what is being measured in the external world), and reliability (the accuracy of the apparent relationship of one datum to the other data internally to the data set).

The data in this set had been collected by the UN in five different sweeps, as described in the first section. At the expert group meeting in 1986 convened by OJP in Washington DC to plan the third sweep, one of the participants proposed that the questionnaire for that and subsequent sweeps should include two new features. These were, administratively, a place at the beginning of each section intended for completion by the different agencies for the name and contact address of the individual who completed the return, and substantively the inclusion of the last year of the time period covered by the previous sweep. The purpose of the first was to enable a dialogue between the UN and the returning office to question possible miss entries and clarify any uncertainty; the purpose of the second was to obtain information on how consistent countries were or are in submitting data. This instrument was included to make some form of validity check feasible.

It seems that the first proposal was implemented up to a point, namely that a space was incorporated, with the appropriate questions, for the provision of identifying specifics by the returning officials, and that these details were often provided; but it seems also that the UN never made use of the contact points so created. It seems also the explanation was that the workload and time pressures of the CPCJB were such that data entry had to be done by volunteers or short term staff, and that it was therefore done some time after the returns had been received, and with no directives from the senior management that any questionable items in the return should be referred back for checking or explanation. Had the planned dialogues taken place, the problems raised by the second proposal might not have been so severe.

The results of an analysis of the second provision, the years for which data were requested as the last year of a given sweep and, five years later, the first of the next sweep, hereafter referred to as the "overlapping" years, are somewhat disconcerting. Each of the cells or fields which provides the figure for a particular variable and case for the same year should show identical numbers, whenever it was collected. As Table 1 (below) shows, in the variables chosen to test this situation, there were very few perfect "matches", and even if figures which are less than 10% different for the same field are allowed to count as a match, still more than half the figures in some categories of variables do not form matches. There are marginally more matches between the fourth and fifth sweeps, but that is not consistently the case. Recorded crimes by crime type was chosen because it is a figure perhaps most often used in international comparisons. One form of analysis which would give a comprehensive insight into the reliability of the data would be to repeat this procedure for all variables, so that a classification of variables could be made into those which have many matches and those

which have relatively few, and these could be broken down into a rank order.

Table 1 - percentage of entries in overlapping years with matching data (within 10%)

Recorded Crimes	Percentage of matches, 1980	Percentage of matches, 1986	Percentage of matches, 1990
V034 TOTAL RECORDED HOMICIDES			66%
V035 TOTAL RECORDED INTENTIONAL HOMICIDES	62%	77%	87.5%
V036 TOTAL RECORDED COMMITTED INTENTIONAL HOMICIDES			83%
V037 TOTAL RECORDED ATTEMPTED INTENTIONAL HOMICIDES			91%
V038 TOTAL RECORDED NON-INTENTIONAL HOMICIDES	65%	70%	55.5%
V039 TOTAL RECORDED ASSAULTS	65%	68%	66%
V040 TOTAL RECORDED MAJOR ASSAULTS			58%
V041 TOTAL RECORDED RAPES	79%	84%	84%
V042 TOTAL RECORDED ROBBERIES	74%	80%	79%
V043 TOTAL RECORDED THEFTS	65%	25%	62.5%
V044 TOTAL RECORDED MAJOR THEFTS			35%
V045 TOTAL RECORDED BURGLARIES			81%
V046 TOTAL RECORDED FRAUDS	38%	78%	87.5%
V047 TOTAL RECORDED EMBEZZLEMENTS		70%	80%
V048 TOTAL RECORDED DRUG OFFENSES			86%
V049 TOTAL RECORDED ILLICIT DRUG TRAFFIC CRIMES			76%
V050 TOTAL RECORDED DRUG POSSESSION CRIMES		47%	72%
V052 TOTAL RECORDED BRIBERY CRIMES	71%	63%	83%
V053 TOTAL RECORDED OTHER CRIMES	0%	33%	37%

Numbers such as these suggest that the external validity of the data may be suspect. In particular the fact that for two of the major categories of crime, assault and theft, not even matches within 10% were recorded for in one third of all cases is decidedly disconcerting. The inability of UN/CPCJB to monitor this aspect of the activity more closely can now be seen, in retrospect, as a more than trivial deficiency. There is an argument to be made that such apparent inconsistencies between sweeps may not indicate lack of validity or reliability within sweeps. Each set of data was presumably collected by different people at five yearly intervals, and he/she may have used different categories of files from those used by their predecessor. However, the comparison of rates of change over the years, discussed in the following paragraphs, does not lend support to that view. Also it raises questions about the inconsistencies of governmental record keeping, and does suggest that the UN should at least have brought this to the attention of the agencies concerned, as a form of assistance to these governments in dealing with problems which could be addressed once the failing was identified. Thus, in summary, the overlapping years discrepancies suggest that the external validity of the data may be suspect, and raise even more serious questions over the internal reliability.

Someone wishing to use some of the data set for analysis, therefore, would be well advised to carry out the procedure, described in Technical Annex I, to establish whether the particular variables and cases of interest demonstrate a high or low level of discontinuity in respect of the overlapping years. As discussed in Section II above, while it would be possible to analyse every variable for every case for which data exist and present the results in some comprehensive report thereof, it would be a very long and tedious report, and, more importantly, the great bulk of it would be irrelevant to any given reader. It seems both more efficient and more constructive, therefore, to present and discuss some examples in the

following paragraphs, and facilitate the carrying out of the analysis by each individual on the variables and cases of concern through the procedure described.

The external validity of the data cannot be checked further without going back to the countries and asking them both to reopen old files and then cross check the numbers contained therein. Such a procedure is almost certainly not feasible, and would cost much more in time and effort than the information so generated would be worth. NIJ might wish to advise the UN ICCP, as it now is, that the effort to validate the data immediately on the receipt of the returned questionnaires is therefore certainly worthwhile, and is indeed essential if the data set is to be increasingly useful.

The internal reliability of the data can, however, be checked further. The main method used has been the comparison of the figures for each variable with earlier figures for that variable. This can be done in two ways. In the first, the figure for one variable is compared with that for the same variable the year before, and the extent of difference recorded as a percentage change, referred to hereafter as "adjacent years". In the second, the figure for a particular year is compared with the figure for a base year, which is constant for all subsequent years, hereafter called "lagged" years. Both sets of the numbers so derived represent the degree of change moving across time, but "time" is conceptualized differently. In the first instance, it is a creeping relative variable, and in the second an absolute value against a constant base. Each set of results shows the change in the rate of change of the variable in question. Adjacent years show the changes more clearly and sharply; individual lagged years show the overall trends across many years. It is therefore worthwhile generating both sets of numbers, as described and illustrated in Technical Annex II

As the first sweep had so many missing variables and cases, the exercise was started with 1975 as the first year, and as the base year for the lagged method. Some results are shown in Charts 1-6. Charts 1-4 show the data for Singapore and Sweden for the whole period of the second through fifth sweeps, for the number of robberies recorded by the police and the number of convictions for robbery recorded by the courts. These data have been analyzed in both the ways described above, adjacent years and lagged years. The mean for all countries submitting complete data in respect of this variable was also computed, and is shown by the thick line. Both the countries shown are mostly below the mean, especially for recorded offences. One important difference between the adjacent and lagged years charts is that in the former, the graph line can turn downwards, if the rate of change is lower than the previous year. For the lagged years, that can occur only when the rate of change is for a given year is less than that for 1975-76. A flat line for adjacent years would mean that the rate of change is consistent and constant. A flat line for the lagged years would mean that there has been no change at all in the incidence rate. In both charts it is important to bear in mind at all times that these lines represent changes in the rate of incidence of the offence or conviction, and **NOT** the incidence itself in any one year.

Chart 1

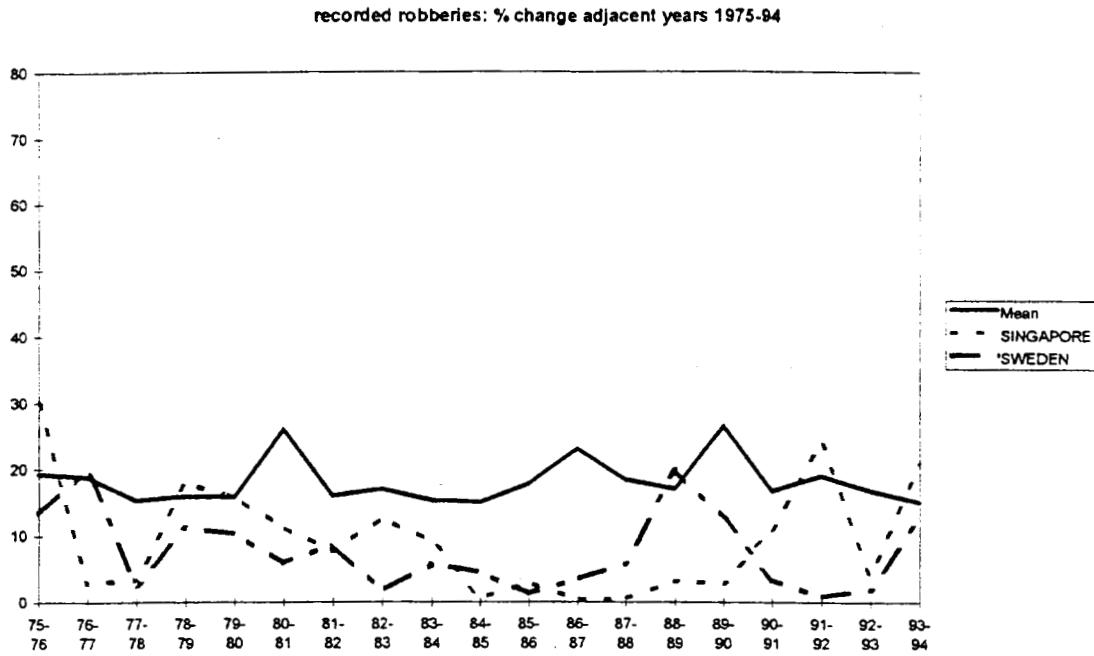
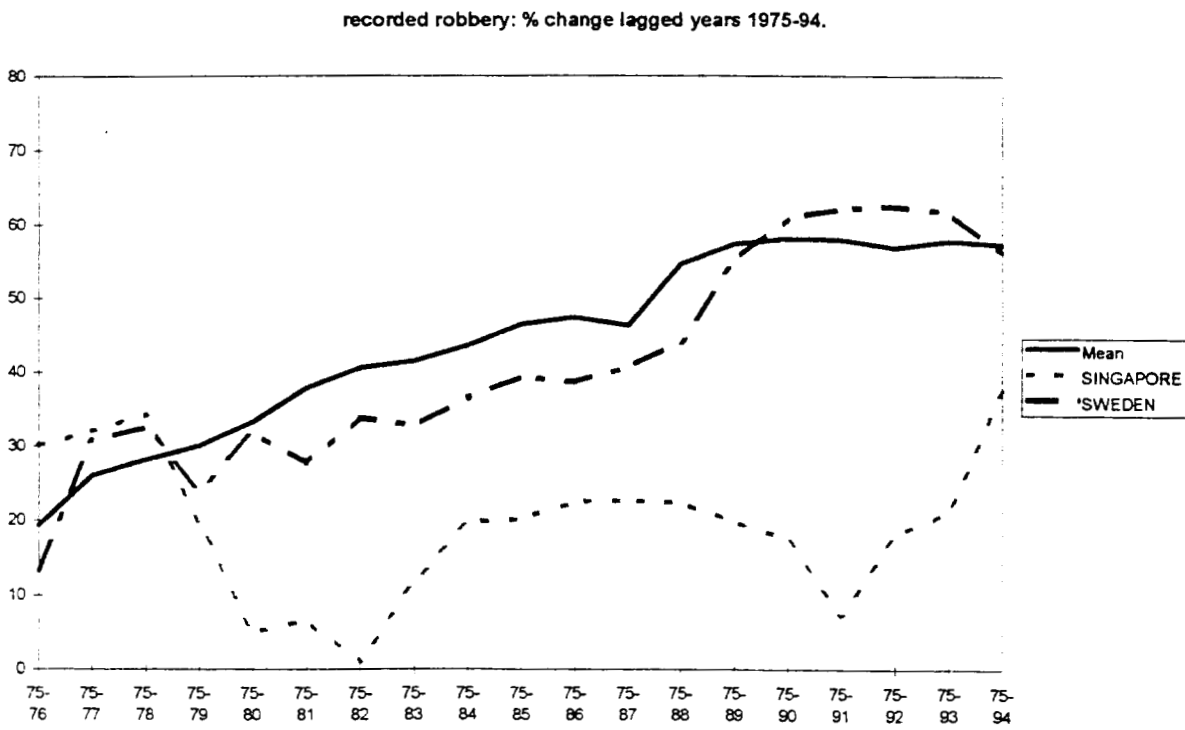


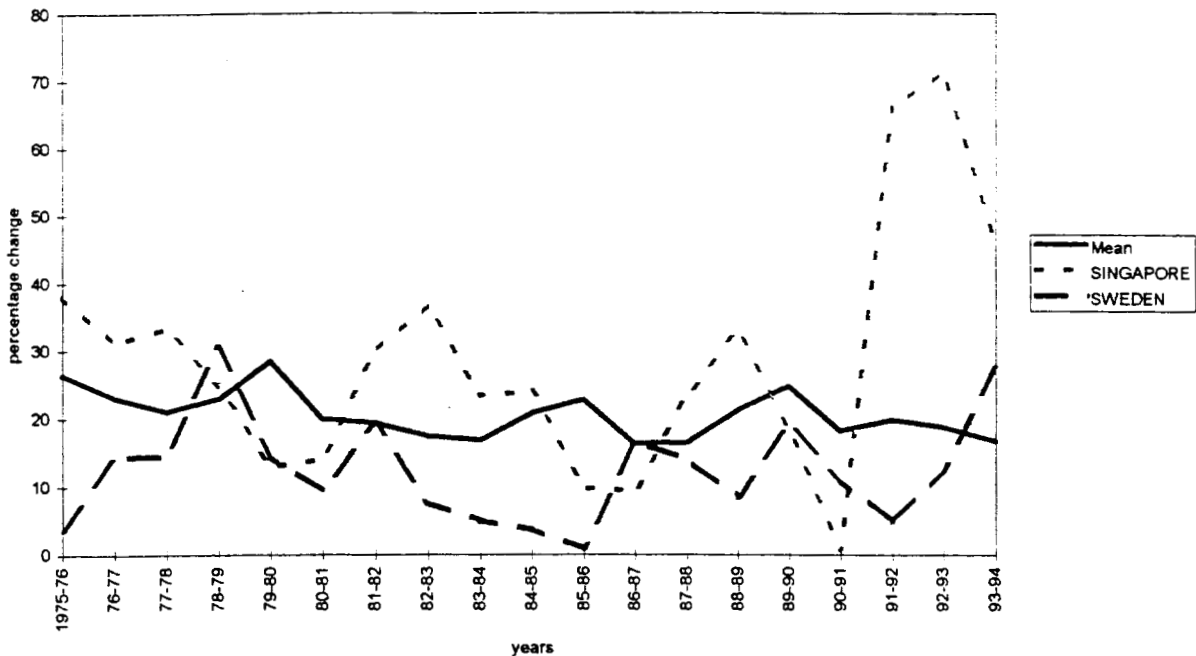
Chart 2



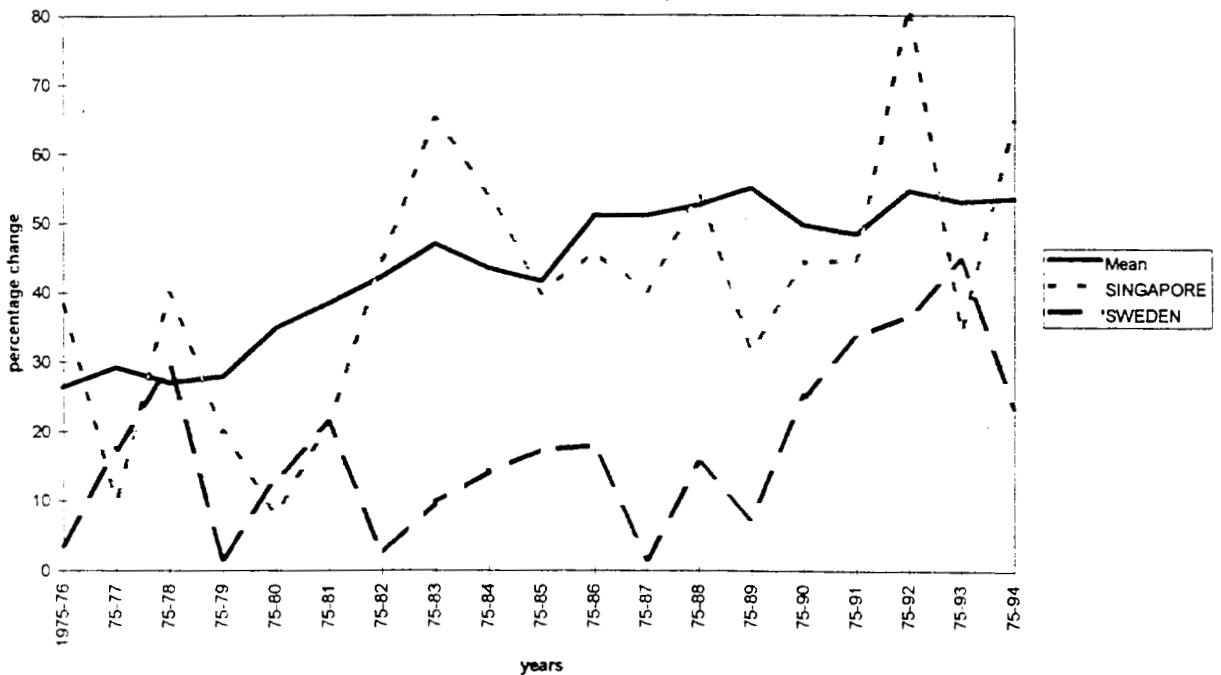


### Charts 3 & 4

robbery convictions: % change adjacent years, 1975-94



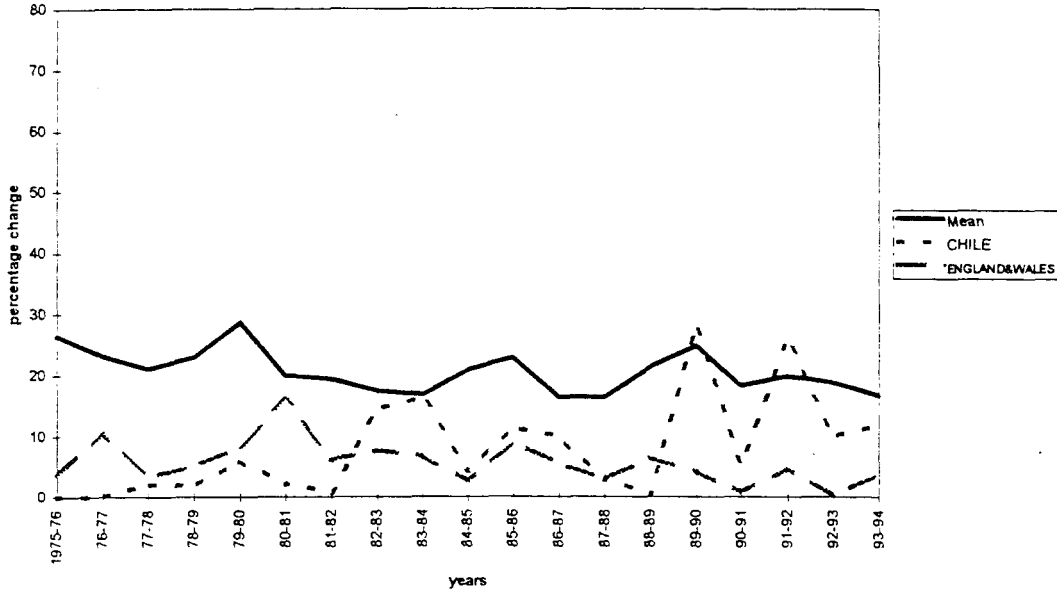
robbery convictions: % change lagged years 1975 - 1994



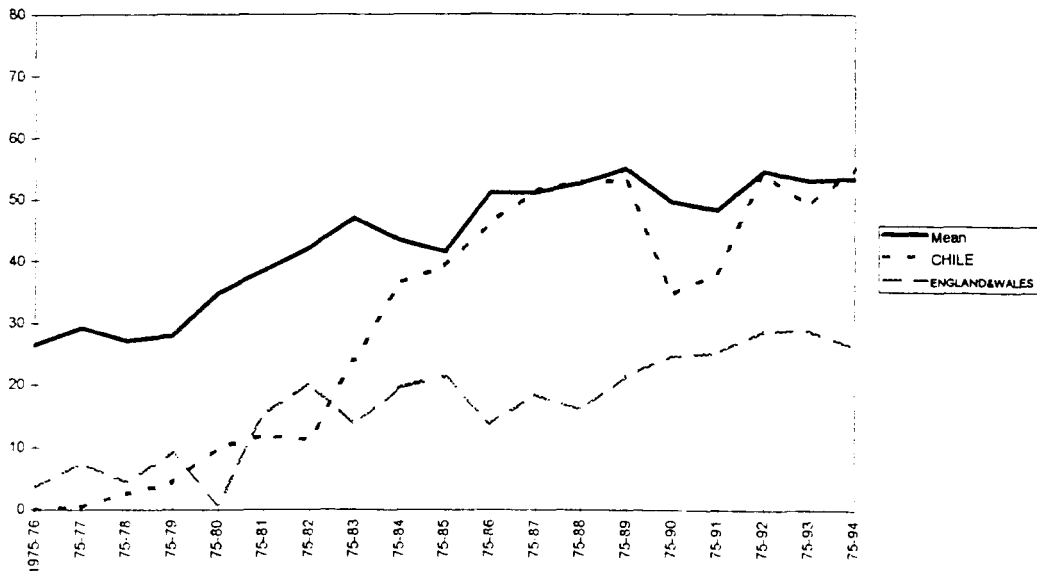
in that the percentage change per year by adjacent years is less smooth than that by lagged years for recorded robberies; but that difference is not found for the recorded convictions. The changes in the convictions rate seem to be both greater and more frequent than for the offence rate, which raises the question of why this should be so. The opposite might have been expected to be the case, if there was some form of unrealised stabilising factor in the operations of the prosecution and courts which led to the same proportion of offenders being convicted each year, irrespective of a vacillating input; but these charts suggest that the situation might be the other way round.

Charts 5 & 6

Robbery convictions: adjacent years 1975-94



robbery convictions: lagged years 1975-94



Charts 5 & 6 show the results from the same analysis for Chile and England & Wales, in respect of the convictions for robbery. The smoother curve of the lagged years graph is again apparent, as is the fact that the longer established, perhaps more stable industrialized country shows a lower rate of change than the newer country, one of which went through a very difficult political time during the period under review. In these examples at least, the variation in the data for the fifth sweep seems even greater than for the earlier sweeps.

One of the most important questions which is raised by this examination of the reliability of the data is whether, or to what extent, the apparently questionable reliability of the data is or is not an indicator of the validity or lack thereof. That is, do the case flows in the system actually vary to the extent indicated, or is there a source of imprecision in the recording process. If the data do change from year to year as much as these charts suggest, and if those changes do accurately record changes levels of incidence of a given variable in an agency of the criminal justice system, one of the most widely held beliefs about the nature and operations of criminal justice is brought into question. It seems to be generally accepted among criminologists and criminal justice scientists that the operations of the criminal justice system are stable, that one year is a good predictor of the next in terms of workload, allowing for a general tendency to increase, or, in recent years in some industrialized countries, to decrease a little. It would require a separate and extensive analysis of all the variables for all years to explore that hypothesis thoroughly, but the samples taken do suggest that either the numbers for the system agencies are not as stable as is usually assumed or that the recording of the data introduces apparent fluctuations which are not actually "there", i.e. the data are not as valid as might be wished.

These tables and charts suggest that confidence in the quality of all the data should be tentative and qualified, and even more that the appropriate or justified confidence level is specific to the subset of data being analysed. It is therefore essential that some form of quality evaluation of any given subset be carried out on that subset, so that a confidence level can be assessed and supported. From these few samples, it seems that the question of reliability, and therefore perhaps of the underlying validity, might well vary not only from case to case but variable to variable.

The analysis described above was one of the factors which led the author to the view expressed several times in this report that the data can be used for suggesting and refining questions for further study, but not, with any authority, for activities demanding statistical rigour such as hypothesis testing. That is, one of the main appropriate uses of this data set is to identify a next generation of more specific and clearly focussed questions for precise study.

#### SECTION IV: ON ANALYSING THE DATA

There are some well known and frequently rehearsed difficulties in respect of the analysis of data on crime and justice across countries, cultures or jurisdictions. The first of these is that of **definitions**. Different legal codes define crimes in different ways, so that the set of acts which constitute a given crime type in one country may not be identical to the set of acts to which the same label is applied in another. One well known example is Rape; another less well known but perhaps more illustrative of the point is that the concept and crime type of "Attempted

Homicide”, which is used in many countries, is not known in the USA, where it is classified as a “Major Assault”. The consequence of this is that any comparison of total homicide figures which include “attempts” with the homicide figures for the USA will have an inbuilt distortion, and the same will occur in reverse in the comparison of assault figures.

The second is that of **recording practices**. Different police forces, in particular, have different rules for when an event should be recorded as a crime and when not. For instance, the Nordic countries are said to be punctilious about recording every theft of a bicycle, whereas the police other countries with a higher workload of serious crimes and which are less well resourced and perhaps organized might not always record the event, particularly if the bicycle were recovered soon afterwards. The degree and manner in which the agencies do differ across countries is an interesting topic for research, but far beyond the scope of this work. It is simply assumed that such variation does exist, and is likely to affect the numbers for the earlier stages of the criminal process considerably. Recording convictions in court and receptions into prison is more likely to be comparable, because there is less room for variation; but even in that respect some caution may be appropriate.

The third is that of **operating practices**. In some countries, for instance Japan, the prosecution stage and process is the locus of the main decisions affecting a case, so that many cases, especially trivial ones, do not appear in the Japanese records until the prosecution stage. Common law and codified, civil law, countries vary also in this respect, and comparisons between the absolute numbers of different systems can be risky unless the person making the comparison is familiar with the details of the *modus operandi* of the system and its implications for the statistical recording thereof. In short, the old scientific adage that understanding a set of data is a necessary precondition for the proper analysis of it applies in this context also.

Fourthly there is a large **factual inequality** between countries as to their size of population, the make up of the population (for instance, % urban and % rural, % over 60 and % under 25 years of age) and the size of the crime problem, even if pro-rated by population. In any exercise in even a pro-rated direct comparison there will be hidden factors affecting the outcome.

Finally, there are a set of problems specifically associated with the category of **recorded crime**. There is an extensive literature on this topic, and the only observation needed here is that, for the purposes of analysis, the numbers provided by governments are regarded as indicators of the input into, and therefore workload of, the criminal justice system. They are not regarded as accurate statements as to the actual incidence of a given crime type in a given jurisdiction, although they may well be that. Further information would be needed to validate the figures. It is general criminological wisdom that the less serious, or less obvious, the crime type, the more questionable the officially recorded figures.

All of these arguments are good reason for caution in regard to a direct comparison of the numbers across countries and jurisdictions.

There is, however, one type of analysis which is not vulnerable to such uncertainties: the use of **ratios within** countries. While the definition of a crime, or the unit or rules of counting may vary across countries, they rarely do so to any extent within a given country or jurisdiction. While the assumption that the definition of a certain type of crime is significantly different

between two countries is easily supported, the assumption that the definition of the crime type does not change significantly across a number of years within one of the countries is also usually valid, although anyone making use of small differences might be wise to check that there have been no major legislative changes in respect of the crime type in the country(ies) and in the period under study.

Common sense suggests that the categories of data which can most profitably be analyzed are those which are reported most comprehensively. The crime type which is probably the best recorded, in the sense of completed number of cells in the questionnaires returned by the governments, is Rape. It has not been used in the exemplary analyses in the following sections, however, for the reasons mentioned in the preceding paragraphs. Rape is the type of crime which, while not subject to frequent changes in legislation, is most vulnerable to changes in reporting rate by victims and recording practices by the police, as public concern over the offence changes. That is to say, there is probably significant internal inconsistency in the figures for Rape within a country for even the ratio approach to be open to question. As the purpose of the analysis in this report to demonstrate the nature and feasibility of some types of analysis, one of the most serious types of crime has not been used. The reasons are methodological, and in other contexts the analysis of the figures for Rape would be an appropriate activity. However the research worker would need to check the consistency question with the countries in question if precise significance is to be given to specific changes in the values.

Rape is both a serious crime and a well reported crime by governments, in the sense that the data cell is rarely left blank, but, as described above, both the validity and the reliability of the figures are so questionable as to remove any strong confidence in their their use for analytic purposes. Homicide as a crime type also has too many variations and sources of uncertainty. The crime type which has been chosen as the most reliable and valid for purposes of example in this report is "Robbery". It is serious enough to be reported in most cases to the police, recorded by them and considerable resources are invested in tracing offenders. It seems to be a crime against the person, but in fact the ultimate objective is property, and in some national criminal codes it is classified as a crime against property. That is, it strides the division between crimes against the person and crimes against property. While the 'recorded crimes' category must be regarded with the standard caution for that event, it seems from victim surveys to be as accurately recorded as any other, and does not have the sub-divisions which are potential sources of statistical difficulty in the case of homicide, assault and theft.

To return to the **ratio** approach. The data set is primarily made up of data on the operations of the agencies of the criminal justice system. Each of these can be seen, sequentially, as receiving the input from the preceding agency and creating, as its output, the input for the next stage. The units of count in all these operations are **people**, and, within one national system, it is feasible to express the values for any stage as a ratio of the preceding or succeeding stage. The most simple form of ratios is a percentage, which is a ratio against base 100. The stage which is selected as the base, and set as 100, can be whichever is the most useful for the particular analysis being undertaken. If a later stage in the criminal process, such as conviction by the courts or reception in to prison, is selected, the figures for the earlier stages will be higher than 100%, unless there is something very unusual about that system.

The figure used for the base in most of the analyses in the next section is that for Recorded

Crimes. One very important observation in that regard is that the unit of count is no longer people but events, namely the decision of the official, usually a police officer, to whose attention the offence is first brought to record it formally. In fact, all the units of count are, in strict system theoretic terms, the consequences of decisions made by officials; but that technical nicety does not affect the general nature of the analysis. Thus in the charts of the attrition through the system which make up much of the next section, the first stage, from recorded crime to number of persons suspected/apprehended for that type of offence, often emerges as a very sharply declining line. The reason for that is that many offences are not cleared up, and quite a lot of offences, especially property crimes, are committed by the same offender. Thus although that slope can be interpreted as a crude measure of clear up rate, its use is most properly within the same jurisdiction to compare either across crime type or across years. If it is used for cross national comparisons, the analysis can be made properly only if the recording practices of each of the countries involved in the comparison are known. Otherwise, especially in respect of relatively common and minor property crimes, such as bicycle theft, those jurisdictions which are punctilious about recording all crimes emerge on the charts as having very low clear up rates, and what is in fact a tribute to their thoroughness can easily be misinterpreted as an indicator of inefficiency. This therefore also provides another instance of how it is necessary to understand the data before drawing specific conclusions about specific countries or agencies.

The ratios of the progress of cases through the agencies of the criminal justice system is most easily plotted and understood as a line graph, and there are several examples in the next section. It is derived directly from, and as a simplified version of, the attrition funnel which was first brought to public attention in the Report of the President's Commission, *The Challenge of Crime in a Free Society*, in 1967. The attrition funnel can also be plotted by gender and by age, which for this data set means 'adult' and 'juvenile'. It can therefore show whether males are filtered out of the process at a faster or slower rate than females, and whether juveniles are filtered out faster or slower than adults. These questions, however, can be asked only in respect of "total crimes". The UN questionnaire for the second sweep asked for breakdown by age and crime type, but very few countries were able to answer, and the questions by age, by gender and by crime type were dropped in subsequent sweeps.

In the charts, the values for each stage are constrained by the other value as a matter of practicality, but they are not related logically to the others, in the sense that there is no total to which they have to add up. Ratios can also be plotted as pie charts, and these are the most appropriate display when the purpose is to show how a given amount of something is divided into or between different sub-components. Thus the division of resources between the different agencies of the criminal justice system can be expressed as ratios in a pie chart. These pie charts can be generated using the number of people employed or the budget figures provided by governments. The number of people can include civilian support staff, or just the qualified officials (sworn police officers, district prosecutors, judges etc). Examples are discussed in the next section.

With these two sets of ratios, a simple set of "criminal justice profiles" can be generated for each jurisdiction. The line graphs can show the outline of how the system processes offenders in terms of the ratio carried on to the next stage, by crime type or any combination of crime types; while the pie chart can show the allocation of resources to each agency. Each of these

types of display can be repeated for any year, or over longer periods, so that some representation of the basic dynamics of the criminal justice emerges.

## SECTION V: SOME INTERPRETATIONS OF THE DATA.

After the rather abstract discussion of the previous section, it is now appropriate to look at some of the results obtained from the analyses along the lines suggested in Section IV. First, however, this is an appropriate place to reinforce and explain in detail why this section deals only with examples, and makes no attempt at a comprehensive analysis. The critical factor is the number of possible charts which could be drawn for each country.

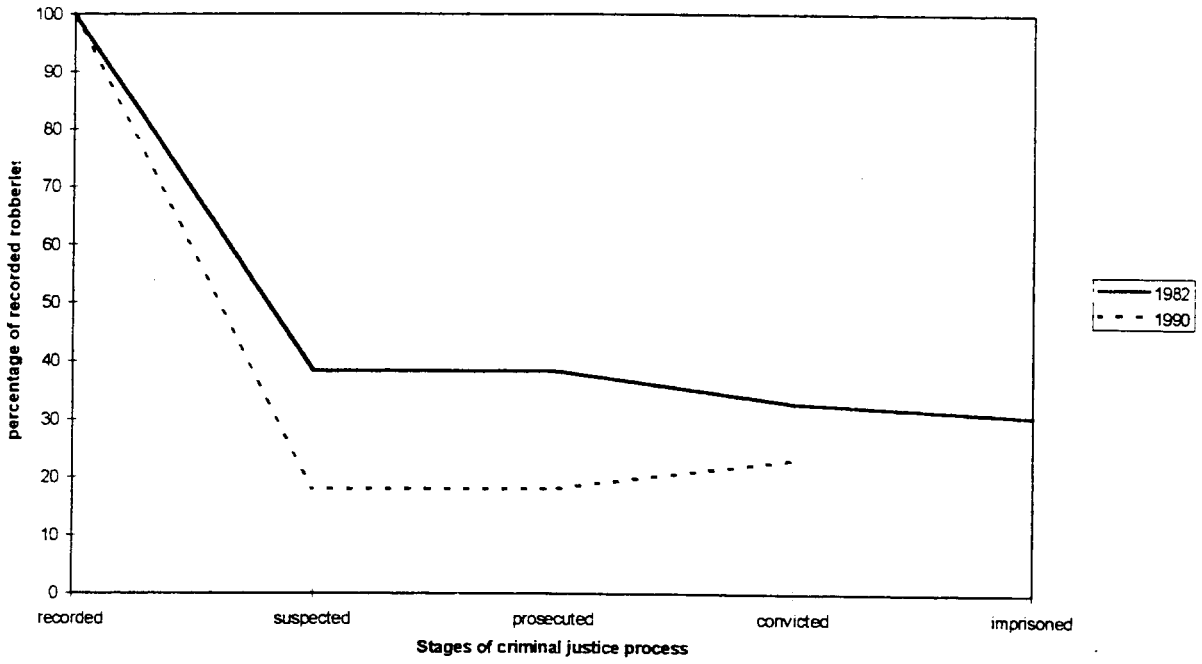
There are nineteen categories of crime as shown in Table 1 in Section III, to which the category of "Total Recorded Crimes" should be added. The data set covers twenty years. If a country submitted a complete return to each sweep, the number of attrition funnel charts which could be created is three hundred and eighty. One chart per year each for differential attrition by gender and age, and two potential pie charts per year on resource allocation, giving a total of eighty more. In reality, no country has submitted complete data, and many of those charts are not feasible, but which they are can be established only by examining the data set.

Even if only forty countries had returned enough data to allow a half complete set of charts, the resulting report would be very long, very repetitive and rather boring, because in all probability most of the contents would be of no particular interest to any one reader. Very few readers in the USA are likely to be interested in a comparison of the profiles of, say, Denmark and Japan; but Danish and Japanese criminologists might be very interested. The number of charts could then be multiplied by a very large number if comparisons were made of two or more countries, in respect of one or more, decision stages of the criminal process. Even if several countries were plotted on the same chart, the number of possible combinations is very large.

The objective of this and the following sections, therefore, is to illustrate, and by the illustrations stimulate readers to carry out the analysis which interests them, by country, crime type or any other variable. The methodology for doing that is given in the Technical Annexes.

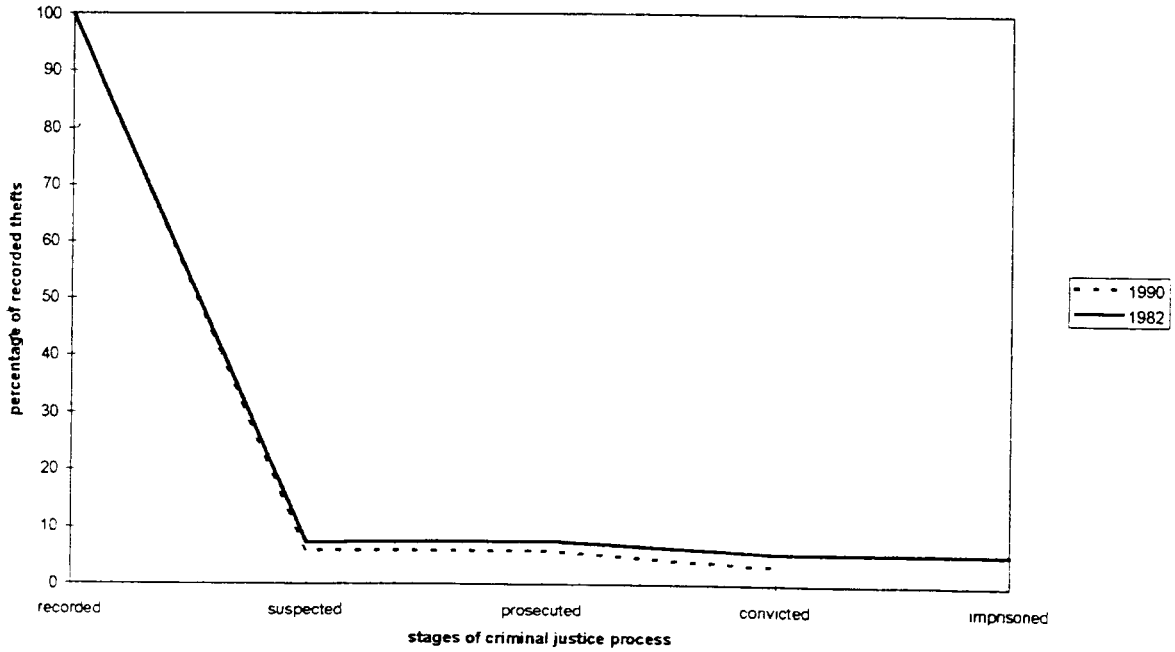
The first set of attrition funnels shows the processing offenders through the system, in the sense of percentages at each stage of the base figure of crimes reported, for two neighbouring and similar countries. Charts 7 & 8 show the attrition funnel for Norway in 1982 and 1990 in respect of Robberies and Theft, and Charts 9 & 10 the same charts for Sweden, for 1982 and 1993 for robberies and 1982 and 1994 for thefts.. The y axis is the rate of recorded offences, set to be 100%, and the stages along the x axis is the number of offenders, as a percentage of the offence figure. Such mixing of two units of count does not pose a problem provided that it is always kept in mind, and one category is not treated as if it were the other.

Norway, robberies, 1982 & 1990



Ch

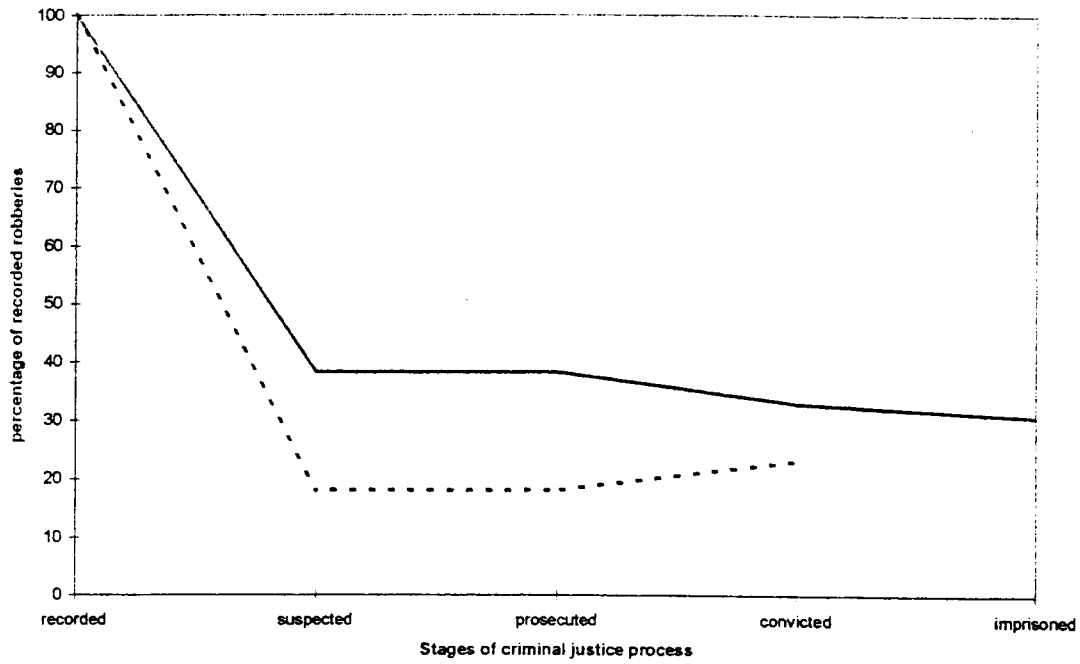
Norway  
Thefts, 1982 & 1990



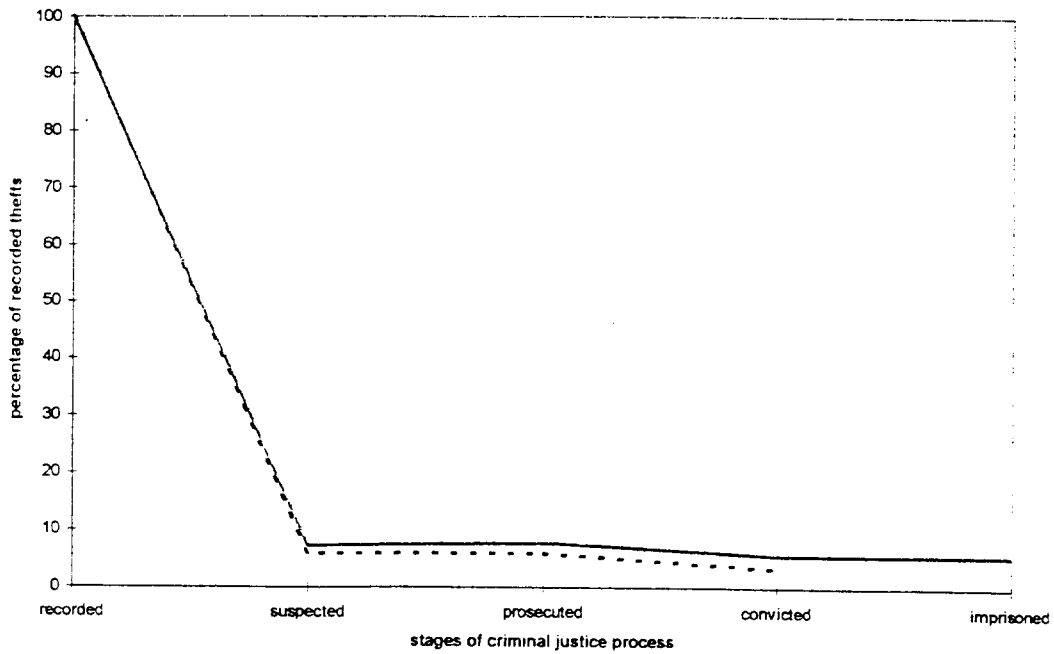


# Charts 7 & 8

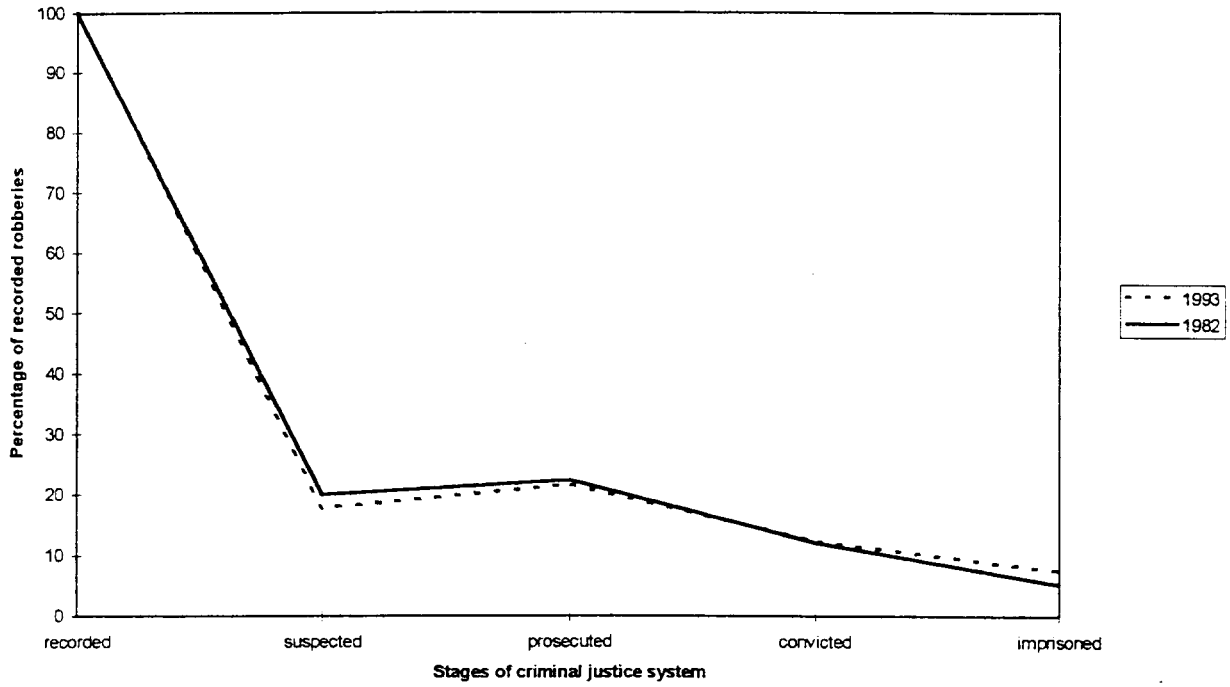
## Norway, robberies, 1982 & 1990



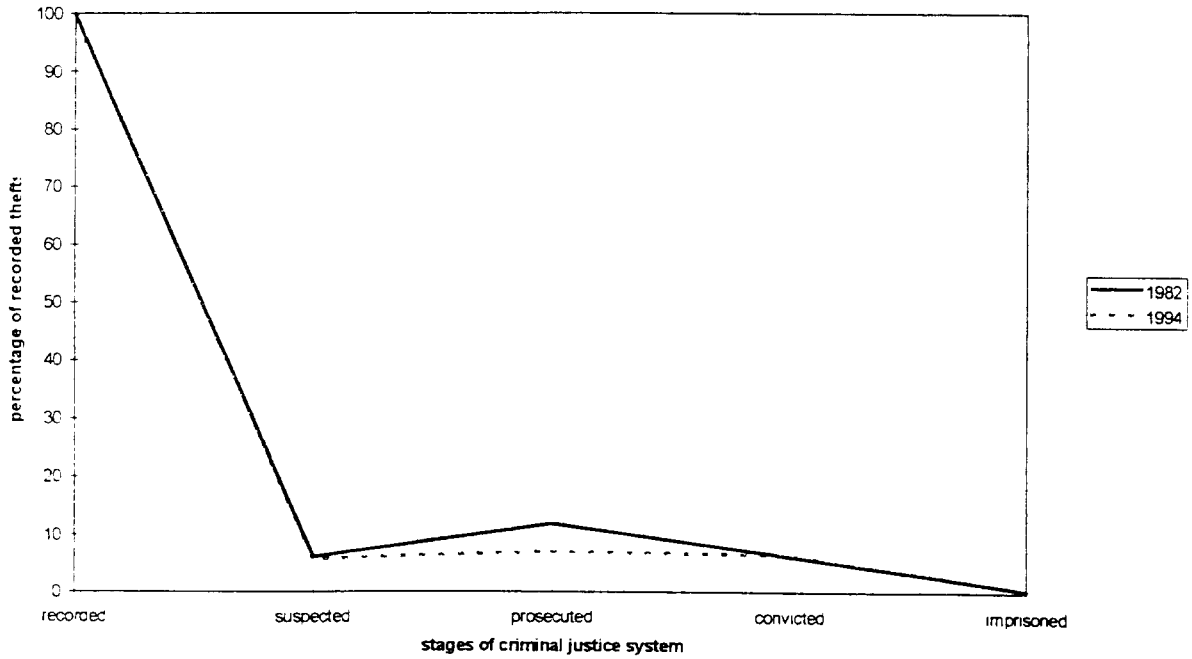
## Norway Thefts, 1982 & 1990



Sweden - Robberies, 1982 & 1993



Sweden - thefts, 1982 & 1994



The first feature which stands out in all charts is the quite steep slope from offences to suspected offenders. In the UN questionnaire, that is defined as 'the first formal contact with the criminal justice system', and in some sweeps is referred to as 'apprehended'. Both terms have been used because this seems to be a concept with which some countries have difficulty. That steep slope represents, approximately, the proportion of offences not cleared up combined with the number of repeat offenders. As mentioned in the previous section, the 'offences' base rate can be made high by the recording of every possible offence, so that while a steep slope might be induced by a police force which was ineffective, it might also be induced by a police force which was scrupulous in its record keeping. It is therefore probably not a good basis for comparison between countries, but it may well be a good basis for comparison within countries across crime types and/or over time.

The second feature requiring comment on the Norwegian charts is that the value for 1982 at which the first slope ends is very different, roughly 40% for robbery and 10% for theft. That can be explained by at least three factors, which are not mutually exclusive; the explanation is probably a combination of them. First, "robbery" is rarely if ever a minor or trivial crime, so that the police will react to every instance of it. "Theft" on the other hand is both much more frequent and sometimes minor. The conscientious police will record it, perhaps for the insurance needs of the victim, but may take little action. Secondly, because of the higher seriousness and profile of robbery, the police will invest a lot more resources into identifying the offender. Thirdly, the population of known or potential robbers is much smaller than that of thieves, so that the task facing the police is better defined. However, for 1990 the ratio of apprehended to recorded offences is the same as for both years in Sweden; therefore presumably one or more the factors outlined above ceased to be the case.

The third noticeable feature is that in Norway, for both types of crime, the line for the progression through the system is almost flat, although Norway did not provide data on admissions to prison in 1990, so that the line is incomplete. That is, of those apprehended very few are filtered out. While most people arrested for robbery may be expected to be sentenced to imprisonment, in many countries quite a large proportion of those arrested for minor theft are given non-custodial sentences. The contrast with Sweden, to which we turn next, is noticeable.

The first contrast between the two countries is that, while the initial steep slope is much the same, and presumably for the same reasons, the difference in the values for the 'suspected' category of "robbery" and "theft" is much less in the case of Sweden. The "theft" figure is lower even than for Norway, but not by much. The "robbery" value, though, is only half that of Norway for 1982, but about the same for 1990. The explanation for the earlier discrepancy, which could range from the fact that Sweden is a much more industrialized country to differences in law enforcement practices would have to be established by local enquiry, which might be of considerable interest to Scandinavian criminal justice authorities. One factor which it is important to note here is that, because all these charts are in percentages of a fixed, artificial base rate, they give no information as to the actual incidence of the events.

Both charts show a slight rise between 'suspected' and 'prosecuted', the effect being noticeable in the case of Sweden. That may well be a function of the way an apprehension is defined in local administrative law, or reflect a practice of bringing some offenders into the system at the prosecution stage as the first instance. The Swedish charts also show a clearer

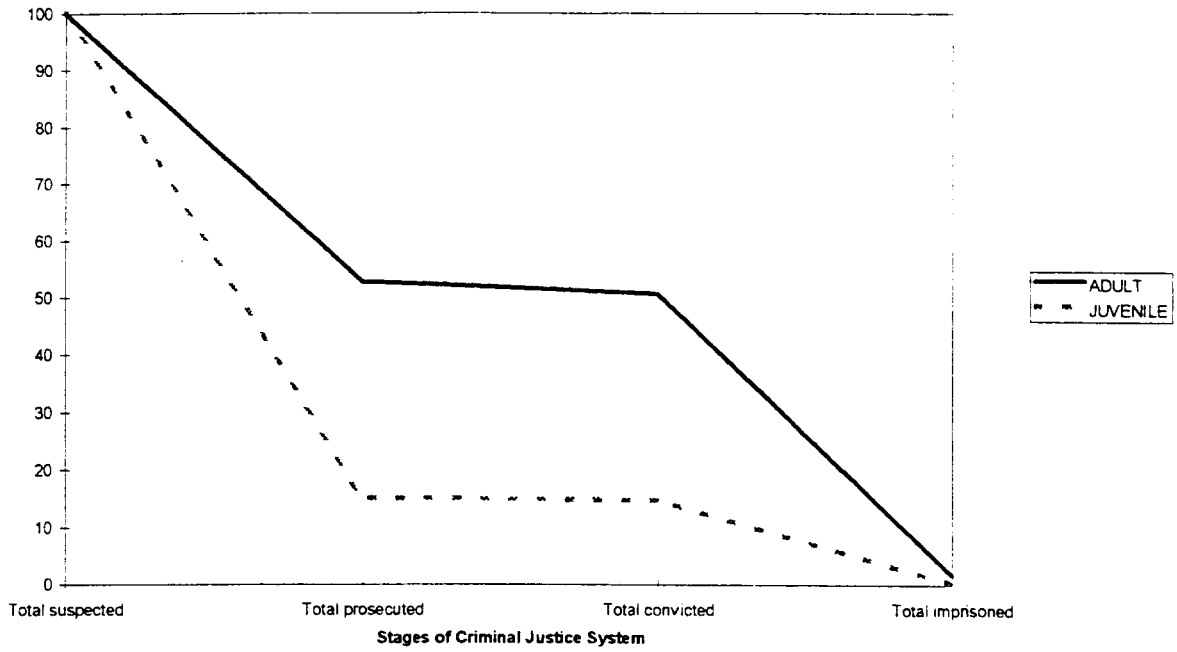
tendency not to send all those convicted to prison, especially those convicted of theft. The Swedish charts also show a greater proportion of those prosecuted for robbery not being convicted compared with the Norwegian chart. Again local study would be necessary for a definitive explanation, but the hypothesis of the effect of an much higher case load would be the first to be explored.

To illustrate the differential processing of adults and juveniles by the criminal justice system, and especially the different rates at which they are discharged from the system at the various agencies, four countries were chosen, two Asian and two European. As was explained in the preceding section, the breakdown by age was requested only in totals, rather than by crime types, at each agency stage. Therefore each of these charts is for "all crimes", and there are probably significant differences in the ways that number is generated in different national offices. While, therefore, comparison of the raw numbers could be misleading, comparison by ratio avoids that particular set of problems, although the trade-off is that there can be no consideration of the size of the country or the size of the crime problem relative to the population total.

Charts 11 & 12 show the attrition rates for Finland and the Republic of Korea. In these two charts, the y axis is the first stage of the process, 'suspected'. There is no point in referring back to a total crime rate, and the resultant graph can be larger and more sensitive to changes at each stage. Both countries emerge as low users of imprisonment, although this characteristic tends to be the case for most countries when "all crimes" is the y axis, because most crimes are relatively trivial and rarely punished with imprisonment. The serious, but statistically rarer crimes are overwhelmed and hidden in such an analysis. A detailed study of differential imprisonment rates between countries would have to be done by crime type. What is most noticeable about Finland is that the bulk of the diversion of juveniles is done at the first stage, that is, the case is not brought to prosecution; but if the prosecutors do decide to bring a formal case, it is almost certain to succeed. Presumably this reflects a policy of prosecuting juveniles formally only when it is a quite serious case which is not in dispute, and that in turn appears to be the case with adults also, but starting from a higher base. The graph for the Republic of Korea is included to demonstrate one feature which calls for some care in this type of analysis, namely that of a missing variable. As no data were given for the prosecution stage for juveniles, the graph becomes a straight line, from suspected to convicted, so that it is not possible to tell whether the profile for juveniles is in fact very close to that for adults. It does seem that the rate of imprisonment following conviction is slightly higher for juveniles than adults in Korea, and that in itself might be thought to be a question worth further study.

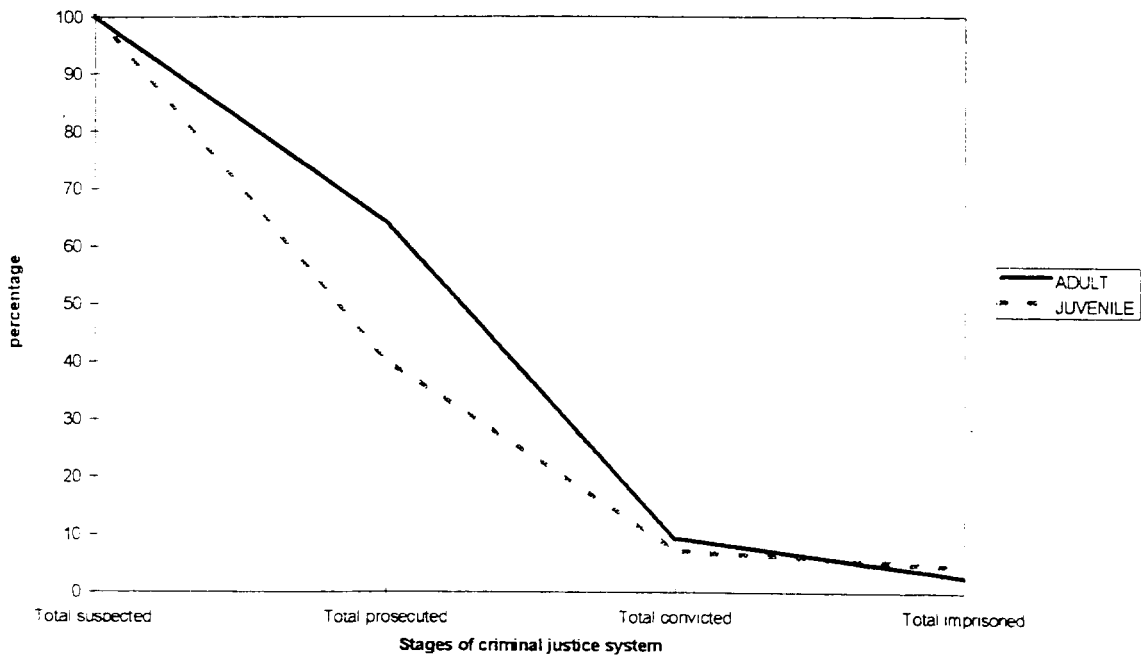
## Charts 11 & 12

Finland - Total Adults and Juveniles 1994



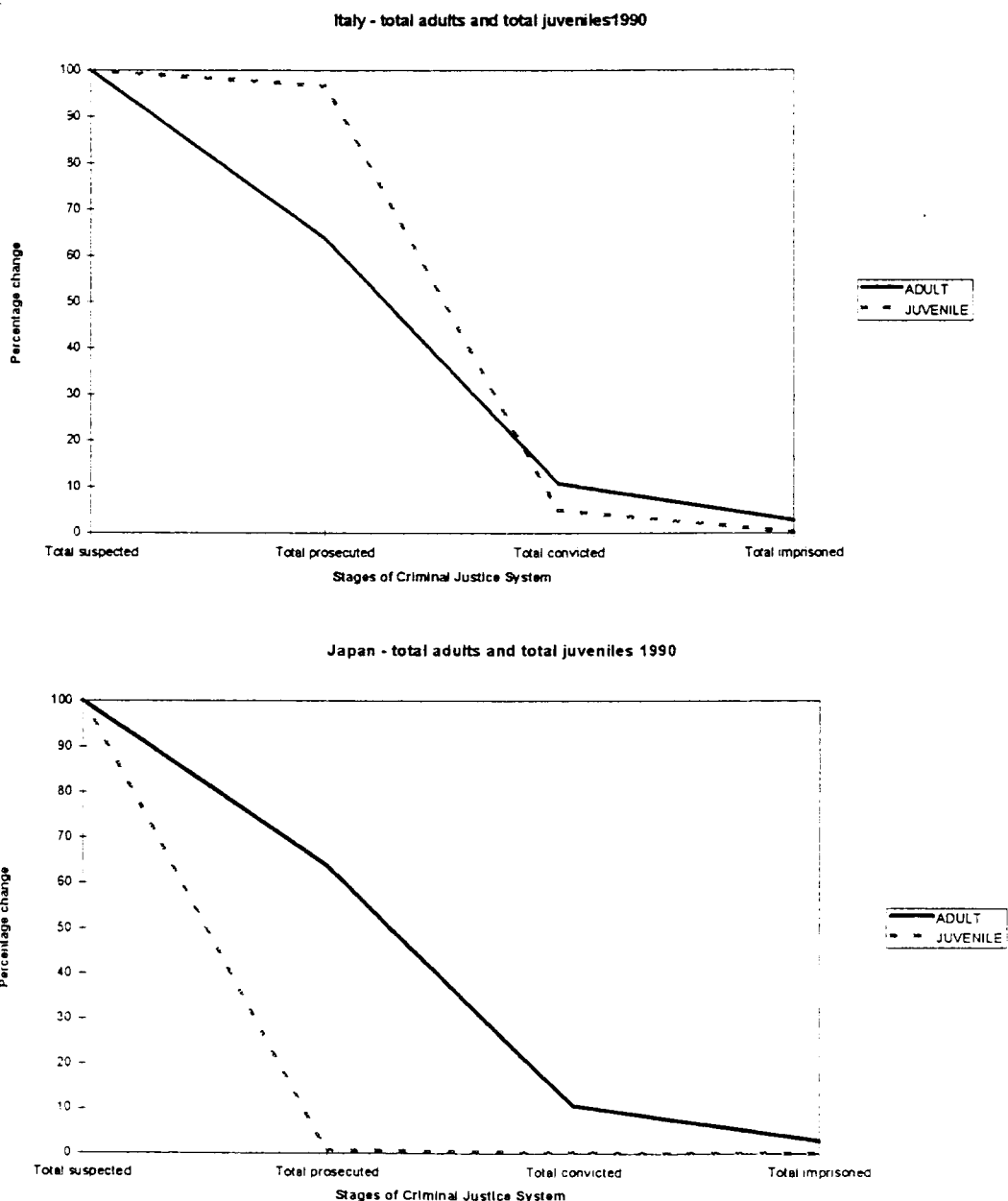
Charts 13 & 14 show the adult/juvenile filtering distinction in Italy and Japan. If the data are

Korea - total adults and total juveniles 1994



valid, the alternative scenarios are a remarkable contrast, to such an extent that the absence of a check on the validity of the data is really regrettable. The contrast is heightened by the fact that the attrition funnels in respect of adults are almost identical. If the two charts are overlaid on transparencies, it is almost impossible to distinguish between them. The situation for juveniles is the opposite for two thirds of the process, and then converging again in the last stage to give a very similar low rate of imprisonment. The reader is reminded again that these are charts of ratios, and not of actual numbers.

Charts 13 & 14

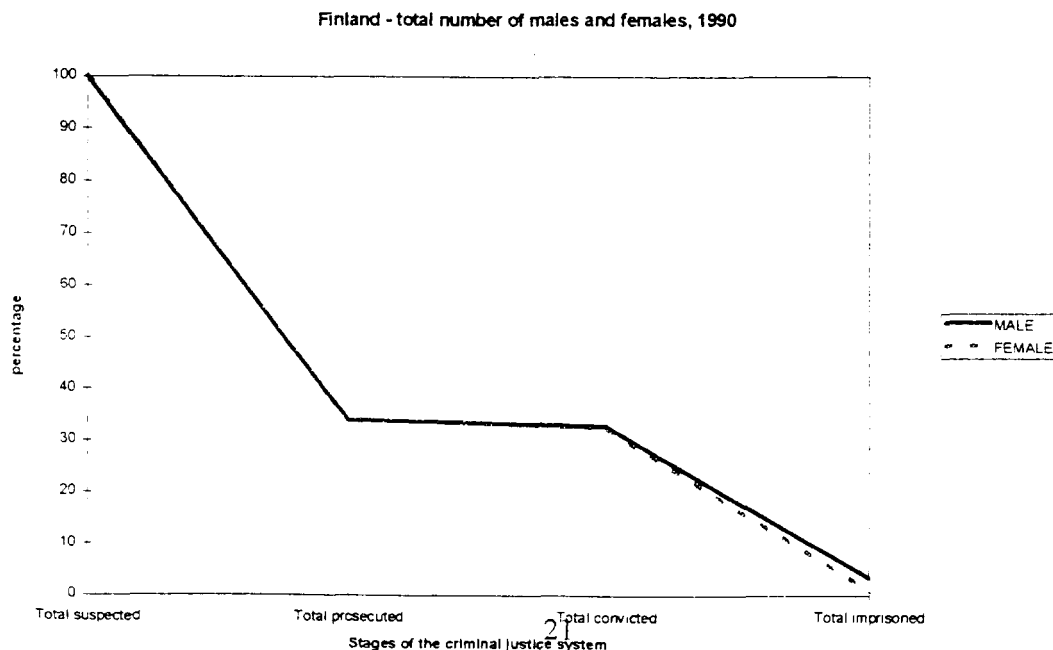


It seems that the Italian tradition is to use the formal mechanism of legal procedure to process juveniles who have been formally brought into contact with the criminal justice system, whereas the Japanese tradition is to divert their juveniles out of the system at the first possible opportunity. The Italian approach seems to have the advantage of due process, whereas the Japanese approach presumably places considerable unaccountable power in the hands of whoever makes the decision about disposition of the suspect. Justice which is not accountable is sometimes criticized as being not transparent and therefore likely to be arbitrary. On the other hand, the Japanese approach would both minimize stigma to the young offender and deliver an outcome quickly, thus avoiding delays in justice which are often regarded as undesirable as informal justice. Finally the Japanese approach presumably would be much less costly in resources.

This last example illustrates one of the main uses of this whole data set, which will be considered at greater length in the next section. That is the provision of empirical data as the foundation for international exchanges. If the data are valid, a meeting on the advantages and disadvantages of each of the approaches and the possible development of a method to obtain the best of both would have a foundation of "fact" which could provide experts on both procedures with a foundation on which to build.

The examples of filtering out from the criminal process by gender is illustrated by Charts 15 & 16 for Finland and Japan. The Finnish chart shows that gender egalitarianism is taken very seriously by the agencies of criminal justice in that country, in that the two lines overlap completely until the final stage, at which point a smaller proportion of convicted women than men are sent to prison. The Japanese data, in contrast, show a clear tendency to divert more women than men from the process, but interestingly that occurs almost entirely at the first stage, the move from first formal contact to formal prosecution. Thereafter the proportion of women diverted is actually smaller than that for men; the explanation is presumably that the majority of those women who are left in the system after the large initial diversion are cases against whom the charge is both uncontested and quite serious.

Chart 15



Japan - total number of males and females, 1990

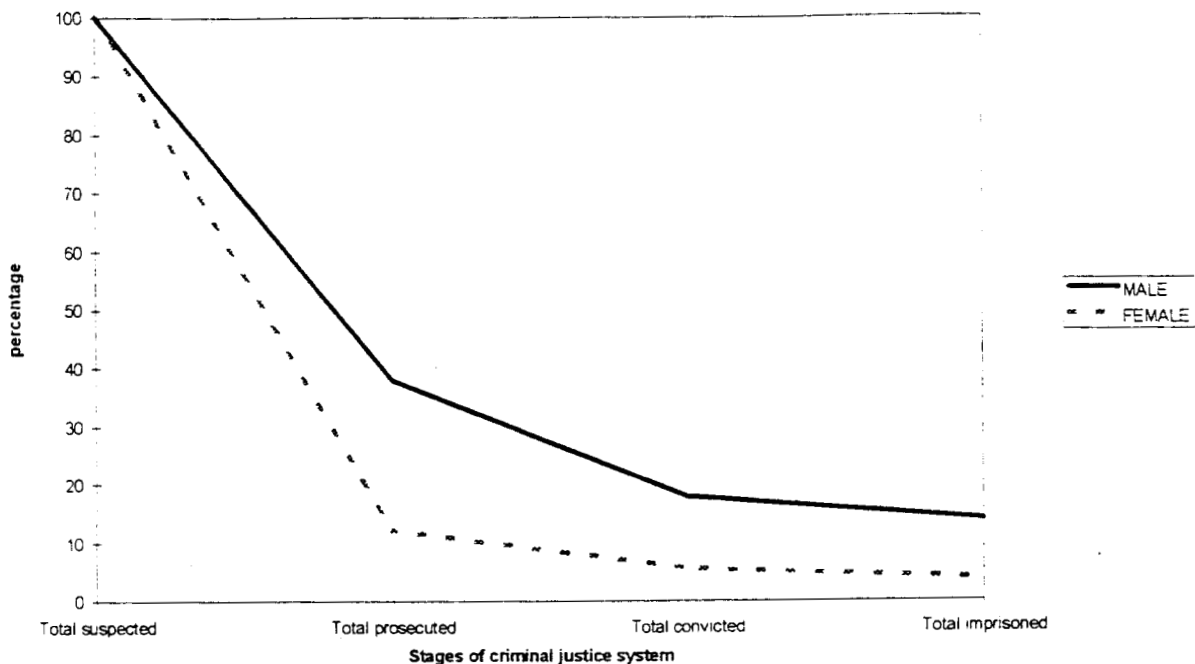
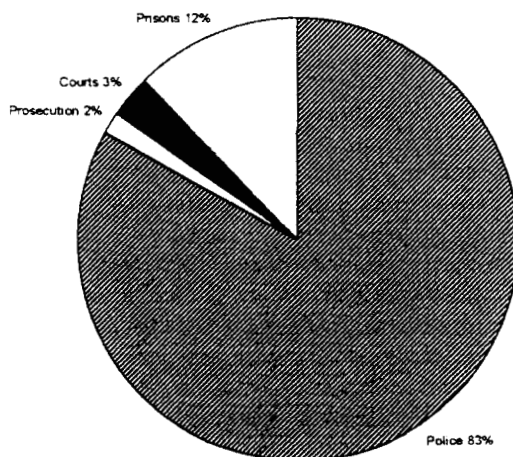


Chart 16

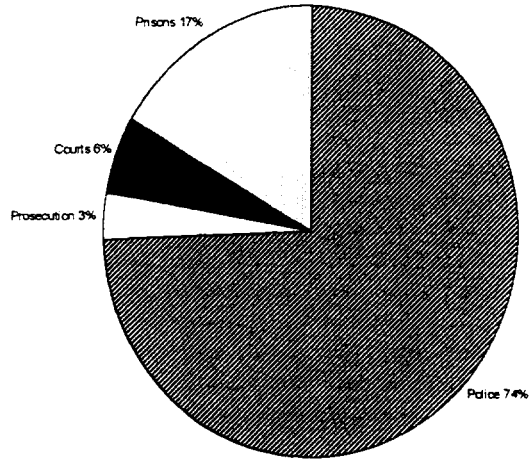
The allocation of resources to the different agencies can be most clearly represented by a pie chart. Charts 17 to 21 inclusive give examples, two European and three Asian. These countries have been chosen partly because they are among the relatively few which provided complete data, and partly because they suggest, very provisionally, an interesting regional pattern which might repay further analysis.

Belgium - Personnel 1990

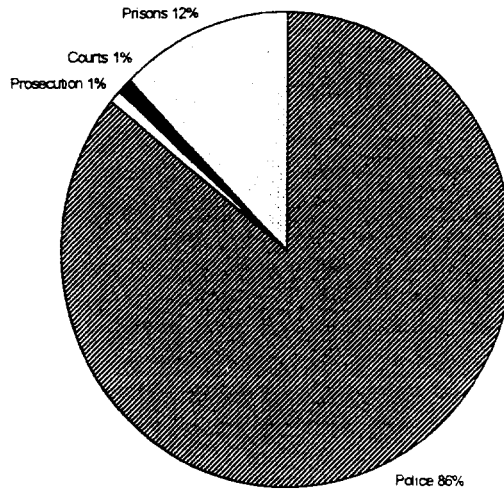




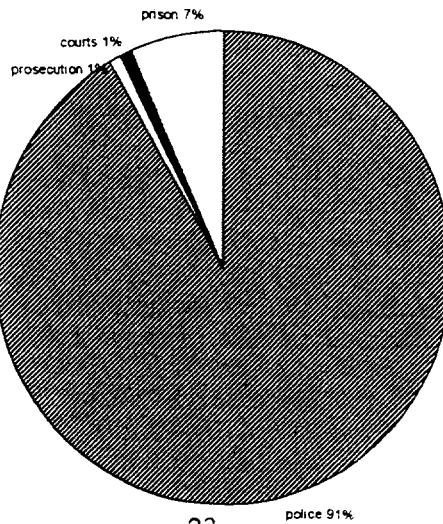
Hungary - Personnel 1990



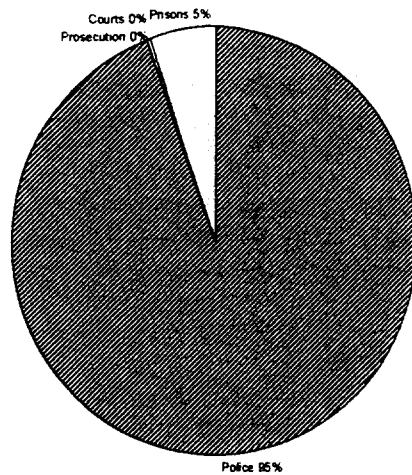
Korea - Personnel 1994



Japan - Personnel 1994



Singapore - Personnel 1990



The two European countries both show a country which, in terms of personnel, has somewhat over three quarters of its resources in the police, somewhat over one tenth in prison posts, and about one in twenty (Belgium) or one in ten (Hungary) in the trial and court stage. Comparisons with other European countries suggest that the parallel figures are roughly similar. There is, perhaps, a "Western" model. The data for the USA made such pie charts difficult to construct, but the more important point, discussed more thoroughly under the title "Federated Countries" below, is that as most of these personnel are employed at the State and local level, such charts should be drawn for the separate States. They could be drawn for Federal employees, but such charts would neither tell the reader much about the organization of criminal justice in the USA nor be comparable with national figures from any other country.

The three charts from the Asian countries of the Republic of Korea, Japan and Singapore show a different pattern. In all three the proportion of police to the other three agencies combined is much higher, and the proportion of personnel in the prosecution and court functions is very small. The same is the case also for Japan and Singapore in respect of prison personnel, but Korea is closer to the European ratio. The most important observation to be made is that it is not possible to deduce from these data why this is so, and any evaluation of which is the "better" or "worse" system would be irresponsible and unsustainable. On the other hand, it is possible to put forward some hypotheses which could then be tested, by the gathering of further data, not all of which would be numerical.

The explanation might (or might not) be one or more of the following, as they are not mutually exclusive:

- (i) the greater number of police in the Asian model enable strongly proactive strategies of crime prevention to be used, so that the actual level of crime is less. That could be checked by comparing rates for different kinds of crime, prorated per 100,000 of population.

(ii) the Asian police divert a larger proportion of the cases which come to their attention away from further formal processing. That could be checked by examining the statistics for this decision.

(iii) trial procedures in the Asian countries are conducted in some way differently from in the West, a way which is in one sense more "efficient" in that many fewer person hours per case are required. Research combining descriptive and quantitative data would be needed to test that proposition, but it is testable.

(iv) persons in Asian who are charged with an offence have to wait longer for the case to come to trial, because the input process (the police) are proportionately larger, and the processing stage smaller. That could be tested by examining data on times awaiting trial in different countries.

(vi) Asian countries make less use of prison for some (all?) crime types. That could be tested by examining data on sentencing in relevant Asian and European countries.

The possible explanations for the pattern which seems to be present in at least these data have been spelled out in some detail to illustrate one of the main uses of the data, which is the topic of the next section.

### THE USES AND LIMITATIONS OF THE DATA

This section begins with explanations of two features of the report which may seem surprising, namely the absence of discussion of prorated figures for countries and the absence of federated countries from the examples given.

Prorated values, that is the raw numbers provided by countries converted into a figure which expresses the incidence of that event per one hundred thousand (100,000) of population, are frequently used in cross national comparisons. In comparing the same category of figures in different countries, such as specific types of crime, or admissions to prison, prorating is the proper procedure because it removes the effect of the different sizes of national populations. Anyone using this data set for direct national comparisons would be justified in using prorating, and the fact that this report does not consider that type of analysis in no way implies a rejection of the method. The explanation of its non appearance is that it is not needed for the type of analysis considered here. As it has become increasingly obvious to me that there are several different main ways in which the data in this set can be analysed, I decided to concentrate on the less traditional approaches, assuming that some other researcher will carry out traditional types of analysis. I also thought it important to look closely at the question of data quality, and believe that it is important that those undertaking further analysis, including that based on prorating, establish some level of confidence in the particular subset of the data they are using

by checking its reliability.

The quality of the data returned from federated countries seems to be probably lower than that from smaller, centrally governed countries of similar cultural and socio-economic status. That would not be surprising, because in some federated countries, at least (for instance, Australia, Brazil, Canada, Germany, India, Nigeria, USA) the management of criminal justice is performed at the State or Province level, if not even more locally, with a federal system in place to deal with a very limited number of special types of crime. Most of the data requested in the UN Surveys is essentially of a management kind, that is they are the data collected by the administrators responsible for the day to day running of the system. The central federal government does not have any great need of the everyday data collected at the state or local level, nor is there usually any value for these bodies to report such data to the central government. Each state may have its own counting and recording methods, and these may not be identical.

Answering requests such as the UN Surveys is therefore intrinsically quite a lot more difficult and costly for federated countries, and this fact is probably the explanation for the possible relatively deficient data supplied. A detailed analysis which would establish whether the suggestion of less complete data from federated countries is generally valid or not, has not yet been carried out coming months. One objective of this report, therefore, is to contribute to thinking and discussion as to how this whole exercise, of UN administration and the use of the data set by many others in research, can be used to stimulate and assist federated countries in creating a centralized data set which is valuable to themselves. Some federated countries, such as the USA, have a governmental office in place, but that may not be the case all other countries of this type.

After that preamble on the ways in which the data have not been used, a review of the main ways in which it seems appropriate to use the data is itself appropriate. The word "appropriate" is reused to give emphasis to the position that there are not 'right' and 'wrong' ways of using the data, but 'better' and 'worse'.

My personal opinion is that inappropriate ways are those which rely upon the precise amount of the change in any one variable from year to year in the values; and that this is true especially of rates of recorded crime. The basis for that proposition is that all the variables which have been checked for reliability show a level of change which cannot be viewed as a good basis for the level of confidence normally considered acceptable in social science. In short there is just too much variation which could occur through errors in reporting and recording. It is not known whether these data are unreliable and invalid, but they might be. Conclusions based upon such data might be correct, and nothing in this analysis asserts that they are not, but we cannot be sure. It is a question of confidence in the validity of the results. It has been asserted in some UN fora that the data for the most recent sweep are more reliable. They are, on the whole, more complete, although there are exceptions. The reliability checks run on the data, however, do not show any lessening of variation in respect of the fifth sweep in the sample examined.

A second probably inappropriate use of the data is to test hypotheses. That is to some extent a function of the kinds of data collected, but again arises primarily over the uncertain quality of the data. The data set as a whole is unsuitable for the relatively precise and complex nature of the inferential statistical techniques used in such activities. It is a long standing principle in statistics that subtle or sophisticated techniques cannot be used on unreliable data to compensate for questionable data quality, and the level of confidence in the results cannot be higher than the limits imposed by such data.

The first appropriate use of the data is to describe, by tables and/or diagrammatically, the dynamics of the main components in the criminal justice process, by crime type or (not 'and') by age and gender across years. A criminal justice profile of a country consisting of some eighteen charts at five yearly intervals would show the main changes in input and the subsequent stages of processing, and the resources required to achieve that.

Such a picture of the workings of a criminal justice system could have two applications, at least. These are:

(A) the identification of some points of apparent uncertainty or seeming dysfunction, or of interest for some other reason, of which further specific, focussed research could be directed. That is, the models generated could be used as a framework for deriving one component of a research program in a ministry of justice or parallel body;

(B) at the international level, the provision of background information to enable a meeting, such as a workshop on comparative policy analysis, to start from a knowledge base to which reference back can be made as required, rather than it being necessary for each delegation or participant to describe the position in their own country as a preamble. The experience of the Fellow in almost thirty years of such international meetings that a lot of time is used unproductively in reaching a point where new thinking and exchange of new information can begin. On questions concerning the operations of criminal justice systems, the provision of the kind of information demonstrated in the preceding sections, for the relevant countries, years and variables would lead to a more focussed discussion in a much shorter time. By analogy, the same case could be made for its support use in parallel activities of exchange of experience and information, and joint activities in policy analysis between the individual states or provinces of a federated country..

One underlying question, often in the minds of policy and decision makers in criminal justice, is whether there is any value in knowing what is done elsewhere. One appropriate use of this material could be to support the argument that there is. Other people might be handling a given problem in a different way because, from some overall picture like this, they realise that the solution to their problem lies in persuading another agency to change its way of doing something. The advantage of simple graphic representations of "the big picture" is that they show, by different slices of pie or different slopes on a graph, that the same agencies in different countries have different patterns of processing; such pictures can be the first step in lateral thinking. One impression that the author has acquired over many years interest in and periodic visits to different parts of the criminal justice machinery is that agencies do not take much interest in how others operate or how changes in their own operations could help other agencies. Clearly that is not a universal truth; but material such as this can provide a foundation

for what the international community calls, perhaps more in hope than accuracy, "international exchanges of information and experience".

Such an approach might therefore turn out to be a model which could be used for the comparison of criminal justice management and practices in the different States of a Federated country. Such analysis would **not** indicate whether one method or policy is better than another, and it would **not** imply any external or central control, even if it mostly carried out at that level as a preliminary to the States undertaking it for themselves. What it would make feasible is a basis for comparing the way in which two (or more) different States organize their criminal justice systems, and from which, if those States wished, relative evaluations of efficiency or whatever parameter is of interest can be measured. It would be a useful, but non-prescriptive tool, in facilitating the process by which States learn from the experience of others States. What is valid and appropriate between States of a Federated country is, of course, equally so between separate sovereign states.

The second of the 'most appropriate' uses of the data set returns to the topic of hypotheses. While the use of these data for hypothesis testing was described as questionable earlier in this section, the use of the data for hypothesis **generating** is both appropriate and potentially very fruitful. Some examples have been given in the text above, such as the possible explanations of the difference between Asian and European resource allocation, especially in respect of prosecution and courts.

Some relatively simple hypotheses can be created to see whether a typology of countries based on the structure and dynamics of their criminal justice systems is feasible and meaningful. For instance:

(a) is it the case that certain countries of any main group which have a similar pattern in, say, the filtering out of juveniles, can be placed in the same category along other dimensions, or in other respects do they belong more with other countries?

(b) do countries which have a very high (or very low) ratio of prosecutors to police officers (or judges) know that this is the case? Is it a deliberate policy or simply a continuation of past, unexamined, practices? Can it be shown, either from the survey data or by information gathered within the country, that this has any discernible impact on case flows (for instance, time spent awaiting trial, on which data were not collected in the UN surveys), or proportion of cases carried through to the next stage?

(c) can some kind of mean score for various ratios between agencies be computed, (e.g. 20 police officers to 1 prosecutor to 2 judges to 5 prison staff), and would that be of assistance in policy analysis? Would it be feasible and useful to try to evaluate such data in terms not only of the most common structure, but the "optimal" one (and what would be the criteria for optimality)?

(d) what light can be thrown on the operations of criminal justice systems by an examination of any discrepancy of the resources profile generated from money resources and personnel resources data?

Three observations, at least, apply to such questions:

- (i) most would require the collection and analysis of further data collected for the purpose, i.e. field work of some kind;
- (ii) such questions could provide a factual basis for international exchanges of information and experience in various meetings which would make them much more focused and specific than seems often to have been the case;
- (iii) selected topics from a thorough inventory of such questions would provide an empirical platform for a programme of international research at an appropriate location.

## CONCLUSIONS AND RECOMMENDATIONS

The main conclusion to this report is that the underlying rationale of any analysis of this data set should be predicated on the approach sometimes referred to as the "progressive reduction of uncertainty". That is to say, first, that one of the main functions of many pieces of research is to create the base from which the next generation of more specific questions can be derived, asked and answered, and secondly that the more precisely a question can be asked, the greater the information value of the response. This approach conceptualizes research as moving along a continuum from some kind of primordial epistemological chaos, in which, for instance, the problem is not to test hypotheses but rather to identify them, to one of conceptual clarity where the objective is to obtain precise values for clearly specified factors or dimensions. The values may or may not be quantitative measurements, but they very probably contain more information if they are. The UN surveys are best seen as an activity toward the starting end of that continuum, so that better questions are a reasonable expectation, but any answers, in the sense of hypotheses strongly supported, should be regarded with some scepticism, if only because of the quality of the data.

The three main recommendations of this report are that organizations and individuals should be encouraged to use the data set for various kinds of research, including but not limited to those approaches illustrated in this report; that the main use should be to ask more precise questions, rather than hope to answer them; and that NIJ/BJA should use their status to urge the UN to put more effort into ensuring data quality, even if the tradeoff is less data quantity. 10 reliable and perhaps valid data points are worth more than twenty data points of questionable reliability and doubtful validity.

## TECHNICAL ANNEX 1

The figures for the percentage of matches for the overlapping years were derived by the following procedure. The years 1980(2), i.e. the data for 1980 as provided by countries in response to the second sweep, and 1980(3), the data for 1980 as provided by countries in the third sweep, for 1986(3) and 1986(4), for the third and fourth sweeps, and 1990(4) and 1990(5) for the fourth and fifth sweeps were taken from the data set and made into separate files. For variables 34 through 50, and 52 & 53, the two readings for the same year were juxtaposed and compared, and when they were identical, deleted as being matching. That occurred only in a minority of cases.

The procedure in SPSS is :

e.g. merge files 'Huncj90(4)' and 'Huncj90(5)'  
[open 'Huncj90(4)'  
data > merge files > add variables  
open Huncj90(5)  
use v001 as key variable]

With this new file, it is then possible to carry out the compute statements.

The following is an example of the compute statement in syntax for finding matches in overlapping years, where diff34 is the new variable showing the difference between the same variable in the two sweeps:

```
COMPUTE diff34 = v034_90 - v034_904 .  
EXECUTE .
```

```
FREQUENCIES  
VARIABLES=diff34 .
```

This gives the cases which are exact matches (i.e. the number is the same for both sweeps giving a result of 0); a closer look is required to see whether the matches are within 10%. For example, in the variable given above, the number of 0's, indicating that the two numbers are exactly the same is 48.7%. In the table 1 on p.5, the percentage is given as 66.



The figures for the comparison across years were generated by the following procedure. For a given country and variable, the availability of data was checked, and a separate file created. For the adjacent years, the smaller was subtracted from the larger figure, the product of that was divided by the larger figure, and the product of that multiplied by 100. As the purpose of the procedure was to establish to size of the change from one year to the next, but was not concerned with the direction of the change, it did not matter whether the first or second of the two figures is the larger, i.e. whether the change is an increase or decrease in the incidence. For the lagged years, the base year was established as 1975 when the data were available in the second sweep and 1980 when they were available only in the third sweep. Alternatively, for the analysis within a given sweep, the first year of that sweep became the base year. The base year was then subtracted from the year each of the years in turn, or they from it if they were the smaller number, and the product again divided by the larger number and multiplied by 100.

These procedures gave the value for the rate of change of the incidence of the variable in question as a percentage relative to either the preceding or the base year, and were plotted on a line chart as exemplified by Charts 1-6.

An example of the syntax of the compute statement in SPSS is as follows, where 'd42d7576' is a new variable representing the difference between 1975 & 1976

\*ADJACENT YEARS V042 (RECORDED ROBBERY)

```
IF (v042_76 >= v042_75) d42d7576 = (v042_76 - v042_75) / v042_76 * 100 .
EXECUTE .
IF (v042_75 >= v042_76) d42d7576 = (v042_75 - v042_76) / v042_75 * 100 .
EXECUTE .
IF (v042_77 >= v042_76) d42d7677 = (v042_77 - v042_76) / v042_77 * 100 .
EXECUTE .
IF (v042_76 >= v042_77) d42d7677 = (v042_76 - v042_77) / v042_76 * 100 .
EXECUTE .
IF (v042_78 >= v042_77) d42d7778 = (v042_78 - v042_77) / v042_78 * 100 .
EXECUTE .
IF (v042_77 >= v042_78) d42d7778 = (v042_77 - v042_78) / v042_77 * 100 .
EXECUTE .
IF (v042_79 >= v042_78) d42d7879 = (v042_79 - v042_78) / v042_79 * 100 .
EXECUTE .
IF (v042_78 >= v042_79) d42d7879 = (v042_78 - v042_79) / v042_78 * 100 .
EXECUTE .
IF (v042_80 >= v042_79) d42d7980 = (v042_80 - v042_79) / v042_80 * 100 .
EXECUTE .
IF (v042_79 >= v042_80) d42d7980 = (v042_79 - v042_80) / v042_79 * 100 .
EXECUTE .
IF (v042_81 >= v042_80) d42d8081 = (v042_81 - v042_80) / v042_81 * 100 .
EXECUTE .
IF (v042_80 >= v042_81) d42d8081 = (v042_80 - v042_81) / v042_80 * 100 .
EXECUTE .
IF (v042_82 >= v042_81) d42d8182 = (v042_82 - v042_81) / v042_82 * 100 .
EXECUTE .
IF (v042_81 >= v042_82) d42d8182 = (v042_81 - v042_82) / v042_81 * 100 .
EXECUTE .
IF (v042_83 >= v042_82) d42d8283 = (v042_83 - v042_82) / v042_83 * 100 .
EXECUTE .
```

IF (v042\_82 >= v042\_83) d42d8283 = (v042\_82 - v042\_83) / v042\_82 \* 100 .  
EXECUTE .  
IF (v042\_84 >= v042\_83) d42d8384 = (v042\_84 - v042\_83) / v042\_84 \* 100 .  
EXECUTE .  
IF (v042\_83 >= v042\_84) d42d8384 = (v042\_83 - v042\_84) / v042\_83 \* 100 .  
EXECUTE .  
IF (v042\_85 >= v042\_84) d42d8485 = (v042\_85 - v042\_84) / v042\_85 \* 100 .  
EXECUTE .  
IF (v042\_84 >= v042\_85) d42d8485 = (v042\_84 - v042\_85) / v042\_84 \* 100 .  
EXECUTE .  
IF (v042\_86 >= v042\_85) d42d8586 = (v042\_86 - v042\_85) / v042\_86 \* 100 .  
EXECUTE .  
IF (v042\_85 >= v042\_86) d42d8586 = (v042\_85 - v042\_86) / v042\_85 \* 100 .  
EXECUTE .  
IF (v042\_87 >= v042\_86) d42d8687 = (v042\_87 - v042\_86) / v042\_87 \* 100 .  
EXECUTE .  
IF (v042\_86 >= v042\_87) d42d8687 = (v042\_86 - v042\_87) / v042\_86 \* 100 .  
EXECUTE .  
IF (v042\_88 >= v042\_87) d42d8788 = (v042\_88 - v042\_87) / v042\_88 \* 100 .  
EXECUTE .  
IF (v042\_87 >= v042\_88) d42d8788 = (v042\_87 - v042\_88) / v042\_87 \* 100 .  
EXECUTE .  
IF (v042\_89 >= v042\_88) d42d8889 = (v042\_89 - v042\_88) / v042\_89 \* 100 .  
EXECUTE .  
IF (v042\_88 >= v042\_89) d42d8889 = (v042\_88 - v042\_89) / v042\_88 \* 100 .  
EXECUTE .  
IF (v042\_90 >= v042\_89) d42d8990 = (v042\_90 - v042\_89) / v042\_90 \* 100 .  
EXECUTE .  
IF (v042\_89 >= v042\_90) d42d8990 = (v042\_89 - v042\_90) / v042\_89 \* 100 .  
EXECUTE .  
IF (v042\_91 >= v042\_90) d42d9091 = (v042\_91 - v042\_90) / v042\_91 \* 100 .  
EXECUTE .  
IF (v042\_90 >= v042\_91) d42d9091 = (v042\_90 - v042\_91) / v042\_90 \* 100 .  
EXECUTE .  
IF (v042\_92 >= v042\_91) d42d9192 = (v042\_92 - v042\_91) / v042\_92 \* 100 .  
EXECUTE .  
IF (v042\_91 >= v042\_92) d42d9192 = (v042\_91 - v042\_92) / v042\_91 \* 100 .  
EXECUTE .  
IF (v042\_93 >= v042\_92) d42d9293 = (v042\_93 - v042\_92) / v042\_93 \* 100 .  
EXECUTE .  
IF (v042\_92 >= v042\_93) d42d9293 = (v042\_92 - v042\_93) / v042\_92 \* 100 .  
EXECUTE .  
IF (v042\_94 >= v042\_93) d42d9394 = (v042\_94 - v042\_93) / v042\_94 \* 100 .  
EXECUTE .  
IF (v042\_93 >= v042\_94) d42d9394 = (v042\_93 - v042\_94) / v042\_93 \* 100 .  
EXECUTE .