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COLLOQUY ON DATA PROCESSING SYSTEMS
IN THE FIELD OF CRIMINAL JUSTICE

organised by the Ministry of Justice
of the Netherlands
in co-operation with the Council of Europe

CRIMINAL JUSTICE PLANNING AND EVALUATION - AN APPLICATION OF THE SVEJUS SYSTEM

(Memorandum No 104 1978-08-29)

submitted by Jan EKLÖF, Sweden

Ministry of Justice
Planning and Budget Secretariat

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ABSTRACT

The needs for more rational and systematic planning and evaluation of the Criminal Justice System (CJS) has been stressed during the last years. A great number of theoretical models have been developed in different countries. However, there is an evident lack of documentation and information on practical applications and real impacts of these models and systems, at least on the policy and programme planning levels.

At the Ministry of Justice in Stockholm a quantitative computer-based planning model for the CJS, called SVEJUS, is being developed. One part of the work is based on the JUSSIM-model as created by Dr. Blumstein at Carnegie Mellon University. The system is used as a tool for describing and evaluating the present state of the CJS as well as for the study of probable effects of proposed modifications within the system and anticipated changes in the environment. It can be used for static (steady state) as well as dynamic analysis.

In the paper the SVEJUS model is briefly presented and discussed. The structure identification, numerical modelling and parameter estimation are shortly commented upon.

The second part of the paper is devoted to a presentation of an empirical analysis of a simulated reform. The results of the model runs are given as numerical average estimates and in terms of sensitivity figures.

At the end of the paper a few general conclusions and special comments on the applicabilities and problems of the model for practical policy planning are given.

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Introduction

The aim of this paper is to present and discuss a few quantitative instruments used within the Ministry of Justice for aggregate planning and evaluation of the Swedish criminal justice system (CJS). The presentation is limited to applications within CJS. However, most of the models and special techniques presented can equally well be used for analyses in the rest of the judicial field. In fact many of them have been used also for studies of the procedures involved in the handling of civil cases (5).

The paper is divided into two parts. In the first part the organisation of central government and criminal justice as well as the general planning and budgeting procedures are very briefly sketched. Part one ends with a description of a special planning system for the CJS called SVEJUS.

Part two contains an empirical study of possible effects for the CJS from a simulated change in the number of registered tax offences. The analysis is carried out by means of numerical simulations in the SVEJUS model system. At the end of the report a few general comments on the applicability of the quantitative ~~instruments~~ techniques are given.

Organisation and administration of Justice (1)

A basic characteristic of the Swedish Civil Service is that it is organised at two separate levels - ministries (departement) and agencies or boards (ämbetsverk). The former are primarily responsible for the framing of policy, the latter primarily for its execution.

The civil service in the ministries assists the ministers by preparing the cases and drafting the decisions. With some minor exceptions (chiefly concerning matters to do with the personnel at the ministry) the civil servants have no power to decide any matter belonging to the field covered by the ministry. The power of decision is invested collectively in the government.

The ministries constitute the government offices which the Instrument of Government stipulates for the preparation of government business. There are 14 ministries at present: Justice, Foreign Affairs, Defence, Health and Social Affairs, Communications, Economic Affairs, Budget, Education, Agriculture, Commerce, Labour, Housing and Physical Planning, Industry and Local Government. The Ministry of Justice is responsible for the largest bulk of new legislation.

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(1) This section, and the next one, is based on (13).

The function of the ministries can be described under five main headings namely policy, planning, activities directed towards the parliament, activities which follow from decisions taken by parliament, reserved matters and administrative appeals. The first one - policy planning - is of course the most important. The second and third follow from the role of the government as the link between parliament and the agencies. The last two follow from the existing relations between government and agencies.

In Sweden, the spadework in the preparation of bills is done by commissions of inquiry, legal experts in the ministries, and Riksdag committees. Initiatives for new legislation can come from the government or a government agency, from professional and trade union organisations or from other associations. Another common procedure is that the Riksdag, on the basis of motions, introduced by individual members, makes representations for an inquiry to be made concerning legislation on a certain question. It is nowadays the exception rather than the rule for one or more members of the Riksdag to present a complete legal draft for consideration.

Commissions of inquiry. As a first step the sponsoring Minister, with the approval of the government, appoints a commission of inquiry. If the proposed measure has political implications, the commission will usually consist of politicians from different parties and representatives of important interest groups, presided over by a high-ranking judge or civil servant. Junior judges will usually officiate as experts and secretaries. The scope of inquiry is defined by terms of reference, which are generally worded and at the most give an outline of the objectives sought. Depending on the nature of the task, the terms of reference may sometimes be quite broadly formulated while in other cases they may be characterised by detailed and goal-oriented directives. Swedish legislative commissions are noted for carrying out extremely full and detailed inquiries. The results of their work are generally presented in a report which usually contains an exhaustive account of the present state of affairs in the field concerned (often with references to legal systems in other countries), a general justification of the changes proposed, and detailed draft proposals with commentaries on each clause.

To a certain extent, inquiries into matters of legislation are carried out in the ministry principally concerned, with the assistance of the ministry's own officials. This form of inquiry has become increasingly common during recent years, especially with regard to legislation that is particularly urgent.

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Legislative work in the ministries and the Law Council. When a commission has finished its work, its recommendations are examined by the affected ministry's legislation department. The commission's report is then sent out for submissions, ie for comment by interested authorities and organisations. If the proposed legislation is of more than average importance, as many as a hundred bodies may be invited to render submissions, and some of these may run the size of small books. On the basis of the report and the invited comments, the matter is prepared by experts within the ministry. The Minister concerned and the government then take up a position on the question. If it is decided to proceed with the matter, the ministry will prepare a bill. The government may refer this bill to the Law Council for its opinion. The Law Council scrutinises the bill from a legal point of view with particular reference to its co-ordination with other legislation and the quality of its formulation. After making such changes that are thought desirable in view of the Law Council's opinion, the government presents the proposal as a bill to the Riksdag.

The parliamentary phase of legislation. The most important part of the Riksdag's legislative work is performed within committees which are organised according to subject areas mainly following the ministerial division. Their composition reflects the political division of strength in the Riksdag. Every committee has access to experts within its field. The committee deals with the government's bill and with motions containing various amendments which are usually called forth in connection with bills of major importance. The committee's work results in a report which contains a declaration of attitude towards the bill, often accompanied by reservations from minority groups within the committee. The bill and the report are subsequently dealt with at a plenary sitting of the Riksdag which after a debate votes on the bill. The Riksdag's decision is announced in a letter to the government.

Promulgation. The laws decided on by the Riksdag are promulgated by the government. The enactments made by the government are published in an official publication, Svensk Författningssamling, SFS.

The different agencies and boards under the Ministry of Justice are listed on sketch 1, below. As seen on the sketch all main agencies involved in the execution of criminal cases belong to the Ministry of Justice. From a planning point of view this situation gives outstanding possibilities for a systematic analysis of the total process.

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The main activities are those of the police, public prosecutors, law courts, legal aid offices, the penal administration and the distraint administration. The largest items of expenditure concern measures designed to prevent crime.

The police administration was transferred from the local to the central government sector in 1965 and has been greatly reinforced, the number of policemen having risen from about 11,000 in 1964 to more than 15,000 in 1978-79. This has been accompanied by technical improvements.

The judiciary is largely a three-tiered organisation: criminal cases and civil actions are handled by what are known as district courts, courts of appeal and, as the final instance, the Supreme Court, the corresponding instances for administrative cases are the county administrative courts of appeal and the county fiscal courts of appeal, the administrative fiscal courts of appeal and the Supreme Administrative Court. Finally, certain types of cases are brought before special courts: rent courts, the Labour Court, the National Social Insurance Court and the Market Court.

The possibility of obtaining legal advice and assistance was greatly improved from the beginning of 1973-74. In principle, an individual is entitled to legal aid for any judicial matter regardless of whether this is handled by a court of law or other authority or concerns advice or assistance in negotiations and the like. The individual contributes to the costs of legal aid according to his/her ability. Legal aid is provided by private lawyers as well as by the 30 State-owned law offices that have been set up to date.

The penal administration covers prisons as well as open correctional treatment. The prisons, with a staff of about 4,200 have an average of about 3,500 inmates. Their size ranges from 15 to 230 places. Various occupations can be provided for the internees, ranging from different kinds of workshops to therapeutic work. A large proportion of internees take study courses. The time spent in prison is to be used so that the prisoner is in a better position after his release. Leave of absence is to be used to encourage prisoners to keep in touch with relatives and other persons in society.

Open correctional treatment has a clientele of about 16,000. The staff comprises about 820 full-time employees and some 12,000 voluntary, paid probation officers. Open correctional treatment is undertaken in close contact with other public bodies such as municipal social welfare, hospitals and the employment service.

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SKETCH 1

Organization of The Administration of Justice in Sweden
1978-09-01

THE GOVERNMENT

Ministry of Justice

POLICE ORGANIZATION	ORGANIZATION OF PUBLIC PROSECUTION	COURT ORGANIZATION	CORRECTIONAL ORGANIZATION	OTHER BODIES
National Police Board	Chief Public Prosecutor	National Courts Administration	National Correctional Administration	Attorney-General
National Laboratory of Forensic Science		Supreme Court		Enskilled Estate Commission
23 County Police Commissioners	21 County Public Prosecutors	8 Courts of Appeal	22 National Correctional Institutions	Data Inspection Board
118 Police Districts	Offices of the District Public Prosecutors, 83 districts	108 District Courts	51 Remand Prisons	National Council for Crime Prevention
				Commission for Computer Register of Real Estate
				183 Representatives for freedom of the press matters
				Commission for Bookkeeping

COURT ORGANIZATION	CORRECTIONAL ORGANIZATION	OTHER BODIES
Supreme Administrative Court		Advisory Board for Appointment of Judges
Apartment Appeal Court		Recruiting Board for Junior Posts in Court and Administration
5 Administrative Courts of Appeal [1]	8 County Correctional Administrations	Correctional Board; Internment Board; Youth Prison Board
Tenancy Tribunals, 12 offices	63 Local Correctional Institutions	46 Probation Districts
Rent Tribunals, 12 offices		
8 Public Legal Aid Boards		
25 Public Lawyer Offices		

PUBLIC PROSECUTION	CORRECTIONAL ORGANIZATION
3 First Public Prosecutors (Stockholm, Göteborg, Malmö)	45 Local Supervision Boards
4 County Public Prosecutors for special cases	

[1] From 1977-01-01 4 Administrative Courts of Appeal

Central economic planning and programming

The Swedish fiscal year runs from 1 July to 30 June. The budget procedure starts in the government agencies during the winter or spring of the preceding calender year, the work being done on the basis of directives issued by the Minister of the Budget. The agency requests have to be presented to the competent ministries not later than 31 August. The Ministry of Justice receives budget requests from all agencies listed on sketch 1, above.

The next step in the budget procedure lasts until 15 December and essentially consists of negotiations between the ministries responsible for the activities in question and the Ministry of the Budget. These activities concerning the expenditure side of the budget are continuously supplemented by an analysis of the estimated revenues as well as of the prospects for the economy as a whole. The outcome of the process is the Budget Bill (budgetpropositionen), containing the economic policy statement (finansplanen), the draft budget (förslaget till statsbudget) and a survey of the national economy (nationalbudgeten), which is presented to parliament in January. For some expenditure items preliminary estimates only are given in the Budget Bill, the final proposals being presented in separate bills during February and March. Even so the Budget Bill is a document of about 4,000 pages, outlining all the government proposals in great detail.

During the fifteen days immediately following the presentation of the Budget Bill, members of parliament have the right to introduce their own proposals on matters dealt with in the bill. On the basis of a report from the Standing Committee on Finance a general debate is then held in parliament, relating to the economic policy pursued by the government and the government's evaluation of the prospects for the economy as shown in the economic survey. This general debate finishes with a decision regarding economic and budgetary policy. The rest of the Budget Bill together with the proposals introduced by the members of parliament is referred to the standing committees dealing with the expenditure side. The committees deal with the proposals successively. When a group of proposals has been decided upon in the committee in question, a report on these proposals is presented to parliament as a basis for its decisions in these matters. These decisions, which constitute a final standpoint on the government proposals, are the basis for the execution of the budget. As the decisions are taken, parliament serves formal notice of them on the government, which then issues appropriation directions (regleringsbrev) to the government agencies.

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Late in April the government presents a Supplementary Budget Bill (kompletteringspropositionen), summing up the various bills presented after the Budget Bill and containing a revised economic policy statement (reviderade finansplanen), a revised revenue estimate and a revision of the economic survey presented in the Budget Bill (reviderade nationalbudgeten).

During the fiscal year, new expenditures or increases of limited expenditures put down in the budget may be enacted by supplementary budgets (tilläggsbudgetar).

In conclusion it should be mentioned that since the fiscal year 1959-60 the Supplementary Budget Bill contains an appendix analysing the medium-term development of revenues and expenditures (långtidsbudget). Originally this medium-term picture was based on information collected in February from the agencies concerned and covered a three-year forecast. From 1965 onwards, information has been collected in September, together with the normal annual agency requests, and the forecast has been extended to cover a four-year period. The medium-term budget is, however, still presented together with the Supplementary Budget Bill. It should be noted that the medium-term budgets are essentially informative and parliament is not requested to act upon them.

Aims of the CJS planning system

As indicated above much of the practical work in the law-making process is carried out within the Ministry of Justice. Moreover, the ministry is intensively involved in the overall planning and programming in the judicial field.

These main tasks require special instruments for planning, analysis and evaluation within the judicial field. Thus the purposes of the desired model system can be classified in the following headings:

- regular economic planning
- system description
- system simulation
- performance evaluation

Regular economic planning includes the yearly budget process and the medium-term budget as well as planning for long-range capacity investments or reductions. The degree of flexibility certainly varies with the planning horizon. In the short-term budget most resources are relatively fixed and it is mainly a question of an effective allocation of existing resources on the aggregate level. The level of input may only be changed on the margin. In the medium-and long-term perspective more factors are free and variations may be accepted within wider boundaries.

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The concept system description stands for a need to systematically describe and analyse trends in production, costs and output in CJS and to identify significant inter-dependencies within the process.

System simulation refers to the need of analysing possible effects of planned reforms and changes in the law structure as well as changes in procedures. The effects in society of new or amended legislation are of many different types. Generally, however, it is often difficult to fully predict what they will be. Some form of models, allowing for possible effects of different kinds to be systemised and summarised is needed in the law-making process.

Performance evaluation refers to the need of systematic analysis as to what actually happens after a reform or change in administrative practice. From a logical point of view this question can be seen parallel to the above mentioned one. It is just a change from an ex ante to ex post analysis of effects. However, the methodology may be another in this case as some data on the effects can be obtained all the time the reporting system has been well designed. In general ex post evaluations either on a full or pilot scale may rest more heavily on real observations and less on theoretical models than is needed in ex ante simulations.

The SVEJUS system

In order to fulfill the purposes discussed above a system of special models and other quantitative instruments are being developed at the Ministry of Justice. The following four are introduced here:

- CJS documentation
- forecasting model
- CJS model
- environment analysis

It is to be stressed that these models are just a few of the many planning systems which exist within the judicial field and they are not yet in regular use but applied by way of experiment. In the Ministry of Justice as well as in the different agencies and boards a number of other models and systems are in effect for the regular economic planning and programming as well as for the analysis of special questions.

The presentation below is concentrated to the CJS model, while the structure of the other planning and evaluation means are just very briefly outlined. This is due to the fact that the empirical experiment to be discussed in part two is based

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on a simulation of the CJS model. The CJS model together with the forecasting model are also from a methodological point of view the most interesting and elaborate ones in force so far. For a more comprehensive description of the other models the reader is referred to the reports mentioned in the text.

Even though the different models are strongly inter-dependent from a logical point of view, they are not fully integrated in practice. At present they can be seen as more or less independent means in the planning process. The motive for the development of new and improved instruments is a stressed need for better and more accurate means in the practical planning and decision-making process within the Ministry of Justice. We are not up to create a nice theoretical structure but just a practical and applicable system of means. The different models are regularly updated and scrutinised to better fit the direct needs of the ministry.

CJS documentation

Results obtained from practical research and development efforts within the judicial field - both in Sweden and abroad - are systematically collected and analysed. This is seen as a source of knowledge on possible improvements of the organisation and administration set up as well as a general bank of ideas for the lawmaking process.

So far the work in this respect has been mainly devoted to a comprehensive survey on recent results in the fields of police administrative research (eg effects of alternative patrol methods and different crime prevention schemes) and research on effective prosecution and court procedures. Short summaries of current interest are regularly compiled and communicated to involved parties (8).

Forecasting model

In order to obtain a systematic analysis of regional variations in the number of reported crimes and thereby also of the resources required for crime control, a special model known as REGION DATA has been devised. Using this model, the relation between the number of reported crimes and various so-called environmental variables can be analysed. In addition, prediction of crimes reported to the police can be generated at regional levels and for the nation as a whole as a function of the expected development in the selected set of environmental variables. These predictions may be seen as a supplement to traditional trend forecasts.

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The underlying statistical model is of the multivariate linear regression type. The general structure is mainly based upon sociological theories on the courses of crimes. The model parameters have been estimated with ordinary least squares techniques on a combination of time series and cross section data. For the numerical calculations standard computer programmes like SPSS (10) have been used.

At present there is a reference register containing data on crimes and environment factors for the period 1971-77 at the police district level. The data base contains some 25 environmental variables and about as many crime variables for the 118 police districts and seven years. For most environment variables exogenous forecasts for 1980 and 1985 are also included in the data base.

The model is regularly run to generate up-to-date forecasts of the expected number of registered crimes for the nation and for a number of regions (24 län). Numerical forecasts for a planning horizon of three and five years are given for a number of crime groups (11).

CJS model

In 1975 a project to create a simulation model of the Swedish Criminal Justice System was initiated at the planning and budget secretariat within the Ministry of Justice. The work is based on ideas developed by Dr. Blumstein (3) and others in America.

A computer programme, called JUSSIM, which has been developed by Dr. Blumstein (*) has been installed at the computer centre of the national police board for this purpose. The programme includes an interactive system (1).

The work within the planning and budget secretariat in this respect has been concentrated towards the creation of a flow model of the Swedish Criminal System (CJS) and to the collection of data for that model. For the numerical calculations the JUSSIM programme is used.

The leading idea of the simulation model is that the CJS can be seen as an open system with inputs in terms of committed crimes and outputs in the form of individuals. The different stages in CJS can be arranged in a chain with only single direction linear relations. Given these features the techniques of input-output analysis may be applied to the system.

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(*) Dr. Alfred Blumstein, Urban Systems Institute, Carnegie-Mellon University.

The structural flow model of the CJS has been created in close collaboration with officials from different involved bodies. It is based on a systematic analysis of the procedures and regulations in the administration of criminal cases. To keep the model handy and operational only the main interdependencies have been included. A sketch of the resulting flow model is given in sketch 2, below.

The model is completely static as there is no feed back function in terms of recidivism and no process times are involved. This abstraction may be accepted for a number of applications where we are only interested in the steady state solutions of the system. However, for short term planning and for analysis of the dynamics of the CJS a model which takes special account of processing times as well as of endogenous variations in recidivism is needed. For this purpose two variants of the flow model have been developed, one based on a more detailed description of the process and one more aggregated model. These two versions have not yet been fully tested and will not be further commented upon here (2).

The CJS can be divided into four sub-systems, ie:

- police
- prosecution
- courts
- prison and probation

Each subsystem has been divided into a number of stages in the model. For each stage workloads, unit costs and available resources may be assigned. For one of the stages in the process a reference flow should be given and for all other stages probabilities for the output alternatives are needed.

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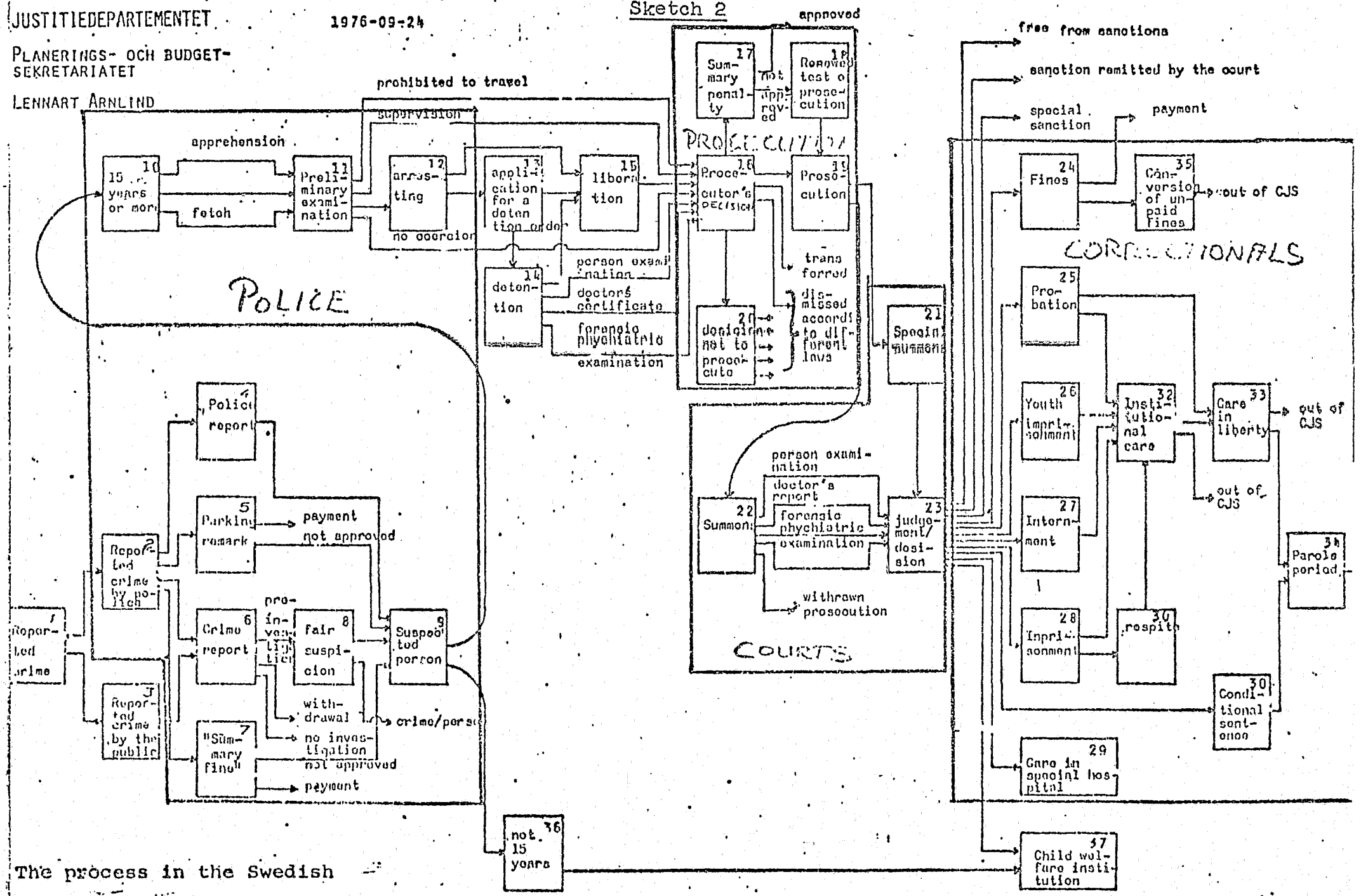
JUSTITIEDEPARTEMENTET

PLANERINGS- OCH BUDGET-SEKRETARIATET

LENNART ARNLIND

1976-09-24

Sketch 2



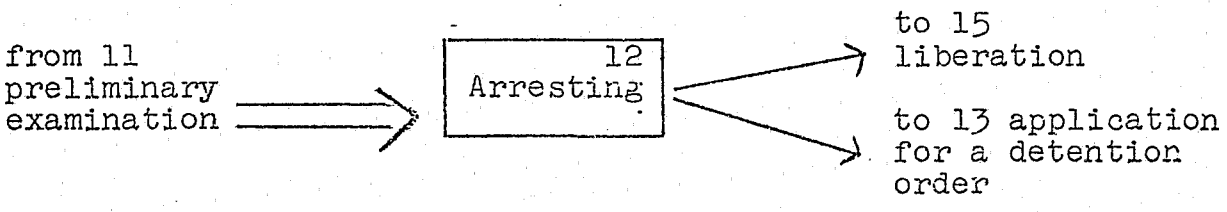
The process in the Swedish Criminal Justice System

A typical run of the model with the JUSSIM programme will result in information on total output costs for the CJS as well as for every single stage in the system. Furthermore data on needed resources and possible capacity overflows together with flows of cases are obtained. A run can be designed to give information on the possible effects from changes in any of the system parameters.

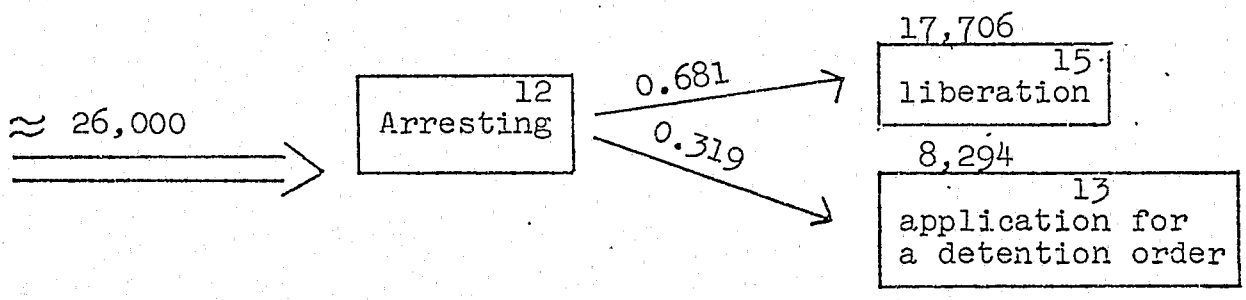
This gives the users a lot of flexibility to test the model for a number of different studies. As examples of questions which may by systematically analysed the following may be given. What are the probable effects of:

- a change in a law or special regulation?
- changes in the administrative practice?
- variations in the number of different crimes?
- changes in exogenous variables as, for example, the number of working hours, general salary or price level?

The leading concepts of the model may be illustrated by means of an example. Let us look at stage number 12, "arresting". Every year some 25,000-30,000 persons suspected for crimes are arrested. For these persons an application for a detention order may be given to the court within a specified time limit. Otherwise the person should be given back his personal liberty. Thus there should be one inflow and two outflows for the box arrest.



For every studied crime type (in our model 24 different types) a probability for outflow to box 13 and box 15 respectively may be given. For the whole population the probabilities are 31.9 and 68.1 per cent respectively. Given these percentages the model will calculate the flows in the next stages, ie:



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Arresting people and keeping them under arrest consumes a number of different resources. In the model just two different resources categories have been associated with the stage, ie police time and care in arrest. Police time is measured in hours and care in arrest in days. The costs for the second resource consists of costs for guard and caretakers as well as costs for the buildings and needed equipment. There are limits on the availability of both resources, as just a limited number of policemen are available and a fixed number of cells are at the disposal for arrested persons. All these figures on unit costs and available resources are fed into the model together with average workloads for each crime type. Thus the resource consumption and costs for the stage 12 is calculated with the computer programme JUSSIM.

In the same way flow workloads, available resources and unit costs can be given to every single stage. The programme summarises the different stages and calculates figures for the CJS as a whole or for any arbitrary sub-division of the system.

Environment analysis

The CJS is a very open social system. It is exposed to influences from a number of outside sources. It is thus important both to analyse the more significant relations between the environment at large and the CJS and to systematically follow up these significant exogenous trends.

One way of relating the CJS with other sectors is through the forecasting model where trends in a number of demographic and socio-economic variables generate predictions in the number of registered crimes. However, there are also a lot of significant dependencies which are not supposed to directly influence the crime level but which do concern the functioning of CJS. As examples of this latter kind of factor, changes in other fields of the law system (eg social welfare, traffic or tax regulations) and changes in the labour market (eg number of working salaries etc) may be mentioned.

For this purpose general trends and planned alterations within a number of fields are systematically followed up and analysed. This is in part done using a computerised information retrieval system called IMDOC.

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Estimation and validation of the CJS model

As is evident from the presentation above a huge lot of numerical data have to be fed into the model. The dimension of the current version is:

- 24 crime types
- 37 stages
- 17 resource categories
- 24 workloads

A number of different sources have been used to obtain the needed data. Flow figures are to some extent published in traditional statistical publications by the central Statistical Office. However, accurate figures are lacking for quite a number of stages.

These supplementary statistics had to be obtained from special studies of some central administrative registers in the judicial field. The technique applied is that a special register containing basic information which is taken directly from the administrative registers concerned, is drawn up on a temporary basis. This temporary register is then further analysed using general data processing programmes such as SPSS and OSIRIS. In this way data for most of the remaining stages have been collected.

Branching ratios for all crime types have been estimated as averages for the period 1974-76. The reference flow is the number of registered crimes during 1977. A special analysis of possible trends in branching ratios is under way. However, in general the flow figures are quite accurate and mainly based on direct measurements as indicated above. Ex post simulations also show that the flows are comparatively consistent throughout the system.

Some minor problems are introduced by changes in the unit of measurement between different stages. Another source of discrepancy is due to the fact that most statistics are of the cross-section type while longitudinal data are actually needed. The flows have been corrected for this obvious error as far as possible.

Available resources are obtained from administrative registers and directly by compiling information from the respective agency's budget proposal. Unit costs have been obtained by combining information on available resources and statistics from the central state accounting system, SYSTEM-S. Two types of cost figures have been derived, ie. total unit costs and marginal unit costs. The difference between the two concepts is due to the treatment of purely fixed costs. The quality in the cost estimates is varying from resource to resource. Current costs refer to the fiscal year 1977-78.

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In general the weakest link in the statistical source material is the workloads. To some small extent accurate average workloads for different crime types are published. This is, for example, the case for duration of imprisonment or detention. However, most workloads have been based on rough estimates and in some instances even on pure guesses. Special projects are under way at the police administration, at the prosecutor general and at the court administration within this field. At present it must be confessed that many of the individual workload figures may be wrong within broad margins. On the other hand, at the aggregate level, that is for all crime types taken together, the estimates are quite acceptable. This is found from ex post simulations of the entire system.

To summarise, statistical data for the model have been compiled from a number of different sources. In some instances special surveys and analyses have been carried out. The model is completely deterministic and only arithmetic averages are given for unit costs and workloads. The quality of data vary to a great extent. However, on the aggregate level the model behaves quite well. The weakest part should be some individual workload estimates.

Design of the simulation study

There has been a rising concern about economic criminality during the last years, in Sweden as well as in other countries. More resources have been allocated for control of tax payments and tax return forms for example.

Suspected offences against the tax laws are primarily discovered by the tax audit administration. This organisation does not belong to the CJS, as it is defined in Sweden. Thus an increase in the number of registered tax offences may be considered as an exogenous disturbance to the CJS, speaking in technical terms.

In this study the expected effects for CJS in terms of costs, manpower and other resources from an anticipated increase in the number of registered tax offences by 50 per cent are simulated. Before the numerical simulation run all figures concerning tax offences (which is a separate crime group) have been scrutinised. A few of the figures have been updated.

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The simulation is very easily carried through, from an ordinary computer terminal, once the correct data base has been defined, and the actual modifications specified in figures. In this case the only modification to be done is an increase in the reference flow of tax offences by 50 per cent. All other figures are supposed to be kept fixed. The JUSSIM programme then creates a new test case with the desired modification. The expected consequences in terms of costs and manpower of the change are calculated and presented for the whole CJS as well as for every defined sub-division.

Suppose that the real number of tax offences is high and just a part of them are discovered due to the fact that only a random sample of all tax documents are carefully scrutinised. Then this experiment may be interpreted as an analysis of the question, what will be the effects for the CJS if the resources for tax audit controls are increased by 50 per cent? By the way the study is designed some special assumptions are implied on the process. The most restrictive one should be that of linear production functions and homogeneity within each crime category.

It is also implied that the cost functions are linear and that resources may be fully transferable between different crime types. In this special case the assumptions may be justified and found not too unrealistic on a national level.

Main results

The simulation indicates that the effects for the CJS are rather moderate, generally speaking. Costs will increase by some 0.4 per cent for the whole system. The most significant increases in relative terms appear for the prosecution and court subsystems as seen in the table below.

Subsystem	Relative change
Police	+ 0.2%
Prosecution	+ 1.5%
Courts	+ 1.4%
Prison and probation	+ 0.2%
Total CJS	+ 0.4%

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No single resource category is increased by more than 1.7 per cent in costs. In total some 52 extra persons are needed. The distribution of manpower requirements is shown in the following table.

Subsystem	Change in manpower
Police	11.5
Prosecution	17.5
Courts	1.5
Prison and probation	21.5
Total CJS	+ 52

The rather slight increases in resource requirements are explained by the fact that tax offences amount to a most marginal share of all registered crimes, just some 0.36 per cent. In the base case the processing costs for tax offences, as main offence, amount to 0.83 per cent of total costs in CJS. In the test case tax offences have risen to 1.24 per cent of the total processing costs.

A condensed print-out from the simulation is included as an appendix. Crime group 1 stands for tax offences while all other crime types are put together to crime group 2 in the listing.

Sensitivity tests of the results

The results presented above may be seen as some sort of most probable or mean effects. As the model is deterministic no information as for the statistical precision of the results is obtained.

The quality of the basic data is most varying as discussed above. The most questionable figures apply to some cost and workload estimates. To analyse the effect of eventual erroneous data a number of sensitivity tests have been carried out. Two of these are presented here.

In a special run all unprecise estimated figures for tax offences have been changed to the highest realistic levels. An increase by 50 per cent for the workload figures and 25 per cent for cost figures. The results from this run may be interpreted as maximum estimates. In another run all questionable figures have been changed with the same magnitudes in just the opposite direction. These results may be seen as minimum estimates.

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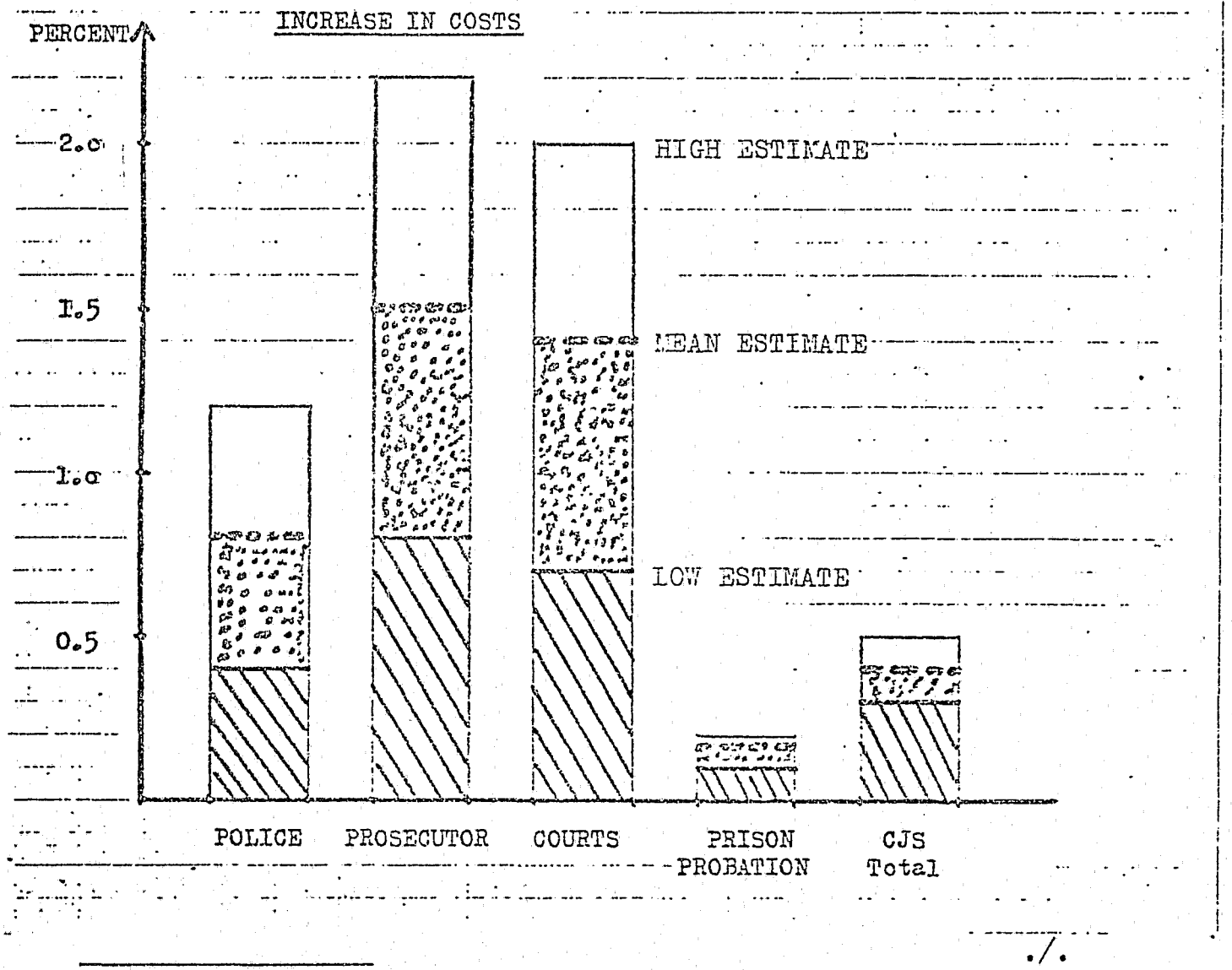
The two complementary runs give very strong support to the main results presented above. That is the effects of an increase in tax offences are generally marginal. The most significant extra resource requirements, in relative terms, are supposed to take place in the prosecution and court subsystems. In the two diagrams below some results from the high and low estimates are put together with the results from the so-called probable estimates. In one way (*) the diagrams may be interpreted as confidence intervals for the results. Looking at the figures in this way it is evident that the results are accurate and show very low coefficients of variation. This is certainly only true if the general structure of the model is correct.



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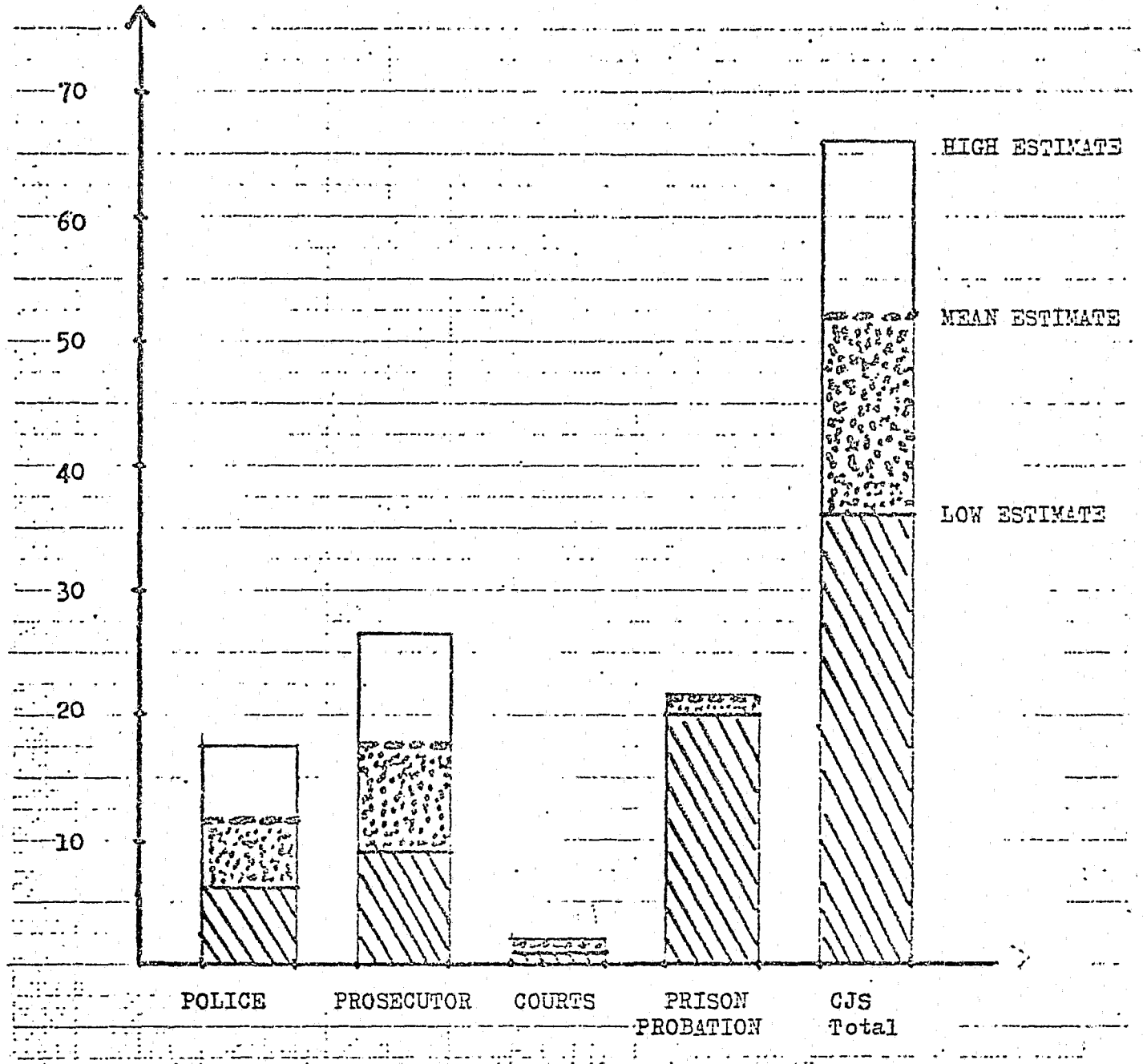
(*) However, not in the strictly statistical meaning of the concept.

EXTRA MANPOWER REQUIREMENTS



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Conclusions

This is but one example of the use of SVEJUS for aggregate planning in CJS. It should not be seen as fully representative for the type of problems which are most frequently analysed. Up till now SVEJUS has mainly been used as a practical tool to analyse possible effects of proposed changes in the law structure or in the administrative practice. However, as illustrated above, it may equally well be used as an instrument to foresee and analyse possible effects for CJS from changes in the environment.

The SVEJUS system has shown helpful at an early stage of the law-making process to single out solutions which are realistic from a purely economic point of view. Also it has been of good help at the implementation stage when the creation of an administrative set-up is discussed.

We have found it crucial to obtain a good balance between a detailed description of CJS and its environment on the one hand and practicable and workable models on the other. For planning and simulation on an aggregated level it is not too important with a very detailed model and completely accurate figures in all detail. Generally speaking the results are not so very sensitive to errors in individual figures that may be expected. On the other hand for a good and close co-operation with the concerned agencies, which we find most crucial, it is very important to obtain realistic and easily interpreted results.

In order to achieve an applicable system, we have developed a basic model structure. For a special problem this may have to be supplemented or improved at some stages. However, by starting with the basic structure the special problem may be analysed much more quickly than if one has to start from the very beginning each time.

The model system is designed for aggregate planning and evaluation. It should not directly be used for analysis on a very detailed level, eg for a single police district. The underlying assumptions on linearity may very well be violated in that case. The CJS model as it is presented here is purely static. It may be used for comparative statistics but does not give any information on the question of possible paths between two points of equilibrium. For dynamic analysis a special version of the CJS model, allowing for feedbacks and time consumption in the process is at present being developed.

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Even though law structures and organisation of justice varies from one country to another it is highly possible to transfer planning instruments and general ideas and implement them in a new context. The Ministry of Justice has a fruitful co-operation in this respect with agencies and other organisations in Norway, Finland and Germany as well as in the USA and Canada.

In the Council of Europe's member countries, some formal models are almost certainly used for planning and evaluation within the judicial field. Many of them are probably also computer-based. In view of this fact, it may be advisable to let the Committee on the Data Processing of Legal Data in Europe act as a forum for the exchange of information on the models referred to here - information such as where the models are available and what experiences have been obtained through using them.

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References

1. Belkin J, Blumstein A, Glass W, JUSSIM, An interactive Computer Programme for Analysis of Criminal Justice Systems, Urban Systems Institute, 1971.

2. _____ JUSSIM II, An interactive Feedback Model for Criminal Justice Planning, Urban Systems Institute, 1973.

3. Blumstein A, Larson R, Models of a Total Criminal Justice System, Operations Research, No. 2, 1969.

4. Cassidy G R, Hopkinson R G, Mead D, Use of Systems Models in Planning and Evaluation, Canjus Project Report No. 25, Ministry of the Solicitor General, Canada, 1976.

5. Computer-based analysis as an aid to study the effects of legislation and governmental regulations, Memo 1977:148 meméo, Ministry of Justice, Stockholm.

6. Maltz M, Measures of Effectiveness for Crime Reduction Programmes, Operation Research No. 3, 1975.

7. Möglestue I, Crimes, Generations and Economic Growth, Artiklar fra Statistisk Sentralbyrå, Nr. 12, 1965, OSLO.

8. Polisforskning och administrativ utveckling inom Polisväsendet. Dess inriktning och resultat - Synpunkter på ett antal projekt (R & D within the police sector, in Swedish), Memo 1977:117, Ministry of Justice, Stockholm.

9. Skogan W G, Public Policy and Public Evaluations of Criminal Justice System Performance, in Crime and Criminal Justice, ed J A Gardiner, Lexington 1975.

10. SPSS, Statistical package for the Social Sciences, User's manual, New York 1975.

11. Studier av samband mellan antalet anmälda brott och miljövariabler på polisdistriktsnivå. (Crime trends and forecasts, in Swedish) Memo 1977:6, Ministry of Justice, Stockholm.

12. SWEDEMO - some preliminary tests with a model of the Swedish Criminal Justice System, Memo 1977:163, meméo, Ministry of Justice, Stockholm.

13. The Swedish Budget 1978-79, the Ministry of Economic Affairs and the Ministry of the Budget, 1978, Stockholm.

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A P P E N D I X

Condensed print-out from the principal run

Crime group 1 stands for tax offences

Crime group 2 contains all other categories.

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EXCEEDED CAPACITY CONSTRAINT FOR ANSTALTSBEN (Imprisonment)

	CONSTRAINT	COMPUTED	DIFF.	O/O DIFF.
BASE CASE	5250.0	7113.4	1863.4	35.5
TEST CASE	5250.0	7131.8	1881.8	35.8

SUMMARY OF RESULTS FOR POLIS (Police)

	BASE	TEST	CHANGE	O/O CHANGE
COSTS IN THOUSANDS				
SPANING	105446.4	105582.9	136.5	.1
CRIME GROUP 1	273.1	409.6	136.5	50.0
CRIME GROUP 2	105173.3	105173.3	.0	.0
UTREDNING	112117.7	113847.8	1730.1	1.5
CRIME GROUP 1	3460.2	5190.3	1730.1	50.0
CRIME GROUP 2	108657.5	108657.5	.0	.0
SERVICE	4610.1	4610.5	.4	.0
CRIME GROUP 1	.7	1.1	.4	50.0
CRIME GROUP 2	4609.4	4609.4	.0	.0
TOTAL	222174.2	224041.2	1867.0	.8
WORKLOADS				
SPANING TIM	1171626.4	1173143.3	1516.9	.1
CRIME GROUP 1	3034.0	4551.0	1517.0	50.0
CRIME GROUP 2	1168592.4	1168592.3	-.1	.0
UTREDNING TIM	1121177.2	1138478.2	17301.0	1.5
CRIME GROUP 1	34602.2	51903.2	17301.1	50.0
CRIME GROUP 2	1086575.1	1086575.0	-.1	.0
SERVICE MY	4610119.7	4610478.8	359.1	.0
CRIME GROUP 1	718.8	1078.1	359.4	50.0
CRIME GROUP 2	4609401.0	4609400.7	-.3	.0
RESOURCE REQUIREMENTS				

SPANING	732.3	733.2	.9	.1
CRIME GROUP 1	1.9	2.8	.9	50.0
CRIME GROUP 2	730.4	730.4	.0	.0
UTREDNING	700.7	711.5	10.8	1.5
CRIME GROUP 1	21.6	32.4	10.8	50.0
CRIME GROUP 2	679.1	679.1	.0	.0

FLOWS

SPANING	844360.0	845876.9	1516.9	.2
CRIME GROUP 1	3034.0	4551.0	1517.0	50.0
CRIME GROUP 2	841326.0	841325.9	-.1	.0
UTREDNING	581775.0	582207.5	432.5	.1
CRIME GROUP 1	865.1	1297.6	432.5	50.0
CRIME GROUP 2	580909.9	580909.9	.0	.0
SERVICE	1304666.2	1304738.5	72.2	.0
CRIME GROUP 1	144.6	216.9	72.3	50.0
CRIME GROUP 2	1304521.6	1304521.5	-.1	.0

SUMMARY OF RESULTS FOR ÅKLAGARE (Prosecution)

	BASE	TEST	CHANGE	O/O CHANGE

COSTS IN THOUSANDS

UTREDNING	299063.6	303613.7	4550.1	1.5
CRIME GROUP 1	9100.4	13650.6	4550.2	50.0
CRIME GROUP 2	289963.2	289963.2	.0	.0
FÖRHANDLING	10673.1	10736.5	63.4	.6
CRIME GROUP 1	126.9	190.3	63.4	50.0
CRIME GROUP 2	10546.2	10546.2	.0	.0
TOTAL	309736.7	314350.3	4613.6	1.5

WORKLOADS

UTREDNING TIM	568562.0	577212.5	8650.5	1.5
CRIME GROUP 1	17301.1	25951.6	8650.5	50.0
CRIME GROUP 2	551260.9	551260.8	-.1	.0
FÖRHANDLING TIM	60989.0	61351.5	362.5	.6

CRIME GROUP	1	725.0	1087.5	362.5	50.0
CRIME GROUP	2	60263.9	60263.9	.0	.0
RESOURCE REQUIREMENTS					
UTREDNING		1137.1	1154.4	17.3	1.5
CRIME GROUP	1	34.6	51.9	17.3	50.0
CRIME GROUP	2	1102.5	1102.5	.0	.0
FÖRHANDLING		38.1	38.3	.2	.6
CRIME GROUP	1	.5	.7	.2	50.0
CRIME GROUP	2	37.7	37.7	.0	.0
FLOWS					
UTREDNING		552264.0	552696.5	432.5	.1
CRIME GROUP	1	865.1	1297.6	432.5	50.0
CRIME GROUP	2	551398.9	551398.9	-.1	.0
FÖRHANDLING		103193.4	103374.6	181.2	.2
CRIME GROUP	1	362.5	543.8	181.3	50.0
CRIME GROUP	2	102830.9	102830.9	.0	.0

SUMMARY OF RESULTS FOR DOMSTOL (courts)

		BASE	TEST	CHANGE	O/O CHANGE
COSTS IN THOUSANDS					
ADMINISTR		5322.8	5413.4	90.6	1.7
CRIME GROUP	1	181.3	271.9	90.6	50.0
CRIME GROUP	2	5141.5	5141.5	.0	.0
DOMARE		9257.1	9365.8	108.8	1.2
CRIME GROUP	1	217.5	326.3	108.8	50.0
CRIME GROUP	2	9039.6	9039.6	.0	.0
FÖRSVAR		13036.1	13226.4	190.3	1.5
CRIME GROUP	1	380.6	571.0	190.3	50.0
CRIME GROUP	2	12655.4	12655.4	.0	.0
NÄMND		670.9	674.9	4.0	.6
CRIME GROUP	1	8.0	12.0	4.0	50.0
CRIME GROUP	2	662.9	662.9	.0	.0
TOTAL		28286.8	28680.5	393.7	1.4

WORKLOADS

ADMINISTR TIM	53228.0	54134.3	906.3	1.7
CRIME GROUP 1	1812.5	2718.8	906.3	50.0
CRIME GROUP 2	51415.4	51415.4	.0	.0
DOMARE TIM	30857.0	31219.5	362.5	1.2
CRIME GROUP 1	725.0	1087.5	362.5	50.0
CRIME GROUP 2	30132.0	30132.0	.0	.0
FÖRSVAR TIM	62076.5	62982.8	906.3	1.5
CRIME GROUP 1	1812.5	2718.8	906.3	50.0
CRIME GROUP 2	60263.9	60263.9	.0	.0
NÄMND TIM	30494.5	30675.7	181.3	.6
CRIME GROUP 1	362.5	543.8	181.3	50.0
CRIME GROUP 2	30132.0	30132.0	.0	.0

RESOURCE REQUIREMENTS

ADMINISTR	33.3	33.8	.6	1.7
CRIME GROUP 1	1.1	1.7	.6	50.0
CRIME GROUP 2	32.1	32.1	.0	.0
DOMARE	19.3	19.5	.2	1.2
CRIME GROUP 1	.5	.7	.2	50.0
CRIME GROUP 2	18.8	18.8	.0	.0
FÖRSVAR	38.8	39.4	.6	1.5
CRIME GROUP 1	1.1	1.7	.6	50.0
CRIME GROUP 2	37.7	37.7	.0	.0
NÄMND	61.0	61.4	.4	.6
CRIME GROUP 1	.7	1.1	.4	50.0
CRIME GROUP 2	60.3	60.3	.0	.0

FLOWS

ADMINISTR	103193.4	103374.6	181.2	.2
CRIME GROUP 1	362.5	543.8	181.3	50.0
CRIME GROUP 2	102830.9	102830.9	.0	.0
DOMARE	103193.4	103374.6	181.2	.2
CRIME GROUP 1	362.5	543.8	181.3	50.0
CRIME GROUP 2	102830.9	102830.9	.0	.0
FÖRSVAR	103193.4	103374.6	181.2	.2
CRIME GROUP 1	362.5	543.8	181.3	50.0
CRIME GROUP 2	102830.9	102830.9	.0	.0

NÄMND	103193.4	103374.6	181.2	.2
CRIME GROUP 1	362.5	543.8	181.3	50.0
CRIME GROUP 2	102830.9	102830.9	.0	.0

SUMMARY OF RESULTS FOR KRIMINALVÅRD (Prison, Probation)

	BASE	TEST	CHANGE	0/0 CHANGE
COSTS IN THOUSANDS				
FRIHETSBER	98716.7	98826.5	109.8	.1
CRIME GROUP 1	219.7	329.5	109.8	50.0
CRIME GROUP 2	98497.0	98497.0	.0	.0
ANSTALTSVÅRD	1631025.2	1633787.7	2762.5	.2
CRIME GROUP 1	5525.5	8288.3	2762.8	50.0
CRIME GROUP 2	1625499.7	1625499.4	-.3	.0
FRIVÅRD	33437.3	33437.3	.0	.0
CRIME GROUP 2	33437.3	33437.3	.0	.0
TOTAL	1763179.1	1766051.4	2872.3	.2
WORKLOADS				
FRIHETSBER DAG	219370.4	219614.4	244.1	.1
CRIME GROUP 1	488.2	732.3	244.1	50.0
CRIME GROUP 2	218882.2	218882.1	.0	.0
ANSTALTSVÅRD MÅN	140725.3	140972.8	247.4	.2
CRIME GROUP 1	494.9	742.4	247.5	50.0
CRIME GROUP 2	140230.4	140230.4	.0	.0
FRIVÅRD MÅN	83593.2	83593.2	.0	.0
CRIME GROUP 2	83593.2	83593.2	.0	.0
RESOURCE REQUIREMENTS				
FRIHETSBER	601.0	601.7	.7	.1
CRIME GROUP 1	1.3	2.0	.7	50.0
CRIME GROUP 2	599.7	599.7	.0	.0
ANSTALTSVÅRD	11727.1	11747.7	20.6	.2
CRIME GROUP 1	41.2	61.9	20.6	50.0
CRIME GROUP 2	11685.9	11685.9	.0	.0
FRIVÅRD	6966.1	6966.1	.0	.0

CRIME GROUP	2	6966.1	6966.1	.0	.0
FLOWS					
FRIHETSBER		7240.5	7247.1	6.6	.1
CRIME GROUP	1	13.2	19.9	6.6	50.0
CRIME GROUP	2	7227.2	7227.2	.0	.0
ANSTALTSVARD		17407.0	17456.5	49.5	.3
CRIME GROUP	1	99.0	148.5	49.5	50.0
CRIME GROUP	2	17308.0	17308.0	.0	.0
FRIVARD		10312.3	10325.0	12.7	.1
CRIME GROUP	1	25.4	38.0	12.7	50.0
CRIME GROUP	2	10286.9	10286.9	.0	.0

SUMMARY OF RESULTS FOR RATTSVASENDE (CJS)

	BASE	TEST	CHANGE	D/D CHANGE
COSTS IN THOUSANDS				
POLIS	222174.2	224041.2	1867.0	.8
CRIME GROUP 1	3734.0	5601.0	1867.0	50.0
CRIME GROUP 2	218440.2	218440.2	.0	.0
AKLAGARE	309736.7	314350.3	4613.6	1.5
CRIME GROUP 1	9227.2	13840.9	4613.6	50.0
CRIME GROUP 2	300509.4	300509.4	.0	.0
DOMSTOL	28286.8	28680.5	393.7	1.4
CRIME GROUP 1	787.4	1181.1	393.7	50.0
CRIME GROUP 2	27499.5	27499.5	.0	.0
KRIMINALVARD	1763179.1	1766051.4	2872.3	.2
CRIME GROUP 1	5745.2	8617.8	2872.6	50.0
CRIME GROUP 2	1757433.9	1757433.6	-.3	.0
OVRIGA ATG	35158.4	35191.8	33.4	.1
CRIME GROUP 1	66.9	100.3	33.4	50.0
CRIME GROUP 2	35091.5	35091.5	.0	.0
TOTAL	2358535.2	2368315.1	9780.0	.4
FLOWS				
POLIS	844360.0	845876.9	1516.9	.2

CRIME GROUP	1	3034.0	4551.0	1517.0	50.0
CRIME GROUP	2	841326.0	841325.9	-.1	.0
ÅKLAGARE		552264.0	552696.5	432.5	.1
CRIME GROUP	1	865.1	1297.6	432.5	50.0
CRIME GROUP	2	551398.9	551398.9	-.1	.0
DOMSTOL		103193.4	103374.6	181.2	.2
CRIME GROUP	1	362.5	543.8	181.3	50.0
CRIME GROUP	2	102830.9	102830.9	.0	.0
KRIMINALVÅRD		17407.0	17456.5	49.5	.3
CRIME GROUP	1	99.0	148.5	49.5	50.0
CRIME GROUP	2	17308.0	17308.0	.0	.0

END