The heroin policy of the Dutch Government aims at preventing and counterbalancing the risks connected with heroin use, as experienced by heroin users and society. Two central policy goals are: improvement of the functioning of heroin users, and reduction of the fact that the use of drugs is being made a criminal act. Policy measures undertaken to attain these goals are: law enforcement, helping programs and educational programs. However, both means and ends being very broadly defined, a direct relationship between them cannot easily be established. Therefore, statements regarding the extent to which the policy measures contribute to the achievement of objectives cannot be made.

The object of this study is to contribute to the knowledge and understanding of the effects of policy measures from an economic point of view. This is done in two steps. First, the functioning of the demand side of the heroin market is studied. Employing a process model, the behaviour of a group of heroin users is described. Next, the effects of policy measures are determined by experimenting with the process model.

From the economic point of view the heroin problem is primarily characterized by two aspects: the illicitness of distributing and consuming heroin, and the addictive quality of heroin. These aspects are interconnected in describing the heroin problem:
- Because of the illicitness of distributing heroin, dealers are faced with the risk of being arrested and, by consequence, with the risk of loss of income, getting imprisoned etc. Dealers will attempt to compensate for these risks by passing the costs of supplying heroin on to the consumer through higher prices.
- As no quality control exists on an illegal market, there is no guarantee that heroin bought is of consistent quality. This uncertainty creates a threat to the consumer's health.
- Heroin has an addictive quality, and regular use of heroin implies a rising level of tolerance (larger quantities of heroin are needed). Faced with high prices, a longer duration of use therefore means an
increasing amount of money needed to satisfy the daily habit size. Eventually criminal activities will be undertaken in most cases as consumers seek to raise their level of real income. Thus, use of heroin can result in bad health, criminality and becoming a marginal member of society. On the aggregate level, the societal consequences of heroin use consist of cost of burglary, theft and the like, and breaking the public peace.

The contribution of economic science to a solution of the heroin problem primarily consists of describing and elucidating the heroin market's mechanism, i.e. the behaviour of participants on this market. Because of the assumed complexity of the market mechanism, this study concentrates on developing an empirically grounded description of the market's demand side, i.e. the behaviour of heroin users. In order to collect data, half structured interviews have been carried out among Dutch heroin users (chapter 2). The demand side of the Dutch heroin market, the size of which is currently estimated at 15,000 to 20,000 users, can be segmented in several ways. In can be divided, for instance, into groups on the basis of duration of use, user's native country, sex or sociological characteristics. From the economic point of view, however, extent of habit should be the most important factor in segmenting the market. Based on this criterion the following groups have been distinguished:

- moderate users: persons who use less than 1/4 gram of heroin per day during their period of heroin use;
- heavy users: persons who use at least 1/4 gram of heroin per day during (parts of) their period of heroin use;
- former users: persons who voluntarily abstain after a period of heroin use.

The distinction between moderate and heavy users arises from the fact that 1/4 gram of heroin is the smallest quantity that can be bought "loose". Smaller quantities such as this are sold in "bags". Users with a habit size of at least 1/4 gram behave differently from moderate users. They need more money to buy heroin and have to gain their income in a more lucrative/intensive way.

This study concentrates on the group of heavy users, for whom the heroin problem is more severe. Within this group we distinguished
between sex and nationality (Dutch and Surinamese). During the year 1982 data was collected by means of half structured interviews among 80 heroin users who had been approached via methadone programs and in houses of detention. Interviews have been carried out among 28 Dutch men, 25 Dutch women, 23 Surinamese men and 4 Surinamese women. The duration of their heroin use varied from 1.5 to 12 years. The model specification underlying data collection consists of a hypothetical logical flow diagram. In this diagram all factors, which are supposed directly or indirectly to influence the demand for and the use of heroin are set forth in their relation to one another. The choice of the variables included in the diagram and of the (sign of) the relations between the variables is partly grounded in (economic-) theoretical considerations, and partly the result of studying literature concerning the heroin market, and interviewing counselors. Furthermore, the first interviews among heroin users played a prominent part in developing supplementary hypotheses, resulting in an extension of both the logical flow diagram and the questionnaire employed in subsequent interviews with heroin users. The diagram altogether contains 34 variables with 69 mutual relations. The interviews resulted in a description of the complete "heroin career" of every respondent in terms of the quantity of heroin consumed per day, the price of heroin, the quantity of money obtained per day from both non-drug crime and drug dealing criminality, the specific way in which the money was obtained, etc. Furthermore, information was gathered about sign and existence of the relations included in the logical flow diagram.

Chapter 3 focuses on the results from analyzing the collected data. Only one hypothesis concerning the existence of a relation could not be confirmed: the demand for bags of heroin is not significantly affected by a changing price of bags. The hypotheses concerning the other relations in the diagram were all confirmed.

The interviews have made it possible to determine the relevant variables describing the heroin user's market behaviour and the relations between these variables, as well as the signs of the relations. Furthermore, the interview data confirmed most of the hypotheses underlying the segmentation. Surinamese users, for instance, are more often involved in the small heroin trade than Dutch users are.
Based on this information a computer simulation model has been developed which describes the behaviour of a part of the segment of Surinamese men (chapter 4). The model describes the daily process of obtaining money and heroin, getting imprisoned, abstaining from heroin and enrolling in methadone programs. The model consists of a sequential specification of relations, included in the logical flow diagram in such a way that the effect of a change in one variable on other variables via intermediate relations can be examined. Such a model is referred to as a process model. Policy measures in the field of methadone treatment and law enforcement are exogenous variables in this model. The endogenous variables of the model are heroin use and quantity of money obtained illegally. Verification of the process model has been carried out, among other things, by performing an expert test and sensitivity analyses, and by testing whether the outcomes of the model correspond with the data from the interviews. These tests do not point at inaccuracy the model.

The process model describes the behaviour of a group of heroin users in accordance with the behaviour found in the interviews. The process model has been used to carry out some scenario analyses in order to examine the effects of policy measures (chapter 5). For this purpose experts in the field of heroin policy have been interviewed to obtain data regarding government policy in the areas of methadone treatment and law enforcement and their effects on several variables. So called projective scenarios have been analyzed, referring to a description of a future situation in which the current possibilities and limitations regarding the use of policy measures have been taken as a starting-point. The scenarios relate to various degrees of expansion of supply of methadone and various degrees of reduction of law enforcement with regard to heroin dealers. Changes in the two endogenous variables of the process model are regarded as an indication of the degree in which policy goals are achieved:
- a reduction in heroin use is interpreted as indicating an improvement of the functioning of heroin users;
- a reduction in the quantity of money obtained illegally indicates a reduction of criminality.
Altogether thirty scenarios have been analyzed, containing thirty different combinations of values of supply of methadone and law enforcement with regard to heroin dealers. The scenario that contains the most extreme values (e.g. the values that differ most from the current situation) results in a 19% decrease in heroin use and a 55% decrease in money obtained illegally. In order to test whether or not statistically significant relations exist between aggregate values of policy measures on the one hand and endogenous variables on the other hand, the scenario outcomes have been analyzed by means of regression analysis. This analysis shows that at the aggregate level a direct relation between policy measures and endogenous variables can hardly be found. This implies that the evaluation of a scenario requires the use of the process model.

Because of the fact that the scenarios analyse non-existing situations, it is not possible to validate the model by using empirical data. Validation has therefore been carried out by means of expert opinions and plausibility tests. From this the conclusion appears to be justified that the process model can be a useful tool in policy making.

The strength of employing a process model lies in offering a substantial aid in policy making. By means of a process model policy measures can be specified numerically. A process model enables one to assess the degree to which policy measures achieve goals. Finally, by offering insight into possible and attainable changes in endogenous variables, a process model enables policy makers to numerically specify policy objectives.