



E.M.C.D.D.A.

EMCDDA SCIENTIFIC REPORT
EXPERT MEETING ON DRUG MARKETS AND
MODELLING
23-24 OCTOBER 2000

Proceedings

EMCDDA / 2001

EMCDDA SCIENTIFIC REPORT

**EXPERT MEETING ON DRUG MARKETS AND
MODELLING**

23-24 OCTOBER 2000

Meeting Proceedings

EMCDDA / EC (TSER) FUNDED PROJECT / 2001
Contract n° SOE2-CT98-3075
Project n° ERB 4141 PL 980030

This report was prepared by:

Chloé Carpentier, Project Manager, EMCDDA, Lisbon

© European Monitoring Centre for Drugs and Drug Addiction, 2001

Quotation is authorised providing the source is acknowledged.

European Monitoring Centre for Drugs and Drug Addiction
Rua da Cruz de Santa Apolónia 23-25
PT - 1149-045 Lisboa
Portugal
Tel: + 351 21 811 30 00
Fax: + 351 21 813 17 11
e-mail: info@emcdda.org
<http://www.emcdda.org>

Contents

<u>EXECUTIVE SUMMARY</u>	7
<u>INTRODUCTION</u>	10
<u>MODELLING DRUG MARKETS: EMPIRICAL EVIDENCE AVAILABLE FROM ECONOMIC STUDIES, <i>Christine Godfrey</i></u>	14
ABSTRACT	14
INTRODUCTION	14
DEMAND STUDIES	15
EMPIRICAL STUDIES OF THE SUPPLY OF DRUGS	20
MARKET INTERACTIONS	21
CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH	21
REFERENCES	22
<u>THE DRUG TRAFFICKING IN FRANCE: ELEMENTS OF FUNCTIONING AND MOTIVATIONS, <i>Nacer Lalam</i></u>	25
ABSTRACT	25
PREAMBLE : THE INFORMAL ECONOMY QUESTION	26
BRIEF METHODOLOGICAL ASPECTS	26
THE RECENT EVOLUTION OF FRENCH DRUG MARKETS	27
THE LOCAL DRUG MARKETS	29
THE PREDOMINANCE OF THE CRIMINAL ORGANIZATIONS	32
LOGIC OF SOCIO-ECONOMIC INTEGRATION AND LOGIC OF ACCUMULATION	35
WEAKNESSES OF PUBLIC POLICIES AND OPPORTUNISM OF DRUG TRAFFICKERS	36
CONCLUDING REMARK	36
ANNEXE	37
<u>ILLEGAL DRUG MARKETS IN FRANKFURT AND MILAN: PRELIMINARY RESULTS OF AN ONGOING RESEARCH PROJECT, <i>Letizia Paoli</i></u>	39
ABSTRACT	39
INTRODUCTION	39
THEORETICAL FRAMEWORK	40
METHODOLOGY AND IMPLEMENTATION OF THE RESEARCH PROTOCOL	41
PRELIMINARY FINDINGS	44
BIBLIOGRAPHICAL REFERENCES	50

**MACRO-ECONOMIC ANALYSIS OF HEROIN MARKETS IN THE EU AND THE
IMPACT OF SUBSTITUTION TREATMENT, *Juan Tecco, Lieven Annemans, Nancy
Vanoverbeke, Fabienne Hariga, Chloé Carpentier*** **53**

ABSTRACT	53
INTRODUCTION	54
METHODOLOGY	54
RESULTS	55
DISCUSSION	62
CONCLUSION	64
REFERENCES	64

**THE ROLE OF THE NETHERLANDS IN COCAINE TRAFFICKING IN EUROPE,
*Toon van der Heijden*** **71**

ABSTRACT	71
INTRODUCTION	72
SET UP OF THE STUDY	72
COCAINE SEIZED	73
CONSUMPTION	76
TRANSITING	80
PRICES	81
CONCLUSIONS	84
REFERENCES	85

DEVELOPMENT AND DRUG, *Giovanni Trovato* **93**

ABSTRACT	93
INTRODUCTION	93
DRUG SECTOR PRODUCTION ACCOUNT	94
THE MODEL	96
CHANGES IN DRUG CONSUMPTION	100

**DYNAMICS AND CONTROL OF ILLICIT DRUG CONSUMPTION: PAST,
ACTUAL, AND FUTURE RESEARCH WORK FROM THE “VIENNA GROUP”,
*Gernot Tragler*** **108**

ABSTRACT	108
----------	-----

Executive Summary

Introduction

The EMCDDA is co-ordinating a ‘European network to develop policy relevant models and socio-economic analyses of drug use, consequences and interventions’¹, funded through the TSER (Targeted Socio-Economic Research) budget of the European Commission from 1 December 1998 to 30 November 2001.

This project aims to bring together and consolidate existing European networks of experts in prevalence estimation and dynamic modelling of drug use. The goal is to develop a set of tools to analyse data on drug use, its consequences, underlying social, economical, and health factors and processes and to explore the feasibility of applying them to evaluate policy options or interventions.

The network is subdivided in six working groups: 1a “National level prevalence estimation”, 1b “Local level prevalence estimation”, 2a “Time trends and incidence”, 2b “Geographic spread”, 3a “Costs and cost-effectiveness”, and 3b “Drug markets and policy options”.

Analysis of economic markets and policy measures

This meeting on Drug Markets and Modelling was held in Lisbon on 23-24 October 2000 and organised as the Expert meeting of sub-group 3b “Drug markets and policy options”².

The objective of the sub-group 3b was to develop criteria for a systematic review of economic studies as a basis for setting up market models.

A review of the empirical estimates of factors influencing supply and demand has been completed by **Christine Godfrey** and presented at the meeting of the working group. This review found that there was a number of empirical studies but these were mainly conducted using data from the United States and few European estimates were identified. It was found that there was a growing literature indicating that the demand for drugs is influenced by prices. Increases in drug prices leads to a decrease in demand for these drugs. These impacts had been found across a range of “hard” and “soft” drugs. These findings give support for attempting to build drug market simulation models, such as those being constructed by two of the partners in the project, Juan Tecco and Gernot Tragler. A few studies have investigated whether different types of drugs are complements or substitutes. These type of studies have considered the relationship between legal and illegal drugs as well as the relationship between different illegal substances. The results suggest that there are more examples of complements than substitutes.

¹ Project co-ordinator: Lucas Wiessing, EMCDDA

² Co-ordinators of sub-group 3b:

- From 1 December 1998 to 31 December 2000: Christine Godfrey, University of York

- From 1 January. 2001 to 1 December 2001: Chloé Carpentier, EMCDDA

A number of studies were identified which provided estimates of the impact of law enforcement on demand for illicit drugs. Little data was found on the role of income or other economic factors on demand.

Few studies were found that provided empirical estimates of different aspects of the supply of drug markets. Most studies have been analyses of the effect of enforcement and most of these have been partly constructed for modelling work rather than using direct observation and analyses. There are different views on the impact of changing enforcement activities and street level prices. A few studies have looked at market interactions and the results suggest as expected spending on drug control impacts on supply and demand. There are data in Europe on prices and different aspects of law enforcement as presented by Toon van der Heijden at the Expert meeting.

The review suggests there is potential to develop empirical research within and across Europe. Economic models demand significant amounts of certain kinds of data and a theoretical understanding, such as the work developed by Giovanni Trovato. There is also a need to understand the markets, which produce these data. Describing different markets and relationships that exist through qualitative studies of the kind being conducted by Nacer Lalam and Letizia Paoli is an essential part of developing such models and interpreting any results.

The discussions at the meeting during the presentations and at the final session suggested there was scope for considerable research in Europe around drug markets and policy options. There was currently, however, difficulties in both building research teams of the interdisciplinary nature required for such work and providing the necessary research funding. Several practical tasks were identified by the group including compiling data on prices, purity and seizures both at macro and micro levels. There was also some need to conduct some additional reviews on socio anthropological models, relevant epidemiological research, social costs and cost-effectiveness evidence on the different policies relevant to market models.

On-going European research

Nacer Lalam presented results from a current research on drug trafficking and money laundering in France, with a special focus on the links between poor areas in big cities and criminal organizations. He also referred to other empirical researches carried out by the same team (CIRED) on the supply system of illicit drugs in France: from the final segment (where the user meets the street dealer) to the highest level (export, distribution...). He underlined two complementary logics associated with the motivation to enter into drug trafficking: the logic of socio-economic integration, which concerns mainly the young native from deprived neighbourhoods, and the logic of accumulation which applies to members of criminal organisations.

Letizia Paoli focused on the preliminary results of an ongoing research project on local drug markets (EMCDDA project) in Frankfurt and Milan. She argued that in both cities the distribution chain is often rather short and may be composed of only three levels: the importer, the dealer, and the final customer. In Frankfurt as well as in Milan, the great majority of drug deals, even those involving large quantities of drugs, seem to be carried out by numerous, relatively small, and often ephemeral enterprises.

Juan Tecco presented the work undertaken within an EMCDDA project to develop a macro-economic model to estimate the total demand for heroin. This model simulates the career of potential heroin users and their related demand for heroin at different stages of use or addiction. Different measures were introduced in the model at year 10 and their effect on the cumulative heroin demand was modelled. The largest impact was observed when modelling changes in heroin price levels. Also the prevention of trying heroin could be a potentially effective measure.

Toon van der Heijden presented the results of a study to assess the trueness of the rumour that 15 to 30 tons of cocaine, would have been imported – but not seized – into the Netherlands between 1990 and 1995. Trends observed in seizures, prevalence and prices data all point to the Netherlands increasingly serving as a primary gateway for cocaine to the European market, but this phenomenon manifested itself before, during, and after the critical period. Having compared the expected changes against available data, it was concluded that the findings do not support the thesis on the importation in the first half of the nineties of 15 to 30 tons of cocaine which were not seized.

Giovanni Trovato's presentation was more theoretical and focused upon the development of a model – based on the Harrod-Domar (HD) mode, which allows to analyse the relations between the growth rates of two different kinds of economies. The standard HD tries to determine under which circumstances the economy is capable to obtain a steady state growth. Trovato's model tries to evaluate the growth's stability of the economic system when there is a sector (the drug sector) inside the economy which takes away resources for investment in the legal sector. The model studies the impact of the increase of criminal activity in the development of economic system.

Gernot Tragler presented the work carried out on dynamic models of illicit drug consumption by the members of the Department of Operations Research and Systems Theory at the Vienna University of Technology and international colleagues. Past work has mainly concentrated on the current U.S. cocaine epidemic, for which both descriptive and normative (in particular, so-called optimal control) models have been developed and analysed. Current work started to involve age-specific aspects of drug epidemics. Future work will aim at validating existing models with European data and developing models of European-specific problems of drug use.

Introduction

European network to develop policy relevant models and socio-economic analyses of drug use, consequences and interventions

The EMCDDA is co-ordinating a ‘European network to develop policy relevant models and socio-economic analyses of drug use, consequences and interventions’.³ This network is funded through the TSER (Targeted Socio-Economic Research) budget of the European Commission from 1 December 1998 to 30 November 2001.

This project aims to bring together and consolidate existing European networks of experts in prevalence estimation and dynamic modelling of drug use. The goal is to develop a set of tools to analyse data on drug use, its consequences, underlying social, economical, and health factors and processes and to explore the feasibility of applying them to evaluate policy options or interventions.

The project has the following general objectives: a) Stimulate and consolidate newly existing multi-national networks of experts. b) Integrate complementary disciplines essential for studying drug use. c) Develop statistical and dynamic models of drug use, leading to improved prevalence estimates and analyses of spread, consequences, causes and interventions, and enhanced European comparability. d) Explore the feasibility of applying these models to evaluate policy options or interventions. e) Generate scientific publications and proposals for further research.

The network is subdivided in three areas: 1) Prevalence, 2) Dynamics and 3) Economic aspects of drug use. Two workgroups have been formed within each area. The workgroups are: 1a “National level prevalence estimation”, 1b “Local level prevalence estimation”, 2a “Time trends and incidence”, 2b “Geographic spread”, 3a “Costs and cost-effectiveness”, and 3b “Drug markets and policy options”.

Analysis of economic markets and policy measures

This meeting on Drug Markets and Modelling was held in Lisbon on 23-24 October 2000 and organised as the Expert meeting of sub-group 3b.

As the first task of the co-ordinator⁴ of this sub-group, **Christine Godfrey** completed a review of the empirical estimates of factors influencing supply and demand. This review found that there was a number of empirical studies but these were mainly conducted using data from the United States and few European estimates were identified. It was found that there was a growing literature indicating that the demand for drugs is influenced by prices. Increases in drug prices leads to a decrease in demand for these drugs. These impacts had

³ Project co-ordinator: Lucas Wiessing, EMCDDA

⁴ Co-ordinators of sub-group 3b:

- From 1 December 1998 to 31 December 2000: Christine Godfrey, University of York

- From 1 January. 2001 to 1 December 2001: Chloé Carpentier, EMCDDA

been found across a range of “hard” and “soft” drugs. These findings give support for attempting to build drug market simulation models, such as those being constructed by two of the partners in the project, Juan Tecco and Gernot Tragler. A few studies have investigated whether different types of drugs are complements or substitutes. These type of studies have considered the relationship between legal and illegal drugs as the relationship between different illegal substances. The results suggest that there are more examples of complements than substitutes. That suggests, for example, that policies to reduce cigarette consumption through higher prices will not lead to an increase in illicit drug use. The available research does suggest the relationship between alcohol and marijuana could be dependent on age with some evidence of complementarity among 12 to 20 year olds but no effects (substitutes or complements) with older age groups.

A number of studies were identified which provided estimates of the impact of law enforcement on demand for illicit drugs. The evidence on the impact of marijuana decriminalisation for possession in some parts of the United States is conflicting with four studies indicating no impact on consumption and three showing a positive impact. There is similar mixed results in studies which have looked at the impact of fines for possession, increased arrest rates or increases in police activity. Little data was found on the role of income or other economic factors on demand.

Few studies were found that provided empirical estimates of different aspects of the supply of drug markets. Most studies have been analyses of the effect of enforcement and most of these have been partly constructed for modelling work rather than using direct observation and analyses. There are different views on the impact of changing enforcement activities and street level prices. A few studies have looked at market interactions and the results suggest as expected spending on drug control impacts on supply and demand. There are data in Europe on prices and different aspects of law enforcement as presented by Toon van der Heijden at the Expert meeting.

The review suggests there is potential to develop empirical research within and across Europe. Economic models demand significant amounts of certain kinds of data and a theoretical understanding, such as the work developed by Giovanni Trovato. There is also a need to understand the markets, which produce these data. Describing different markets and relationships that exist through qualitative studies of the kind being conducted by Nacer Lalam and Letizia Paoli is an essential part of developing such models and interpreting any results.

The discussions at the meeting during the presentations and at the final session suggested there was scope for considerable research in Europe around drug markets and policy options. There were currently, however, difficulties in both building research teams of the interdisciplinary nature required for such work and providing the necessary research funding. Several practical tasks were identified by the group including compiling data on prices, purity and seizures both at macro and micro levels. There was also highlighted some need to conduct additional reviews on socio anthropological models, relevant epidemiological research, social costs and cost-effectiveness evidence on the different policies relevant to market models.

On-going European research on drug markets and modelling

Nacer Lalam presented results from a current research on drug trafficking and money laundering in France, with a special focus on the links between poor areas in big cities and criminal organizations. He also referred to other empirical researches carried out by the same team (CIRED) on the supply system of illicit drugs in France: from the final segment (where the user meets the street dealer) to the highest level (export, distribution...). He mentioned the coexistence of two major chains: a cross-border channel and an organized crime channel. Their functioning could be understood using a network approach. Indeed, managing the risks and profits of drug trafficking requires skills from a wide range of fields, which sometimes means contacts beyond the borders. There are two complementary logics associated with the motivation to enter into drug trafficking: the logic of socio-economic integration, which concerns mainly the young native from deprived neighborhoods, and the logic of accumulation which applies to members of criminal organisations.

Letizia Paoli focused on the preliminary results of an ongoing research project on local drug markets (EMCDDA project) in Frankfurt and Milan. She argued that in both cities the distribution chain is often rather short, indeed much shorter than the six-level model foreseen by Preble and Casey. Especially in Frankfurt, but less frequently even in Milan, the distribution chain may be composed of only three levels: the importer, who sometimes relies on one or more couriers, the dealer, and the final customer. She also underlined that much of what happens in Milan's and Frankfurt's drug markets is "disorganised crime". Drug entrepreneurs of all kinds are subject to the constraints deriving from the illegal status of the products they sell. These constraints have so far prevented the rise of large, hierarchically organised firms to mediate economic transactions in the illegal marketplace. In Frankfurt as well as in Milan, the great majority of drug deals, even those involving large quantities of drugs, seem to be carried out by numerous, relatively small, and often ephemeral enterprises.

Juan Tecco presented the work undertaken within an EMCDDA project to develop a macro-economic model to estimate the total demand for heroin. This model simulates the career of potential heroin users and their related demand for heroin at different stages of use or addiction. It starts with a theoretical population of >12 year-olds, all non heroin users, who make transition through different 'states' ('non user', 'has sampled', 'dependent treated', etc.) every 6 months. At year 10, it is estimated that we obtain a cross-sectional population broken down in different groups corresponding to the different 'states'. Different measures were introduced in the model at year 10 and their effect on the cumulative heroin demand was modeled. The largest impact was observed when modeling changes in heroin price levels (a 50% increase in the price level could have a negative impact of 72% on total heroin demand). Also the prevention of trying heroin could be a potentially effective measure (a decrease of trying with 50% would generate an almost equal impact on total heroin demand).

Toon van der Heijden presented the results of a study to assess the trueness of the rumour that 15 to 30 tons of cocaine, would have been imported – but not seized – into the Netherlands between 1990 and 1995. This work is based on the hypothesis that if this rumour were true then, the following changes would have been expected in the Netherlands between 1990 and 1995 (in comparison to other time periods or other Western European countries): 1) a decrease of the amount of cocaine seized; and/or 2) an increase in the use of cocaine; and/or 3) an increase in the amount of cocaine seized in neighbouring countries which transited the

Netherlands; and/or 4) a decrease of cocaine prices. While trends observed in seizures, prevalence and prices data all point to the Netherlands increasingly serving as a primary gateway for cocaine to the European market, it is underlined that this phenomenon manifested itself before, during, and after the critical period. Having compared the expected changes against available data, it was concluded that the findings do not support the thesis on the importation in the first half of the nineties of 15 to 30 tons of cocaine which were not seized.

Giovanni Trovato's presentation was more theoretical and focused upon the development of a model – based on the Harrod-Domar (HD) model. By the HD model it is possible to analyse the relations between the growth rates of two different kinds of economies. The standard HD tries to determine under which circumstances the economy is capable to obtain a steady state growth. The question posed by Trovato's model tries to evaluate the growth's stability of the economic system when there is a sector (the drug sector) inside the economy which takes away resources for investment in the legal sector. The model studies the impact of the increase of criminal activity in the development of economic system. In one scenario, by the increase of the drug consumption the capital appropriation of the drug sector from the legal sector increases the financial investment in the legal sector and this phenomenon is registered by the legal growth rate. However, in a second period when the capital is important to sustain the productivity investments, the criminal sector operates to take away savings and to export capital in more remunerative financial investment. The system is in an explosive phase and the drug sector growth rate is greater than the legal sector. Other scenario's confirm the potentially strong effects of the criminal sector on the legal sector.

Gernot Tragler focused on dynamic models of illicit drug consumption that have been, or will be analysed by the members of the Department of Operations Research and Systems Theory at the Vienna University of Technology and their colleagues at different institutions all over the world. He mentioned past work, which has mainly concentrated on the current U.S. cocaine epidemic, for which both descriptive and normative (in particular, so-called optimal control) models have been developed and analysed. He presented on-going work, which continues along this stream of research, but has also started to involve age-specific aspects of drug epidemics. Future work will aim at validating existing models with European data and developing/analysing models of European-specific problems of drug use. One of the problems is to investigate the interrelation between supply, demand, and prices. In all models, special emphasis is placed on the dynamics of drug use as well as on the inter-temporal cost-effectiveness of drug control interventions.

Chloé Carpentier, EMCDDA

Christine Godfrey, University of York

Lucas Wiessing, EMCDDA

Modelling drug markets: empirical evidence available from economic studies, Christine Godfrey⁵

Abstract

Market behaviour involves the interaction between a number of people involved in the buying and selling of the commodity. Applied economists have always attempted to model this behaviour and derive estimates of the importance of different factors. Such parameter estimates play an important part in assessing the potential impact of policy changes, for example, the impact of a tax change or new regulations. Estimating the impact of different factors on the demand and supply of illicit drugs does present a number of specific challenges. However, estimates of the impact of price on demand and supply are important components of many simulation models.

In this presentation the results of a literature review of available empirical studies will be presented. The limited studies and their results will be considered in the context of the European context. The potential use of economic empirical studies in modelling markets will be considered and priorities for future research outlined.

Introduction

As drug use and misuse has increased there has been increased public and policy making interest in attempting to understand these trends. Too often, however, arguments about the impact of different factors and policy initiatives are based on "myths" rather than careful analysis of either theory or available data. Researching drug markets does present a number of markets. Most obvious is the lack of official series of the type that are collected on legitimate markets. However, there is increasing amounts of data available which bodies such as the the EMCDDA are attempting to collate across Europe.

Economic analyses of markets concentrate on the factors, which influence both the buyers and sellers behaviour and how they interact in the market place. Empirical studies provide not only tests for different models of behaviour but also provide estimates of the strengths of various effects. In competitive markets price plays a central role, adjusting to changes in demand and supply conditions. In drug markets enforcement policies are assumed to influence markets by raising prices. On the supply side the risks of goods being confiscated, violence, and members of the "firm" being arrested and punished are assumed to add to costs and this feeds through to prices. The prices of illicit substances are well above the costs of production, distribution and profit mark-up. However, there is a need to investigate whether

⁵ Professor of Health Economics
Department of Health Sciences and Clinical Evaluation
Centre for Health Economics
University of York
YO10 5DD (UK)
E-mail: cg2@york.ac.uk

changes in enforcement impact on prices and also whether demand for drugs is influenced by prices.

There are a huge potential variety of different markets involved in illicit drugs. Depending on the supply chain, there can be a variety of transactions before the goods reach the retail market. The retail markets could also vary across different drugs and different types of consumers. Dependent consumers will want some assurance of supply and may seek different relationships with their suppliers than occasional users. Also some drug markets are directed at a “mass population” level while others are directed at much smaller groups. Similarly there could be many different types of suppliers from friends, through organised marketplaces and even the medical profession. Markets also interact with policy both at a national and local level.

The aim of this paper is to present available evidence on markets and the factors which influence markets, drawn from the economic literature. A literature review was undertaken using an economic electronic database (EconLit) and from the references given in identified studies. The criteria for selecting studies for the review was that some empirical econometric estimates had been presented. There is no attempt in this paper to summarise the findings from experimental economic studies, from the simulation model literature or the qualitative studies of drug market behaviour. The simulation models are being explored by other members of the TSER group and other qualitative research has been commissioned by EMCDDA.

The results of the review are presented in three major sections. The first section contains a description of studies of demand, focussing on price elasticity estimates. The second section comments on the available literature, which gives some empirical insight into the supply of drugs. Studies which have attempted to consider the interactions between demand and supply are considered in the third section. Finally some conclusions are drawn from the available study and recommendations for future research given.

Demand Studies

Lack of reliable price series and other data has limited the number of econometric analyses. However researchers have demonstrated that it is possible to gather economic data from drug users (e.g. Bretteville-Jensen and Sutton, 1996) and others have combined large survey and cohort studies with enforcement based price series.

Economic theory would suggest that demand for most goods is dependent on the price of that good, the prices of substitutes and complements, income, and preferences. For illicit drugs it may also be expected that demand may well be effected by different policies. Increased availability of treatment may reduce demand as may effective preventive policies. Increased enforcement of laws against possession will raise the implicit costs of consuming drugs. Note other enforcement measures would be predicted to impact on supply directly and through any increase in price affect consumption indirectly through the price impact.

Economic theory suggests that the size of any price effects may vary across a range of factors. In particular, for most goods the demand of the young is more price sensitive than that of

older people. Similarly the poor may be more price sensitive than the rich. Price sensitivity will also vary over the product life-span. Demand for new innovative products tend to react more strongly to price changes than more mature products.

There have been many theories about how price may or may not affect the consumption of different illicit drugs. Many have assumed that price would not have an impact on dependent drug users. However others have suggested that there is a stepped or kinked relationship across the dependence spectrum. The hypothesis is that users at the beginning of their drug-using career would be price sensitive. As dependence increases then price sensitivity falls. However at some point, the user may be a point where it has become difficult to sustain their habit and then the user may also become very sensitive to price changes, possibly opting to enter treatment if prices rise. A further model, however, the rational addiction model suggests that dependent users may be more price sensitive than non users (see Sutton (2001) for a fuller review of the theory of economic behaviour and models).

Different theoretical models also yield different predictions about price effects. This does pose some issues for any review. Different studies in different countries at different time periods may yield different estimates but the reviewer frequently can only use the calculations reported in the paper. In general, price effects are measured in terms of elasticities. The price elasticity measures the proportionate change in demand that results from the proportionate change in price. In general available studies measure participation elasticities, that is how price impacts on the numbers using drugs. Price effects on the number of drug users may be different in size than the effect of price on the amount of drug consumed. The policy implications of these two different price impacts could be important.

Table 1: Drug price elasticities

Drug/Study	Year published	Estimate
COCAINE		
Saffer and Chaloupka	1995	-0.44
Caulkins	1996	-2.5
Dinardo	1993	no effect
Grossman et al	1996	-1.18 (lr), -0.71(sr) temp price change -0.42
Grossman and Chaloupka	1998	-1.35
MARIJUANA		
Nisbet and Vakil	1972	-0.7 to -1.5
Pacula et al	2000	annual participation -0.06 to -0.47 30 day participation -0.002 to -0.69
OPIUM		
Van Ours	1995	-1.0 (use), -0.4 (participation)

Lui et al	1996	-1.22 (lr)
HEROIN		
Silverman and Spruill	1977	-0.27
Saffer and Chaloupka	1995	-0.82
Caulkins	1996	-1.50
Bretteville-Jensen and Sutton	1996	-1.23 non dealing -0.20 dealing

Note: lr = long run; sr = short run

In Table 1, a summary is given on the significant price elasticities found in published economic studies arranged by substance. In general price changes were found to have a significant effect in the majority of studies, with increases in prices leading to a reduction in drug use. The size of effect is variable between studies in the same drug group and no clear patterns emerge from these studies. However, these studies while limited suggest that drug consumption at a general population level will vary with price levels.

Another policy concern is the interaction of consumption between different illicit drugs and between illicit drugs and smoking and drinking. Concerns have been expressed that restrictions on smoking and drinking may make illicit drug consumption more attractive. A rise in cigarette prices with marijuana prices remaining unchanged could mean that while fewer young people smoke cigarettes, more young people smoke marijuana. If this result were found then cigarettes and marijuana would be considered economic substitutes. There are two other possibilities. First that there are no links between the different substances. Second, rather than being substitutes different psychoactive substances act like compliments. That means that if cigarette prices rose then young people may both reduce smoking and drug taking behaviour.

Table 2 contains a summary of the empirical results, which have attempted to determine whether different types of substances are compliments or substitutes. It should be noted that most of the studies had limited data because of the limited price series for the illicit drugs and these relationships were estimated in an indirect way. The results give more examples of complements than substitutes. Two studies found some evidence that there was some evidence of complementarity between alcohol and marijuana among the 12 to 20 year olds but no effects (substitute or compliment) for the older groups (Farely et al, 1999 and Saffer and Chaloupka, 1995). This may be an example of different relationship with prices both for younger groups and those in a more experimenting phase than a more settled pattern of consumption among older age groups. A similar lack of substitution or complementarity among different types of alcoholic beverages has been found in alcohol demand studies.

Table 2 Cross price impacts

Drugs/Study	Date of publication	Estimated effect
Cigarettes and marijuana		
Chaloupka et al	1999	Complements

Farrelly et al	1999	Complements
Cocaine and marijuana		
Saffer and Chaloupka	1999a	Complements
Alcohol and marijuana		
DiNardo and Lemieux	1992	Substitutes
Chaloupka and Laixuthai	1997	Substitutes
Pacula	1998a	Complements
Pacula	1998b	Complements
Thies and Register	1993	Complements
Saffer and Chaloupka	1999a	Complements
Farrelly et al	1999	Young (12 – 20 year olds) complements, no effect, substitute or complement for older ages (21-30).
Alcohol and heroin, alcohol and cocaine		
Saffer and Cahloupka	1999a	Both drugs complements with alcohol.

A number of studies have included some element of law enforcement in their demand studies. Some care needs to be taken in such specifications as it may be expected only street level enforcement on possession would normally directly impact on demand. One particular policy change that occurred in the US was that some states changed their enforcement policy on marijuana possession, effectively a decriminalisation lowering chances of apprehension and punishment. These results are mixed as can be seen in Table 3, four studies indicating no impact on consumption and 3 showing positive impact especially for any consumption in a year rather than the numbers consuming in the last 30 days. Two further studies indicated conflicting results on marijuana related consequences. One study suggests that marijuana decriminalisation changed patterns of crime, lowering violent crime but increasing property crimes. Another study suggests that marijuana mentions rose in Emergency Rooms in decriminalisation states but other drug mentions fell.

There is some mixed evidence about whether fines for possession impact on drug use. Again in one study the effect varied by age with no effects of the fines for younger people but a positive effect on young adults. Similar mixed results were found in two studies, which looked at the impact of increased arrest rates or police activity.

Table 3 Impact of law enforcement measures

Effect/Study	Year of publication	Impact
Decriminalisation of marijuana		
Johnston et al	1981	No effect
DiNarda and Lemieux	1992	No effect
Thies and Register	1993	No effect
Pacula	1998a	No effect
Chaloupka, Grossman and Tauras	1999	No effect on 30 day measure of prevalence, annual use increased more in decriminalised states
Chaloupka et al	1999	Significant effect on prevalence and quantity consumed
Model	1992	Positive impact on property crimes but negative impact on violent crime
Model	1993	Higher marijuana ER mentions but lower other drugs
Saffer and Chaloupka	1995	Positive and significant impact on marijuana prevalence
Fines		
Chaloupka, Grossman and Tauras	1999	Drug use responsive to fines
Chaloupka et al	1999	Drug use responsive to fines
Farrelly et al	1999	No impact 12-20 year olds, positive effect 21 – 30
Arrest rates/ policy activity		
Fareilly et al	1999	Young adults responsive to arrest rates but not youths
Pacula	1998b	Higher crime rate per officer associated with higher rates of marijuana use.

There are far fewer studies, which report the impact of other economic factors. In particular, there are little data about the role of income. The relationship between income and drug use is complex especially with harder drugs where many users may also be part-time dealers. Bretteville-Jensen and Sutton (1996) did estimate an income elasticity of 0.47 from their survey of non-dealing heroin users in Norway. This suggests that increases in income will

increase drug use. However, unlike MacCoun and Reuter (1992), in the Norway study drug users reduced their illegal income when legitimate income either from work or from benefits rose.

More recent studies have also included some preference and policy related data. The study of Saffer and Chaloupka (1999b) investigated the impact of increased state spending on enforcement, prevention and treatment on drug use. Further studies of the impact of treatment on the demand for heroin may be possible to detect with more recent data as expenditures have been significantly shifted towards treatment and away from enforcement. Pacula et al (2000) attempted to look at the role of preferences by considering the impact of the perception of drug related harm. These preference factors were found to be important. Some care needs to be taken about generalising from one study, especially as the study raises a number of methodological issues.

Overall, there has been a major increase in the number of empirical studies of the demand for different illicit drugs. Some caution must be made in interpreting these data especially in a European context. Both the policy context and the structure of drug markets are very different. Most studies have been conducted by a relatively small group of researchers on a few surveys. The surveys include a national household survey, a young people survey repeated regularly and a cohort study of young people. These surveys are large enough to yield sufficient numbers of hard drug users for analysis. Some studies have however been based on primary data collection, which would be very cost-effective to replicate in a number of European countries where suitable secondary data sources are unavailable.

Empirical studies of the supply of drugs

Few studies were found that provided empirical estimates of different aspects of the supply of drug markets. Most studies have been analyses of the effect of enforcement and most of these have been partly constructed for modelling work than direct observation and analysis. One of the themes of work on the supply of drugs is the impact on enforcement on the retail price of drugs. There are a number of studies which suggest that increases in enforcement particularly in attempting to stop drugs at source has little impact on price and therefore demand (see Reuter and Caulkins, 1998). Authors have also argued as to whether increased costs at source will be simply added to the final price (and hence have a small impact) or whether these costs add multiplicatively to the price through percentage mark-ups (and therefore have a more significant impact). What has general agreement is that the costs of production and distribution are a small proportion of the eventual street price (Caulkins et al, 1999).

Some studies have been made of the structure of drug markets. Caulkins et al (1999) found four different types of retailers with profit margins varying from 50 per cent to less than 10 per cent. However, this study was conducted in the United States and markets may be different and involve shorter supply chains in some European countries.

Unfortunately there have been few studies, which have considered the existence of competition in drug markets. Economics would suggest that competition in normal markets act to drive costs and therefore prices down. It is clear that prices vary across and within

European countries and there are many opportunities for further research within Europe and this may open the possibility of applied economic studies.

Market interactions

Economics would suggest that demand and supply interact. Also given that enforcement affects supply and demand there may be a need to carefully specify both demand and supply relationships. Lee (1993) illustrated with a theoretical model the potential for policies directed at supply to impact on demand and vice versa. This may lead to unexpected effects. For example, Lee hypothesised that harassing drug users may lead to an increase in drug use rather than decreasing use as may be predicted from a simple demand model.

It is important to use the right estimation techniques when there are potential feedback effects. Saffer and Chaloupka (1999b) have attempted to model the supply and the demand for drugs. They use the specifications to produce reduced form equations to take account of feedback effects. They did find in their study that drug control spending impacts on supply and demand. Interestingly they found an impact for police enforcement expenditure but not for expenditure on prisons.

Conclusions and recommendations for further research

There is a growing literature indicating that demand for drugs is influenced by prices. This has been found across a range of “hard” and “soft” drugs. This gives support for attempting to build drug simulation models based on economic and policy options in Europe. However, it would also be useful to stimulate empirical studies using European data. These would be fertile areas for economic PhD students. However, such students do need expert help on the intricacies of the drug markets in Europe so that they can make judgements about different data series and not over interpret any empirical studies.

Demand studies could be further enhanced. Some effects such as whether price impacts vary across characteristics such as dependence are limited. Interestingly in Norway, Bretteville-Jensen and Sutton (1996) found no evidence of the kinked relationship with price described earlier. There is also a need to examine the relationship of price with different aspects of drug consumption behaviour. The role price takes in the quantity consumed is important as is the potential to study initiation and quitting behaviour differently as has been done with cigarette consumption.

There is far less empirical data available on supply relationships compared to that on demand. It may be to investigate drug markets it will be profitable to combine a number of different research techniques. Describing different markets and relationships that exist through qualitative studies would inform how economic models should be specified. Bringing together economists, modellers and other researchers could be very productive. One of the difficulties with economists in Europe is that there is not the grouping that Michael Grossman has been able to create in the United States. There is considerable research on drug markets across Europe. Unfortunately there has been little interest shown by applied economists. How economic interest can be encouraged at a national and international level

remains a challenge that no-one has as yet taken up.

References

- Bretteville-Jensen, A.L., and Sutton, M. (1996) Under the influence of the market: an applied study of illicitly selling and consuming heroin, Discussion Paper 147, Centre for Health Economics, University of York.
- Caulkins, J.P. (1996) Estimating elasticities of demand for cocaine and heroin with DUF data, Working Paper, Carnegie Mellon University.
- Caulkins, J.P. and Reuter, P. (1998) What price data tell us about drug markets, *Journal of Drug Issues*, 28(3): 593-612.
- Caulkins, J.P., Johnson, B., Taylor, A. & Taylor, L. (1999) What drug dealers tell us about their costs of doing business, *Journal of Drug Issues*, 29(2): 323-340.
- Chaloupka, F., Grossman, M. & Tauras, J.A. The demand for cocaine and marijuana by youth. In Chaloupka, F., Grossman, M., Bickel, W.K. and Saffer, H. (eds) *The economic Analysis of Substance Use and Abuse: An integration of econometric and behavioural economic research..* University of Chicago Press: Chicago, pp. 133-155.
- Chaloupka, F. and Laixuthai, A. (1997) Do youths substitute alcohol and marijuana? Some econometric evidence. *Eastern Economic Journal*, 23(3): 253-276.
- Chaloupka, F., Pacula, R., Farrelly, M., Johnston, L., O'Malley, P. & Bray, J. (1999) Do higher cigarette prices encourage youth to use marijuana? NBER Working Paper No 6938. National Bureau of Economic Research: Cambridge, Mass.
- DiNardo, J. (1993) Law enforcement, the price of cocaine and cocaine use, *Mathematical and Computer Modelling*, 17(2): 53-64.
- DiNardo, J. and Lemieux, T. (1992) Alcohol, marijuana and American youth: the unintended effects of government regulation. NBER Working Paper 4212. National Bureau of Economic Research: Cambridge, Massachusetts.
- Farrell, G. (1998) Routine activities and drug trafficking: the case of the Netherlands, *International Journal of Drug Policy*, 9: 21-32.
- Farrell, G., Mansur, K. and Tullis, M. (1996) Cocaine and heroin in Europe 1983-93, *British Journal of Criminology*, 36(2): 225-281.
- Farrelly, M., Bray, J., Zarkin, G., Wendling, B., & Pacula, R. (1999) The effects of prices and policies on the demand for marijuana: Evidence from the National Household Surveys on Drug Abuse, NBER Working Paper 6940, National Bureau of Economic Research: Cambridge, Massachusetts.

Grossman, M., Chaloupka, F.J., and Brown, C.C. (1996) The demand for cocaine by young adults: a rational addiction approach, NBER Working Paper 5713 National Bureau of Economic Research: Cambridge, Massachusetts.

Johnson, L., Malley, P. and Backman, J. (1981) Marijuana decriminalization: the impact on youth 1975-1980, Institute for Social Research, Ann Arbor, Michigan.

Lee, L.W. (1993) Would harassing drug users work? *Journal of Political Economy*, 101(5): 939-959.

Liu, J-T., Liu, J-L., and Chow, S-Y. (1996) The demand for opium in colonial Taiwan, 1914-1942, Working Paper, National Taiwan University.

MacCoun, R. and Reuter, P. (1992) Are the wages of sin \$30 an Hour? Economic aspects of street-level drug dealing, *Crime and Delinquency*, 38(4):477-491.

Model, K.E. (1992) Crime, violence and drug policy, unpublished paper, Harvard University.

Model, K.E. (1993) The effect of marijuana decriminalisation on hospital emergency room drug episodes, 1975-1978, *Journal of the American Statistical Association*, 88(423):737-747.

Nisbet, C.T. and Vakil, F. (1972) Some estimates price and expenditure elasticities of demand for marijuana among UCLA students, *Review of Economics and Statistics*, 54(4): 473-475.

Pacula, R. (1998a) Does increasing the beer tax reduce marijuana consumption, *Journal of Health Economics* 17(5): 557-586.

Pacula, R (1998b) Adolescent alcohol and marijuana consumption: Is there really a gateway effect? NBER Working Paper 6384, Cambridge, Massachusetts.

Pacula, R., Grossman, M., Chaloupka, F.J., O'Malley, P., Johnston, L.D. & Farrelly, M.C. (2000) Marijuana and Youth, NBER Working Paper 7703, National Bureau of Economic Research: Cambridge, Massachusetts.

Saffer, H. and Chaloupka, F. (1995) The demand for illicit drugs. NBER Working Paper 5238, National Bureau of Economic Research: Cambridge, Massachusetts.

Saffer, H. and Chaloupka, F. (1998) Demographic differentials in the demand for alcohol and illicit drugs, NBER Working Paper 6432 National Bureau of Economic Research: Cambridge, Massachusetts.

Saffer, H. and Chaloupka, F. (1999a) Demographic differentials in the demand for alcohol and illicit drugs, in Chaloupka, F.J., Grossman, M., Bickel, W.K. and Saffer, H. (eds) *The economic analysis of substance use and abuse*, Chicago: National Bureau of Economic Research, 187-211.

Saffer, H. and Chaloupka, F. (1999b) State drug control spending and illicit drug participation, NBER Working Paper 7114 National Bureau of Economic Research: Cambridge, Massachusetts.

Silverman, L.P. and Spruill, N.L. (1977) Urban crime and the price of heroin, *Journal of Urban Economics*, 4(1): 80-103.

Sutton, M. (2001) Economic market models. In Godfrey, C., Hartnoll, R. and Wiessing, L. (eds.) *Modelling drug use: methods to quantify and understand hidden processes*. Monograph No 6. Lisbon: EMCDDA.

Thies, C. and Register, C. (1993) Decriminalization of marijuana and the demand for alcohol, marijuana and cocaine, *The Social Science Journal*, 30(4).

Van Ours, J.C. (1995) The price elasticity of hard drugs: the case of opium in the Dutch East Indies, 1923-1938, *Journal of Political Economy*, 103(2): 261-279.

The drug trafficking in France: elements of functioning and motivations, Nacer Lalam⁶

Abstract

This paper presents the preliminary results of the research that is being undertaken on drug trafficking and money laundering in France, with a special regard for the links between poor areas of the big cities and criminal organizations.

The studies, done by our research team CIRED⁷, analyse the supply system of illicit drugs. From the final segment (where the consumer meets the street dealer) to the high level (export, distribution,...), we try to upward the chain in France.

One of the significant result of the last research⁸ on the subject of synthetic drugs (ecstasy, amphetamines, LSD,...) reveals a kind of re-conversion of criminal organizations in the high level drug trafficking, in close contact with young professional native of poor areas.

We could set out the coexistence of two major chains : one called cross-border channel and the other called organized crime channel. Their functioning could be perceptible according a network approach. Indeed, managing the risk and profits requires a lot of skills from a wide range of field which sometimes means contacts beyond the borders.

The presumed role of the criminal organization in the drug trafficking suggests to adopt an historical point of view, that's why we take a glance at the "French connexion" between 1960 and 1975.

⁶ CIRED

Jardin tropical de Paris
45 bis, avenue de la Belle Gabrielle
94736 Nogent sur Marne Cedex (France)
E-mail : lalam@centre-cired.fr

⁷ Centre International de Recherche sur l'Environnement et le Développement.

⁸ Thierry Colombié, Nacer Lalam, Michel Schiray, "Etude des filières produits psychotropes à partir des soirées techno", OFDT, Paris, 1999.

Preamble : the informal economy question

Table 1: The informal economy

Overall Economic Activity					
Formal Economy (= official GDP)			Informal Economy		
Non market sector	Market Sector			Non Market Sector	
Public and Private Non Market Sector	Market Goods and Services	Black Economy	<u>Criminal Economy</u>	Domestic work	Voluntary
		Grey Economy	Occasional Undeclared Labor Clandestine Labor	Drug trafficking Procuring Fruit machines	

As many studies⁹ have shown these last two decades, the notion “informal economy” is a construction that does not make any sense itself, and that is used differently according to the purposes of its author.

Nevertheless, all notice, a serious deficit of knowledge of the realities covered by this notion. The discussion started in Europe in the 1970s has opened a very promising field of inquiry into the economy and its different forms, and has helped us to better understand the relationship of the economy to the social sphere. Unfortunately, both this discussion and empirical research on the topic have progressed slowly. This slow pace reflects the hegemony of the paradigms of the dominant economy established by its binary object, the official market and the public sector.

However, the vision of the economist should appear very clear on this subject. Modern economics, with its informational instruments, has focused on controlled and officially registered economic activities, both private and public.

The official market is supplemented by a set of heterogeneous activities developed inside household or community structures, and those related to different levels of social organizations. The only common characteristics of these activities are that they are not registered by economic national accounts coming from the official information systems, and that they are marginalized by public policies and, probably as a consequence, by the social sciences, especially economics.

The table above give details by a didactic way : the larger of the column is not proportionate to their importance in the economy. The temptations of estimating the column of the right side are really uncertain, particularly those implemented by the specialists of national accounting.

Although the outlines of the informal economy are blurred and changing according to the spatial and temporal variables, we focus on the criminal economy, the activities prohibited that generated a kind of wealth.

Brief methodological aspects

This work implements the general methodology experimented in the previous studies which includes two major axes :

⁹ Schiray M, in M. Castells, in the dual metropolis, Berkeley, San Francisco.

- the direct methods imply observations, questionnaires and interviews with the actors of the supply side (dealer, wholesaler, people responsible of the market protection,...);
- the indirect methods, presently the most important, emphasize the institutional approach (treatment of the information available in the concerned institutions).

This methodology uses techniques stemmed from the anthropology and tries to build up material, well-matched with the economic, particularly quantitative, approach.

Table 2: Evolution of the main illicit drugs average prices since 10 years (France). In French francs.

Product	Cocaine	Heroin	Ecstasy	LSD	Amphetamines	Cannabis
Time Period	One gram	One gram	One pile	One unity	One pile or one gram	One gram
At the end of the 1980s	1 000	800	300	100	100	40
Mid 1990s	700	600	150	80	70	30
Today	500	300 / 400	100	50	50	30

From research investigation CIRED / OFDT (1998)

The recent evolution of French drug markets

In the 90's, the French illicit drug markets are characterised by four main evolutions.

The market of cocaine is rising

Indeed, some quantitative and qualitative data seem to converge to confirm this state. For example, the enforcement seized 3687 kg of cocaine in France, during the year 1999, which is 250 % more than the year before¹⁰. Although, part of this quantity is not dedicated to the French market, the arrests show an increase of consumption of roughly 7 %, of trafficking of 22 %¹¹.

The price has fall from 1000 ff per gram in the end of the 80's to 500 ff today (retail sale price, table 2). No real element to test the quality but the more a drug is widespread the more the quality decreases.

This growing demand could be explained by various causes, that we can sum up, without being exhaustive :

- some of heroin addicts following a harm reduction program are driven to use cocaine, the dealer was adapting its "panoply" of product ;
- the diffusion of crack surreptitiously, the dealers try to gain new consumers (such as prostitutes, teenagers,...) ;
- the festive dynamic partly hold by the "techno scene" and the search of stimulants as dance pills and cocaine.

An other argument from the supply side is standing for the cartel strategies, that shift some of their resources from U.S.A. to Europe, and so forth. This hypothesis need to be verified.

¹⁰ In 1998, the quantity of cocaine seized reached 1050 kgs.

¹¹ The data from OCRTIS has recorded 3397 cocaine or crack user in 1999 compared to 3181 in 1998 ; and reciprocally, 1188 traffickers compared to 972.

The market of heroin is declining

In 1993, the substitutes of heroin, Methadone and Subutex were available. The substitution treatment of heroin addiction seems to have altered the demand curve. In other words, the demand for heroin has been reduced. The police data clearly show this decline, especially those users named problematic user.

The quantity of heroin seized has also diminished.

The variable that describes this movement is the price of heroin. Since the mid 90's, the retail price of one heroin gram has fallen from 800 ff to 400 ff (table above).

At a global level, the situation appears somehow paradoxical, the international production of poppy, opium and morphine is relatively important (Afghanistan, Mexico, Colombia, south east Asia, south countries of the ex-USSR,...). It suggests that these countries have already become places of consumption.

By focusing on the supply side, we could wonder what is the perspectives of the usual heroin dealer. Do they try to find new consumers, with a proselyte method. In this case, it is entirely possible that this new generation of consumer has not been yet checked with the health system, also because their pattern of use is essentially based on snorting and smoking. The fact that the heroin price has decreased from an average level of 800 ff per gram in the middle of the 90's to 300 ff today, means that the pressure on the income is not as huge as before. The opiates are also used in big "tecknival" by polydrug users to absorb the negative effects of stimulants.

The spreading of synthetic drugs

One of the significant evolution of the drugs landscape is the introduction of many synthetic drugs mostly coming from northern countries. The most consumed still are the amphetamines and the ecstasy (MDMA), and were soon associated with the festive dimension (the most known is the techno scene). Among the different products (the last quoted plus L.S.D., G.H.B., Ketamine, etc.) the user could choose many drugs in the same moment, or at different moments ; to the search of an effect is corresponding a product. Then, we observe a kind of products managing.

The "democratisation" of cannabis consumption

The cannabis under its different form (hashish, marijuana, oil) stays the main illicit drug. The average age of 14 years is the one of sample cannabis.

It is the most widespread drug among all social categories and all ages.

The quality of the cannabis that comes essentially from Morocco is globally decreasing at the retail level. In fact, it depends on the number of intermediates between the imports and the final dealers and on the chain of acheminement.

An other element that is particularly growing, the propensity of individual to cultivate cannabis in their house, what we call the "home cultivation".

Table 3 : Arrests for illicit drug use and trafficking (France : 1993 to 1999)

Year	1993	1994	1995	1996	1997	1998	1999
User	38189	44261	52112	56144	70444	74633	80037
User-dealer	7017	8257	10213	13084	12281	10874	10367
local & intern trafficking	6451	7179	7107	8412	6560	5541	5506
Total	51657	59697	69432	77640	89285	91048	95910

source : OCRTIS / FNAILS (2000)

The local drug markets

There is a great variety of illicit drugs micro-markets where demand meets supply. We use to focus on the suburbs of big agglomerations, this perception is based on their visibility. The consecutive stigmatisation must not hide other places and persons are constitutive of the global market.

The cannabis trafficking is dominant. Small groups of dealers that are not really in competition but share the territories.

On the contrary, the markets of heroin and cannabis were dissociated. In the 90's, this final segment is not integrated in a big structure, it is relatively autonomous, the relations with the wholesaler are simply commercial.

In the end of 90's, a new configuration has emerged, the professionalisation of dealers from these areas. Indeed, they become more and more organized and some of them are directly in contact with the exporters. The "natural" place from where they could organize this trafficking appears to be the south of Spain (Malaga, Marbella,...).

In France, the scene of drug markets in the poor neighbourhoods has brought politicians to speak about a mafia drift. Various studies¹² have invalidated these remarks and shed the light on the economic and social impacts. For instance, although cannabis and heroin were available in the neighbourhood of suburbs of Paris¹³, the trafficking profit of these two products were not so huge. By trying to estimate the economic weight of drug trafficking generated in this place. We achieved to the proportion between 2 % and 5 % compared to the overall revenue (legal). In that way, the aggregated level is interesting to take into account the economic impacts of drug trafficking. But, objections must be formulated to this result. The money generated by drug trafficking could entail, especially among young individual, a real gap with the legitimate norms and reference points (schools, work, family, institutions,...). Through the social impacts, some are, without doubt, very disturbing :

- violence between traffickers, traffickers and users, traffickers and neighbourhood
- appropriation of public space by dealers and consumers
- inside the family (they can earn more money than their parents)
- in relation to the school and work (deterrence of doing such activities)
- in relation to the social workers
- in relation to the ordinary consumption.

All types of relations exist within the family, from numerous cases of exclusion, to families that shut their eyes and take advantage of illegal benefits to survive, and families that organize themselves around the trafficking.

¹² Conseil National des Villes, *Economie souterraine de la drogue*, Paris, 1994.

¹³ Ibidem

In the following table, many interviews with traffickers aged between 16 and 30 permit to list the costs and benefits of trafficking illicit drugs. Two stages illustrate the calculus, one very succinct and the other a bit detailed. Some of them are monetarised. The psychological nuisances, such as the stigmatisation, seem difficult to assess, this is, to a certain extent, a negative externality. One of the significant characteristic is the relative myopia about the sentences.

Table 4: The individual costs-benefits calculus

A brief costs-benefits calculus	
<i>Costs</i>	<i>Benefits</i>
<ul style="list-style-type: none"> • purchase of the raw materials • protection against the police, against the competitors and against the consumers • cost of people watching out and touting 	<ul style="list-style-type: none"> • important amount of cash and quickly obtained • accept various objects of drug addicts who need drugs • to assist more or less directly their family
A wider costs-benefits calculus	
<i>Costs</i>	<i>Benefits</i>
<ul style="list-style-type: none"> • sentencing, incarceration and fines • to search dealer's house • break up with their family circle • the stigmatization • risk of confinement in a criminal world • to deter the dealer from the legitimate structure of social integration 	<ul style="list-style-type: none"> • return on investments very short • the ability to be one's own boss • exhibition of a certain success • work not so laborious • attraction of receiver for his • the power by redistribution, notably money he gives to buy the social peace in the neighborhoods • no taxes

Unemployment and precariousness appear to be very spread among these young native from deprived neighborhoods. The proposal done by social workers are not well perceived by this target population considering that the wage is not enough to cover their needs. As suggests the table below, the minimal calculus will pretend a kind of rationality by comparing the direct gains from the illegal and legal activities.

Table 5: Gains associated with the retail sale of haschich and heroin on a monthly basis.

Trafficking on a monthly basis	Semi-whole buying price	Retail sale prices	Benefits (or margin = aggregated sales minus buying price)
Haschich (cannabis)	1 kg at the price of 10 000 f	12 g sold 250 f each 83 x 250 = 20 750 f	20 750 f - 10 000 f = 10 750 f
Heroin	40 g at the price of 8 000 f	1 g sold 400 f f each 40 x 400 = 16 000 f	16 000 f - 8 000f = 8 000 f

With the hypothesis that the drugs are not diluted. If it is the case, the profit will be more important.

In many cases, the dealer is also a user of the same product. And other forms exist as : the dealer of heroin can smoke cannabis, or the dealer of cannabis can snort heroin. Where the

deal takes place will condition the nature of the transaction, in the street, it is more anonymous and the quality is often mediocre, in the apartment, it is based on confidence, the quality is better than in the street (friendship networks).

Table 6: the most common legitimate incomes of the young adults per month (especially, those coming from the poor neighbourhoods) in French francs.

Minimum wage (gross)	Minimum care income (Revenu Minimum d'Insertion)	Contrat Emploi Solidarité	Contrat d'Apprentissage	Contrat de qualification
6 881 f	2 552 f (net) for one person living alone	50 % of the monthly minimum wage	maximum = 78 % of the minimum wage	maximum = 75 % of the minimum wage

Source : INSEE, 1999

To compare these two sources of making money is what economist do also with a little concern about the moral aspect. But nevertheless, the observation shows that it will vary according its own feeling of being outlaw and the degree of local acceptance.

Drug trafficking could be considered as a substitute to official employment. But in a case, it concerns the young unemployed, without any qualification and any perspective of economic insertion in the official economy. Whereas in an other case, it concerns persons in illegal positions without rights to official jobs, “employed” by organized wholesale traffickers acting for illegal capital accumulation. Our work raises many questions on this point. One central question concerns the type of relations between these street retailers and more organized criminal groups at upper levels of trafficking. Are they relations of competition, complementarity, association, or subordination?

The process of professionalisation

Although a majority of these young continue to traffic at a little scale, especially haschich, a minority become real professional noticeable by the level of transaction (big quantities of illicit drug and much more money), the division of labor, their capacity to launder,...

In fact, the ascension is progressive, the path begins by little jobs around protection, observation, taste, dissimulation, etc). The more the dealer is young, the more he is prone to reach a high position in a few years.

In the chain, these individual have succeed in the bypass of wholesaler settled in France to the wholesalers based near the zones of production. This position induce more profit and more risk, it means for the protagonists to have a good ability of learning.

The amount of profit has developed or exacerbated some skills like bargaining.

They frequently ally with older people, ex-gangsters settled in the same place (to avoid the law enforcement). Some of them have recently converted into drug trafficking. In several cases, the older gangsters take a rapidly dominant position, using this new opportunity to reactivate their former delinquent networks and consolidate their position. In fact, many French gangster were settled in European countries as Spain, Netherlands or other countries as Morocco, Thailand, Latin America,...

The predominance of the criminal organizations

We cannot use the concept of mafia or cartel to describe the French case of criminal organizations. It is necessary to return to the second world war to understand the emergence of little teams that have endured after : some were near the "Gestapo", other were linked with the French Resistance.

Doubtless, the figures of these teams were very integrated locally (Paris, Lyon, Marseille) and were close to the politicians.

The definition of organized crime is far from being unanimous, especially in Europe where some countries have adopted various laws, with a high disparity, to counter this phenomenon. In France, no legal definition of "organized crime". The penal code indicates the infraction of "criminal association" and "acts in organized gangs".

European Union¹⁴ tries to define it with 11 criteria :

- 1) collaboration between more than two persons**
- 2) each person has a specific role
- 3) on a long term period**
- 4) with a rule of discipline or control
- 5) suspected of having committed serious penal offenses**
- 6) at an international level
- 7) resorting to violence and other means of "intimidation"
- 8) using commercial structures
- 9) doing the money laundering
- 10) trying to influence the politicians, media, public administration, law enforcement, the economic system
- 11) acting for profit or power**

The four criteria in bold are explicitly required to speak of criminal organization plus at least one other criteria. These general elements could apply to many criminal groups acting in Europe, it is not enough precise, one must include societal dimension.

Neither the European definition is satisfying nor the Canadian, that define "organized crime" as follow : "economically motivated illicit activity undertaken by any group, association, or other body consisting of two or more individuals, whether formally or informally organized, where the negative impact of said activity could be considered significant from an economic, social, violence generation, health and safety and/or environmental perspective."¹⁵

For the case of France, the profile of these criminal organization (we use this notion for lack of real study) is their ability to be invisible.

The teams predominantly take place in three zones : Paris, Lyon et Marseille and could be in real reciprocal relationships, also characterized by the gathering of skills or specialities.

The main activities are :

- armed robbery
- racket
- procuring

¹⁴ Conseil de l'Union Européenne, *Groupe multidisciplinaire sur la criminalité organisée, Révision du document ENFOPOL 35 REV 2 basée sur le document CRIMORG 55, REV 1*, Bruxelles, octobre 1999.

¹⁵ Margaret Beare, *Unraveling the concept of organized crime*, Nathanson Centre for the study of organized crime and corruption, Commission du droit du Canada, 1999.

- burglary
- forged currency
- gambling
- fruit machines

Some of these activities permit an initial accumulation to commit an activity of drug trafficking (even though this way of functioning is changing because of new strategies spread out by big exporters, i.e. “advance against takings”, it appears to be a very interesting lever to extend their field of action. This possibility means, you don't have to pay the drug as an ordinary transaction. But you pay it after having sold it. This mechanism can generate a kind of economic dependence, above all among drug users. But usually, the exporters adopt this *modus operandi* only with people endowed with a good reputation.

In France, outside the casinos, the fruit machines are prohibited. The criminal organizations have soon exploit this possibility of making profit. They buy machines in Spain or in Italy where they are authorized and install them in bars and cafes of regions of Marseille, Lyon, Paris and Lille. This activity entails to occupy territories and to sign it. The respect of informal rules achieve to a share of territories ; if it is not the case, we assist to gangland murders. The illicit drug markets respond hardly to the competition rules, the most common is to share out the market on the basis of particular rules, such as the territorial criteria, etc. Of course, there exists some moments of regulation, for example, in an organisation where members decide to traffic while others prefer staying on fruit machines and armed robbery : this regulation is often fatal for elements of the sub-group of the organisation.

By listing the previous activities, the analyst could notice the fact that these organizations are most prone to penetrate each opportunity by making a calculus more or less elaborated (see figure 1).

A historical point of view help to better understand the role of organizations in the drug trafficking. Three main constitution emerge :

- groups that have always done drug trafficking and continue
- groups that are partly reconverted
- groups that are diversified, from illicit drugs to weapons trafficking,...

The data show that the illicit drug trade in France is mainly dual. On the one hand, the criminal organizations, on the other hand young professional that we can't designate organised crime. In some places, organizations dominate geographic territories and control the importation, manufacturing, and distribution of narcotics.

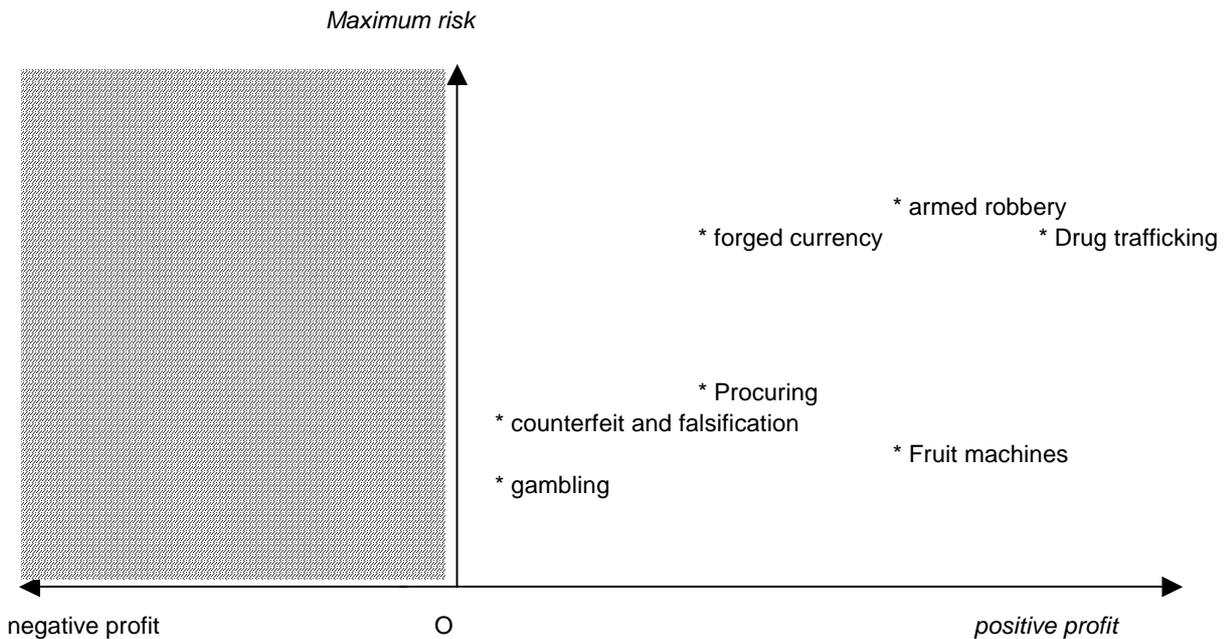
Family and friendship relations in source countries outside France afford many of the dealers connections to high quality drugs at low prices. Drug traffickers prefer to work with people from their own racial and ethnic group because these are persons whom they know and trust.

We can also indicate that high level dealers operate in relatively small crews, hide their identity from all but a small number of trusted associates, and work on a need-to-know basis.

The small size of drug dealing crews provides safety advantages since crew members can be chosen from trusted and known associates; associates and employees can be monitored more closely; and the organisation is difficult to penetrate by law enforcement organisations.

Members of a drug dealing crew not only distribute drugs and collect profits, they also serve as an information network that keeps participants abreast of what is happening on the street and provides information on police activities. Introductions are arranged through drug networks and former drug dealers released from prison report that a good reputation and contacts will put them back into action immediately.

Figure 1: The map of the criminal activities : what place for the drug trafficking?



The profit is monetary, the aspects of psychological satisfaction are not taken into account
 The hachured surface represents the negative profit zone and corresponds to the activities that have failed.
 examples : to throw the cannabis cargo overboard or the armed robbery without any loot.
 The risks are composed of the sum : external, law enforcement and competitors ; internal.

Rules and conventions (the organized crime subculture)

Trustworthiness embodies a fundamental function into the control and durability of illicit activities. Obviously, at an individual scale, the sensibility towards risks is also preminent but we are speaking of mechanism and not of determinants.

The corollary of this rule is the capacity to keep one’s word, or the well known “omerta”. To be sure of this skill means to be interested in the reputation. Considering the prison as a place of training, any dealer will observe around him the workforce he could recruit. The reputation is composed of heroic act, facing law enforcement, using firearm,... All these elements are The other fundamental convention is the use of violence as mean of regulating disagreements. In case of treason, the extremely sanction is the murder of the offender. When the problem involve all the organization (competition between and inside groups), then it ends in a gangland confrontation, with murders and injured.

Not to be solvent when he is discovered, the professional criminal doesn’t possess any patrimony. But he could appeal to good lawyers.

The young professional have not yet adopted these principle, but one indicator indicates a progress in this process : many of these young have the same lawyer specialized on the questions of illicit drugs. He could be paid on a yearly basis.

Finally, this polarization of drug trafficking fits to two complementary logics : a logic of socio-economic integration and a logic of accumulation (see figure 2). The first concerns more the young native of deprived neighborhoods, the second applies to members of criminal

organizations. Far from developing a fine etiology of drug trafficking, this analysis seems relevant to retain the principal motivation of entry in drug trafficking.

Logic of socio-economic integration and logic of accumulation

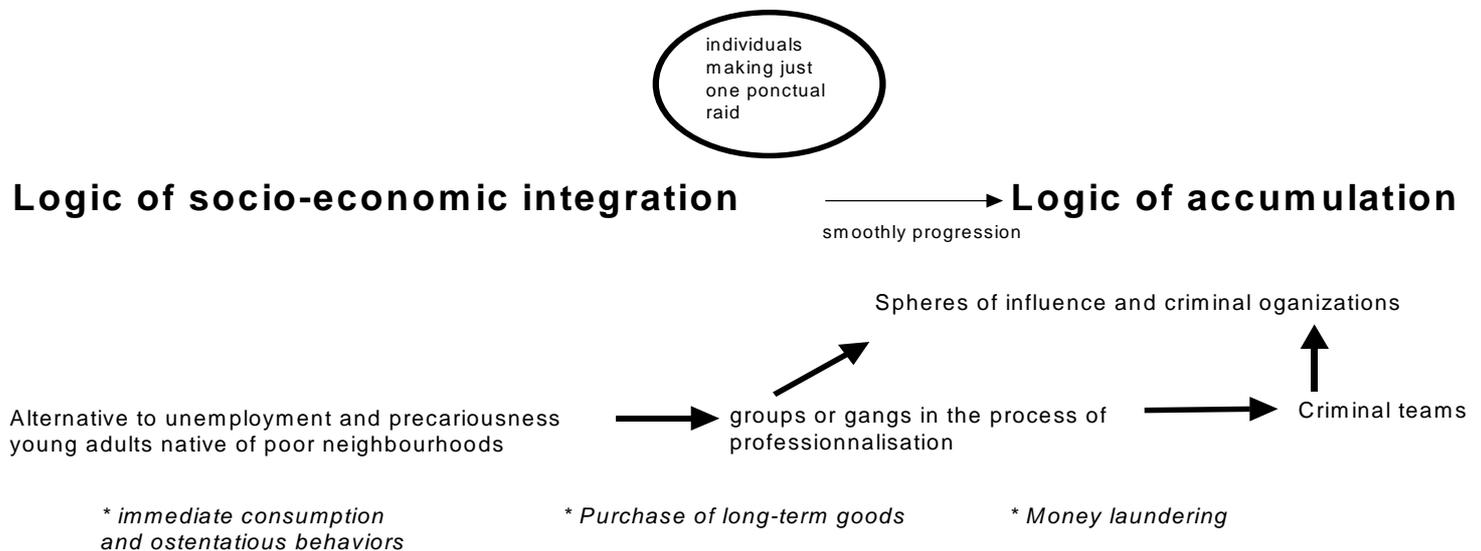
The logic of socio-economic integration is characterized by the search of money, to acquire consumption goods and services. This motivation to consume and to imitate the average household. For example, the money obtained by trafficking permits to pay leisure, to be "a big time gambler", to buy cars, trademark products, to pay the house rent,... This behavior is, most of the time, really ostentatious. With the time, some of these young traffickers become professional and recycle or launder profit in purchase of house, trading business,... Usually, this practice is the fact of members of criminal organizations.

The logic of accumulation means a real enrichment, by means of launder, more or less complicated. The profits are here invest within the Stock Exchange. These big traffickers acquire a property business (hotel, housing, grounds,...), they also do invest in foreign countries. In the figure 2, both logic are presented and the link that unifies them, by a progression of young delinquents.

It is difficult to identify these practises of money laundering : shops, or small firms, night clubs, bars, restaurants. The necessary invisibility is associated with a great mobility of transactions.

- foreign exchange office ;
- off shore societies ;
- casinos, public markets, property company (SCI in France) ;
- investments in developing countries (Brazil, Thailand,...).

Figure 2: Logic of socio-economic integration and logic of accumulation



Weaknesses of public policies and opportunism of drug traffickers

Many questions raise about the public policies in the case of drug trafficking. One of the more insistent concern the law enforcement efficiency. The ministry of interior (police) and the ministry of defense (gendarmerie) are solicited these last years for a certain productivity, the statistical prospects exceed the networks dismantling. This tendency is more acute when elections are near. It signifies that they tend to give priority to little dealers and neglect the professional traffickers well organized. Despite the growing police arrests, the markets of illicit drugs stay heavily active. An other point acts as a brake upon efficiency of law enforcement : the rivalries between services (internal or external). There exist problem of coordination inside and cooperation outside (between countries). Each service does not want to communicate its information and tries to end the investigation itself. We know the importance of success in the conduct of affairs to climb in the hierarchy. They prefer the short term output than to break up organizations in the long term.

Within the justice system, it's possible to retain many dysfunctions. One initial bias is the fact that the judges scarcely pursue the charge of money laundering because it requires a long time in the investigations and the penalties are enough hard for the charge of trafficking.

The judges are also rarely in contact between each other to build relations between affairs. To the extent that they are mobile, the transmission of memory is really failing. The cooperation between judges of different countries is very unequal. The letters rogatory are most of the time not followed.

Moreover, the changing legislation about illicit drugs within two dimensions, space and time, pushes the drug trafficking to adapt to it. The traffickers use to search the place where the risks and costs are the lowest. This is a powerful mover of internationalisation (see figure 3 in the annex about the "French connection").

We can not forget the effect of globalisation and the diffusion of technologies of communication. The purpose of invisibility suggests to be aware and to adopt the slightest innovation. This is the case for the technologies of communication, the diffusion of mobile phones is exemplary (as also scanner, internet, etc.).

At last, one subject that drug trafficking implies and that requires a study in itself is the private and public corruption.

Concluding remark

In France, the prevailing attitude of the law enforcement institutions is, somehow, schizophrenic. According to the local SRPJ and the OCRTIS¹⁶, most of the drug trafficking would be the fact of young adults coming from the deprived neighborhoods, going to the Netherlands or to Spain for the purchase of illicit drugs (cannabis, heroin, cocaine or synthetic drug). If it is partly true, it does not correspond to the entire reality. This visible aspect of the drug supplying entails a major concentration of the police resources on these populations. Moreover, the development of a local underground economy in these disqualified areas and its corollary, the insecurity, contributes to nourish this vision.

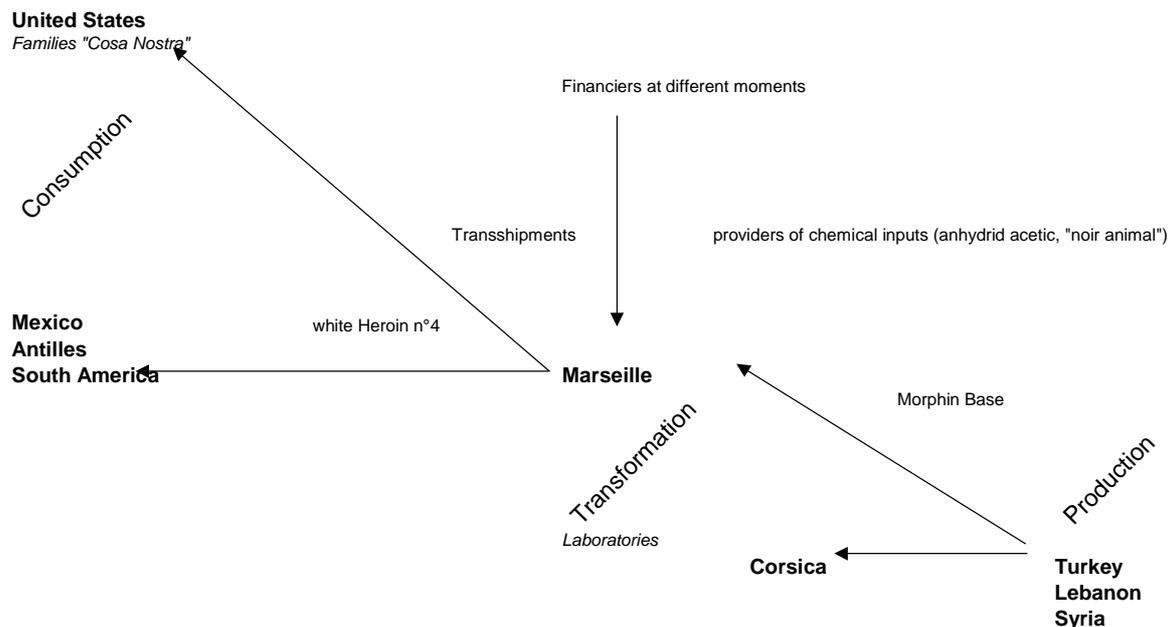
¹⁶ Service Régional de Police Judiciaire et Office Central de Répression du Trafic Illicite de Stupéfiants.

Nevertheless, the French history of gangsterism is very rich and the case of the "French connection" reminds us the involving of bandits in the drug trafficking. After its dismantling in the mid 1970s, the belief set up that the criminal organizations will disappear or not stay in France.

Annexe

Figure 3: A brief exposition of the “so-called” French connection

The 4th October of 1952, one act of piracy is at the origine of the initial accumulation of the french operators, the diversion of the ship "Combinatie" containing 27 tons of american cigarettes.



The name “French connection” is firstly a police notion. It has been re-used by media and in movies. When the French public authorities decide to tackle the problem of heroine production, it was under the pressure of the U.S.A. which was the principal country of destination of this heroin produced in the south. The period of existence of this segment approaches 15 years (between 1960 and 1975), after its presumed definitive dismantling. The main characteristic of this “connection” is the skill of men able to transform the morphine base into heroine called n°4 (which is injectable). Many laboratories have been discovered with all the raw materials, the machines, etc.

- 1) The morphine base came from Turkey, Lebanon and Syria, it was extract from local poppy cultivation. The transaction were made by the Armenian origin population settled in Marseille, but the financiers were French.
- 2) The morphine base arrived in the port of Marseille, or Corsica where it was brought until a place, often a house in the country, and transformed into heroine. Before, some persons were in charge of collecting the necessary different inputs (chemical products, compressed air machines,...).
- 3) Members of the organisation were responsible of the transhipments of heroine from France to the American continent (hidden in cars, on individual) and finally reach the U.S market. Here, the heroine was bought by italo-american families.

We have voluntarily and with a drastic manner summed up this episode and are aware that there was something before (importance of the French colonies during the post-second world war, legal cultivation of poppy and cannabis) and something after (the principal actors have continued their activities in France and in foreign countries). After the hard repression, we have noticed a shift of laboratories to other regions of France (suburbs of Paris) but mostly to Lebanon, Spain, Mexico, Switzerland, and even in the U.S.A. It has produced a dissemination of skills. Up to now, some participants to this connection use to be active in the field of international drug trafficking, even in the production and distribution of synthetic drugs such as ecstasy.

It is useful to keep in mind that the law against illicit drugs in France has been promulgated the 31st December of 1970.

Illegal drug markets in Frankfurt and Milan: preliminary results of an ongoing research project, Letizia Paoli¹⁷

Abstract

The presentation summarises the preliminary results of an ongoing research project on local drug markets, whose first, one-year long, phase was funded by the EMCDDA.

The presentation will be divided in two parts. In the first one, I will briefly describe the research project, explaining its theoretical framework, its methodology and the fieldwork that has been carried out so far.

The second part will focus on the supply of Frankfurt's and Milan's local drug markets. The starting point is represented by Preble and Casey's six-level hierarchical outline of the New York delivery system, which has long been considered a reliable approximation of the structure of heroin markets in Europe and is sometimes assumed to be a model valid even for other drugs. Drawing on the information collected at both sites, I will argue that in both cities the distribution chain is often rather short, indeed much shorter than the six-level model foreseen by Preble and Casey. Especially in Frankfurt, but less frequently even in Milan, the distribution chain may be composed of only three levels: the importer, who sometimes relies on one or more couriers, the dealer, and the final customer.

Further, contrary to many hypotheses on organised crime's involvement in illegal drug trafficking, I will argue that much of what happens in Milan's and Frankfurt's drug markets is "disorganised crime". In both cities, drug entrepreneurs of all kinds are subject to the constraints deriving from the illegal status of the products they sell. These constraints have so far prevented the rise of large, hierarchically organised firms to mediate economic transactions in the illegal marketplace. The factors promoting the development of bureaucracies in the legal section of the economy - namely to take advantage of economies of scale and specialisation of roles - are outbalanced in the illegal arena by the very consequences of product illegality. Due to these constraints, within the drug economy there is no immanent tendency towards the consolidation of large-scale, modern bureaucracies. In Frankfurt as well as in Milan, the great majority of drug deals, even those involving large quantities of drugs, seem to be carried out by numerous, relatively small, and often ephemeral enterprises.

Introduction

Today I would like to present you the preliminary results of a pilot project on illegal drug markets in two European cities, Frankfurt and Milan. The first, one-year long, phase started in September 1999 and was funded by the EMCDDA. A second phase was originally

¹⁷ Max Planck Institute for Foreign and International Criminal Law
Criminological Research Unit
Günterstalstrasse 73
79100 Freiburg im Breisgau (Germany)
E-mail: l.paoli@iuscrim.mpg.de

foreseen in the EMCDDA's call for tender and Hans-Jörg Albrecht and I, the co-ordinators of the research project, had proposed to extend the fieldwork to three other cities: Paris, Amsterdam, and Copenhagen. Due to the unavailability of funds, however, this second phase will not probably take place at least in its extended form.¹⁸

This pilot project is highly innovative for several reasons. First, as a recent EMCDDA review proved, drug market research is still rather underdeveloped in Europe. Some studies on single drug (usually heroin) markets have been carried out but usually the focus has been more on consumption patterns, whereas the interplay of demand and supply has hardly been studied yet. Recently, however, the awareness has spread that market analysis is an invaluable tool. In order to develop and implement realistic and thus effective drug policies, we need to know how a drug market works, who are its actors and how they interact with each other. Second, in both Frankfurt and Milan we have not focused on a single illegal substance but we have analysed the market for illegal drugs as a whole. Only by doing so, in fact, we are able to realise the areas of superimposition, on both the demand and the supply side, between different drug markets and, at the same time, to point out to their differences. The third strength of the project was supposed to be its Europe-wide extension. For the first time ever, in five different European cities drug markets were to be studied on the basis of the same research protocol, so as to ensure the full comparison of the data. Even if the second phase does not take place as planned, however, the current project will not entirely lose its novelty. No other study has so far compared the markets of all the major illegal drugs in two different European cities.

My talk will be divided in the following three parts. First, I intend to explain the theoretical framework of the research. Then, I will describe the methodology that we have adopted and briefly mention what we have done so far. In the third and longest part I will present the first results of the ongoing study in Frankfurt and Milan, focusing on the supply of illegal drugs (see also Paoli 2000).

Theoretical framework

Illegal markets—and specifically drug markets—have much in common with their legal counterparts. As Pino Arlacchi puts it, 'there are buyers and sellers, wholesalers and retailers, go-betweens, importers and distributors, price structures, balance sheets, profits and, though less frequently, losses' (1998: 204). To understand these basic economic processes, the concepts and methods of the discipline of economics are very useful and will be extensively employed in both phases of the project.

A mere economic approach, however, is not sufficient. Consumer demand and consumption patterns are influenced by cross-national cultural movements and, within each context, by local structural variables. The expansion of the use of cannabis in the 1960s, heroin in the 1970s, and ecstasy in the 1990s, for example, could not be explained without examining the international youth cultures and fashions that fostered and accompanied the increase in their popularity. Moreover, local structural factors, such as youth population numbers, family relations, social and economic development, geographical location, and drug policies,

¹⁸ Though not clear at the moment of the presentation, the second phase of the project was indeed cancelled due to the EMCDDA's lack of funds. For a more detailed account of the first phase of the pilot project on illegal drug markets, see Paoli (2001).

influence the development and the extent and patterns of consumption of the different substances. The dynamics of drug use and the shifts from one substance to another cannot be understood without taking the wider cultural and social context within which drug exchanges take place into consideration.

The limits of a strict economic approach are even more evident on the supply side. Drug markets, in fact, have some peculiarities that do not allow a simplistic analogy between their enterprises and legal ones. Nor can drug-supplying enterprises be thought to follow the same evolutionary trends of licit firms and be roughly equated to multinational corporations, as is often the case in much of the contemporary discourse on organised crime. Although drug entrepreneurs often seem to embody the ‘animal spirits’ of capitalism in their fullest form, they are subject to powerful constraints which derive from the illegal status of the products they sell. These constraints have to do with the fact that all illegal market actors—and particularly drug traffickers and dealers—are obliged to operate 1) without and 2) against the state.

1) Since the goods and services they provide are prohibited, illegal market suppliers cannot resort to state institutions to enforce contracts and have the violations of contracts sanctioned, nor does the illegal arena host an alternative sovereign power to which a party may appeal for redress of injury (Reuter, 1985). As a result, property rights are poorly protected, employment contracts can hardly be formalised, and the development of large, formally organised, enduring companies is strongly discouraged.

2) All suppliers of illegal commodities—and specifically drugs—are bound to operate under the constant threat of being arrested and having their assets confiscated by law enforcement institutions. Each participant in the drug trade will thus try to organise his activities in such a way as to assure that the risk of police detection is minimised. Incorporating drug transactions into kinship and friendship networks and reducing the number of customers and employees are two of the most frequent strategies that drug entrepreneurs employ to reduce their vulnerability to law enforcement efforts.

To gain a deep knowledge of the trends in and the organisation of drug markets, economic tools and assumptions must be complemented by the analysis of social and cultural factors and by the investigation of the peculiarities of illegal markets. These are the theoretical assumptions upon which we have founded our research.

Methodology and implementation of the research protocol

The illegal status of some substances implies not only constraints for those who buy and sell them, but also makes research quite difficult and irksome because all participants have an understandable interest in keeping their involvement unknown to law enforcement. The difficulties, in particular, tend to escalate if the research aims to investigate the higher levels of the drug distribution system and transactions involving socially well-integrated, non-problematic drug users.

In order to overcome these difficulties, we have decided to employ a multifaceted methodology which emphasises qualitative research instruments and whose rationale is to

collect information from as many different perspectives as possible. In particular, *secondary* and *primary* sources have been used. Among secondary sources, four main ones can be listed:

- existing studies, including grey literature
- the periodical and ad hoc information released by local and national law enforcement agencies, drug treatment services, and other public bodies
- judicial files, and
- media articles and reports.

In addition to secondary sources, the study also draws from *primary* ones. Under MPI supervision, the research teams in Frankfurt and Milan have collected first-hand information from the four main actors of today's illegal markets: consumers, suppliers, law enforcement personnel, as well as public and private drug treatment providers.

During the first phase we carried out more than thirty interviews with law enforcement officials, public drug treatment providers, and the representatives of drug-related NGOs in each of the two cities. From December 1999, however, most energies were invested in organising and conducting interviews with drug users and dealers. In order to obtain standardised and comparable results, a questionnaire was developed.

In Frankfurt, Paoli, Güller, as well as the ad-hoc recruited interviewers of the *Junkfurter Ballergazette* (Jubaz), and the Integrative Drogenhilfe (IDH) carried out almost seventy interviews with current and former drug users and dealers. Fourteen interviews were carried out by the Jubaz and IDH staff; the rest by Paoli and Güller. In Milan, too, a considerable, though slightly minor, number of interviews were conducted. Half of them were carried out by Paoli and Palidda, the second half by ad hoc recruited interviewers.

A wide range of people were interviewed, at least twenty of whom in each city were foreigners. Likewise, at both sites about twenty of the interviewees are current (and, in some cases, former) users of different illegal drugs (ranging from cannabis to heroin and crack) who are socially integrated, can (or at least could for a long while) keep their drug use under control and only infrequently visit the open drug scene. Twenty-five other interviewees are current (and, in some cases, former) heavy drug users who regularly attend the open drug scene. Many of the latter are currently registered in a methadone substitution programme.

Finally, in each city at least ten, albeit occasional users of different drugs, earn or earned most of their money by selling drugs. At both sites, dealing experiences were additionally registered in about thirty of the interviews with drug users. As much as drug consumption, dealing experiences proved to be very diversified. While some of the interviewees have drifted into dealing to finance their drug consumption and today sell small drug quantities, others run or ran relatively large-scale businesses.

Interviewees were recruited in different places, sometimes through friends and acquaintances. Confidentiality and anonymity have been ensured to all interviewees, most strictly to those who are vulnerable to law enforcement repression. Finally, whenever it was possible, the research teams have employed participant observation to reconstruct drug consumption and dealing patterns.

The sources and the research methods that are being used to study the actors and mechanisms at the various stages of the drug distribution system have been summarised in Figure 1. In

order to represent the sources graphically, we have relied on the distribution categories elaborated from the empirical observations of heroin markets made by Roger Lewis and other researchers in several EU countries (1994: 42-54).¹⁹ These categories, however, have not been considered as a blueprint. In each city and for each substance, MPI aims to assess to what extent local markets resemble or differ from this ideal-typical distribution system.

We are aware that most of our sources are partial and biased. As well known, most of the statistics and documents published by all the private and public drug-related agencies foremost reflect each agency's priorities and effectiveness of intervention. Only secondarily do these data also register trends and changes of the drug markets themselves (Kitsuse and Cicourel, 1963).

Interviews, too, are unavoidably biased, as they necessarily reflect each interviewee's *Weltanschauung* and experiences. Unlike quantitative surveys, in-depth qualitative interviews are also often criticised because they usually involve a limited number of interviewees, who are not recruited according to rigorous casual criteria and thus cannot represent the whole population of relevant subjects. Leaving aside the fact that many methodologists are quite sceptical about the alleged 'representative power' of standardised surveys (Marradi, 1988), it is worth recalling that this research instrument can only rarely be employed by scholars studying illegal phenomena and, specifically, illegal drug markets. On the one hand, a 'representative' sample can seldom be built, as the characteristics and even the extent of the whole population of drug users and dealers are usually unknown. On the other hand, standardised surveys among the general population are not only very costly and time-consuming, but are also unable to gather meaningful information on the mechanisms and trends of drug markets. The use of most illegal substances and, even more, drug dealing and trafficking involve only tiny minorities of the general population and this means that in a general survey a very large number of irrelevant interviews with uninformed persons would be made, just to be able to interview a few drug dealers and heavy drug users. Moreover, the chances are very high that the latter would not be prepared to talk sincerely about their illegal activities with routine interviewers they have never met before.

For all these reasons, qualitative methods and, specifically, in-depth interviews are to be preferred in the exploration of drug markets. Though they have no guarantee of being representative, in-depth interviews may provide very detailed, first-hand and reliable information about the interviewee's life-world and, specifically, about his/her involvement in the drug markets. In other words, their weakness—that is, their close link to the interviewee's personal, specific experience—is, at the same time, their major strength.

By comparing the information obtained from interviews with drug users, dealers and key witnesses with information drawn from other, more 'objective' sources, we intend to answer the research questions that we formulated in the earliest phases of the project in agreement with the EMCDDA. At both sites, the information collected from all sources is being compared, analysed, and listed according to its degree of validity. While trying to cross-validate hypotheses with information obtained from various sources, our aim is to provide a reliable reconstruction of what happens in the drug markets of Frankfurt and Milan.

¹⁹ Lewis' categories owe much to the six-level outline of the heroin delivery system in New York, which was drawn by Preble and Casey in the late 1960s (1969).

Preliminary findings

Let me now move to the third part of my talk. I will first summarise the most important findings concerning the Frankfurt and Milan drug markets to concentrate then on the supply.

The first point that needs to be mentioned in the following: on both the demand and the supply side the similarities between the two cities by far overshadow the differences. The data that we have gathered so far leave us no doubts. In both Frankfurt and Milan drug markets seem to have evolved in surprisingly parallel ways, by and large following analogous time sequences.

The demand: diversification and normalisation

The similarities are most evident on the demand side. In both cities, the substances preferred by the users, the latter's social characteristics and the meanings they attach to drug use seem to have evolved along roughly parallel paths over the last thirty years.

In the late 1960s and early 1970s, at both sites cannabis and LSD consumption spread among the youths who participated in the 1968 collective movement and who were most closely influenced by the 'flower power' American subculture. Around the mid-1970s opiates and then heroin made their appearance on both markets and heroin use spread among those who were disappointed by the failure of the youth protest movements and, increasingly, among marginalised, low-class youths.

While LSD largely disappeared from both cities in the late 1970s, during the following decade two large, parallel drug markets developed: one for heroin and one for cannabis. In both cities, these markets have always (with an initial exception in Frankfurt) been physically separate, as they have been located in different, though changing, parts of the two metropolis. During the 1990s, however, the polarisation of the illegal drug market was shaken by the diffusion of several new illegal drugs. Some of them, such as ecstasy, were indeed entirely new. Others, such as cocaine, amphetamines, and LSD, were largely rediscovered and/or became attractive to a wider pool of consumers.

In both contexts, in particular, the turn of the century recorded a strong diffusion of cocaine, which has become a *passé-partout* drug and is increasingly used by a wide-ranging spectrum of people. Cocaine is no longer consumed only by a wealthy, elite public as it mainly had been in the 1980s, but according to several sources in both Frankfurt and Milan, over the last few years cocaine consumption has become popular among injecting heroin users and methadone-substituted addicts. Further, it increasingly interests many young people who have been most closely associated with ecstasy and cannabis use. The former, however, predominantly inject cocaine, whereas the latter sniff it.

Since the early 1990s, even crack cocaine has registered a veritable boom on the Frankfurt open drug scene. Long a peculiarity of Frankfurt, crack cocaine has also become available in Milan in the late 1990s.

The wider drug supply has been paralleled in both contexts by the growing diversification of drug consumers. Today the latter can no longer be described with reference to a single cluster of demographic, social, and cultural characteristics, nor can their drug use be explained by referring to one or few economic or social variables.

In both cities, there is a strong core of heavy drug addicts, for whom drug use and search represent two of the most important daily activities. In Frankfurt, 3.198 such drug consumers were registered by the local police in 1999 and, according to some experts, their real number currently oscillates between 4.000 and 6.000 (PPF, annual). In Milan, too, slightly more than 3.000 heavy drug users are officially known because they are clients of the city's six public drug treatment units. Their true consistency is variously estimated between 4.000 and 7.000 (see Paoli 2001: 130). At both sites, a growing portion of these marginalised, dependent drug users are foreign migrants.

Neither in Frankfurt nor in Milan, however, are illegal drugs exclusively used by the former category of people, the so-called 'junkies'. Though they are the most visible component, the latter by no means exhaust the demand for illegal drugs in both cities. Indeed, 'traditional' heavy drug addicts represent only a minority. At least some illegal drugs—above all, hashish, but also increasingly cocaine, ecstasy and other synthetic drugs—are regularly or occasionally consumed by dozens of thousands of teen-agers and young (and not so young) adults, who belong to the most different social strata and cultural backgrounds.

In Milan, about 30 percent of high-school students admit to having smoked cannabis at least once in their life and 8 percent say that they have used cocaine or acids. Roughly 7 percent have allegedly used ecstasy and more than 50 percent have friends who use it. Analogous percentages of cannabis and cocaine users can also be estimated among Milanese in their twenties and thirties.

At least 12-14.000 Frankfurter are assumed to smoke cannabis regularly, 4.000 of whom are young adults. Cannabis's lifetime prevalence is estimated at about 24 percent of young adults (age 18-24) in Germany, whereas 13,2 percent report use in the last 12 months. Within the same age group, the lifetime, past year and past month prevalence rates for ecstasy are estimated respectively at 5,5, 3,2, and 1,3 percent (ibid.).

The drug use of this new generation of consumers can certainly not be explained with reference to their supposed marginalisation. Rather, it is fostered by the youth mass culture, which through songs, movies and entertainment stars—spreads the same myths, values, and expectations among young people at all corners of the world. This international cultural movement has also spread the positive, mythical image of psychoactive drugs and, above all, stimulants. For many young people, both in Frankfurt and Milan, drugs have thus become a means to easily achieve the feeling of belonging, conviviality, fun, evasion and to remove sufferings and angst.

Though all these hypotheses need to be checked with further research and some additional interviews, the impression is that the risks associated with drug use are strongly underassessed by most young people in Frankfurt and Milan. Except for heroin, the other illegal substances are hardly considered dangerous, especially if consumed occasionally and in limited doses. In the young people's perception, only those who 'shoot' are considered drug addicts.

Unsurprisingly, both metropolis have registered a normalisation of drug use over the past ten years. Despite their illegal status, the use of some drugs—above all, hashish, but in some contexts also cocaine and ecstasy—has by and large become 'normal' and it is widely

practised and accepted. It is no longer the expression of a rebellious counterculture, but it has instead entered the mass youth culture. Though it may have dangerous consequences for some, the use of some illegal substances seems to have become a sort of generalised *rite de passage* from childhood into adulthood.

The supply: small enterprises, open markets

On the supply side too, there are striking similarities. In both cities, drug entrepreneurs of all kinds are subject to the constraints deriving from the illegal status of the products they sell. These constraints have so far prevented the rise of large, hierarchically organised firms to mediate economic transactions in the illegal marketplace. The factors promoting the development of bureaucracies in the legal section of the economy—namely to take advantage of economies of scale and specialisation of roles—are outbalanced in the illegal arena by the very consequences of product illegality. Due to these constraints, within the drug economy there is no immanent tendency towards the consolidation of large-scale, modern bureaucracies.

In Frankfurt as well as in Milan, the great majority of drug deals, even those involving large quantities of drugs, seem to be carried out by numerous, relatively small, and often ephemeral enterprises. Some of them are family businesses: that is, they are run by the members of a blood family, who resort on an *ad hoc* basis to a net of non-kin in order to carry out the most dangerous tasks. Some are veritable non-kin groups, which are formed around a (charismatic) leader and then manage to acquire a certain degree of stability and develop a rudimentary division of labour. Others are crews: loose associations of people, which form, split, and come together again as opportunity arises.

Even Southern Italian mafia families, whose members were deeply involved in large drug deals in Milan during the 1980s and early 1990s, do not seem to operate like monolithic productive and commercial units. On the contrary, their members frequently set up crews with a few other mafia affiliates or even with external people to make drug deals. These crews are far from being stable working units that could be compared to the branch office of a legal firm. Their composition frequently changes depending on the moment when deals take place or on the availability of single members. After one or a few drug transactions some teams are disbanded, while others continue to operate for a longer time, eventually changing their composition to some extent.

Especially at the intermediate and lower levels, many dealers work alone, either to finance their own drug consumption habits or, more rarely, to earn fast money. Most of these drug entrepreneurs have no contact whatsoever with the underworld, but are often inconspicuous persons, who have a clean record, an education, and a regular job. This type of drug entrepreneur is most frequently found at the retail level of cocaine, hashish and party drugs, above all in closed scene settings. Most of Raffaele's six cocaine suppliers, for example, are 'normal people, they deal to supplement their salary. They are all Italian and Milanese' (Interview MF24). Likewise, Giovanni's hash dealer is

a serious person, though it seems a bit funny to say that about a drug pusher, he is not a hot head, he reasons, he has a job, a girl-friend, two dogs, he is a body-building fan, he is as normal person, as I am, I smoke, he deals (Interview MF20).

Some of these ‘normal persons’, however, do not content themselves with selling drugs at the retail level, but adapting to the globalisation era, also directly import illegal substances to reap fatter profits. In the Frankfurt area, for example, large-scale heroin trafficking was for many years carried out by a respectable Turkish beverage dealer, who hid the illegal transactions behind the legal ones. The business would have probably gone on without any problem if his German girlfriend had not had alcohol problems and in a detox therapy had not talked about the heroin deals. In the 1980s and early 1990s, moreover, large quantities of hashish and cocaine were imported by a crew that included an employee of the city of Frankfurt, a lawyer, an auto dealer, and an engineer.

Likewise, two of the largest cocaine importers, who have been active in the Milanese area over the last few years, belong to the sphere of white-collar crime. The first was a Milanese, Umberto Orio, who invested the money earned from loansharking in the drug business and was able to import 600-800 kilograms of cocaine directly from Colombia each time. The second one was a former bank manager from Naples, Pasquale Centore, who was responsible for several 400-700 kilogram cocaine shippings. Both of them supplied a plurality of wholesale traffickers, including members of Southern Italian mafia groups, who resided in several parts of the country (Interview MD5; TrMI, 1999).

In both cities, the street drug market is largely dominated by foreign dealers, as both police statistics and interviews with key witnesses, drug users and dealers point out. Within a few years a veritable substitution process has taken place: the lowest and most dangerous positions, which used to be occupied by the most marginalised Italian/German drug users, are now taken over by foreigners, especially those who have immigrated recently, are applicants for political asylum or do not have a residence permit.

Like other forms of crime in the past, the involvement in today’s largest illegal market is used by immigrants as a ‘queer ladder of social mobility’. To a greater extent than in the past, moreover, migrants today have a harder time accessing the legal economy and, due to the restrictive policies adopted by most Western European states, are more likely to find survival means only in the informal and illegal economies. Many of them, finally, are also drug users, who have begun to deal drugs in order to finance their consumption patterns.

Neither in Milan nor in Frankfurt has a subject ever succeeded in controlling the city market for any illegal substance. This is true although during the 1980s several mafia and underworld drug dealing enterprises operating in Milan tried to exercise monopoly claims over their areas of settlement, obliging the local intermediate and street dealers to buy drugs from them. None of these groups, however, ever succeeded in controlling the whole city market or even relevant portions of it. As the Chief of the Milan Police Narcotics Squad candidly put it, ‘the market is free, the drug is not’ (Interview MC6; see also Interview MC10). The drug markets of both cities have always been open markets, in which anybody can try to earn his/her fortune, selling, importing, or producing drugs.

In Frankfurt, the openness of the illegal drug market is guaranteed by the city’s closeness to Holland. Ever since the 1970s, dealers and users alike pass the Dutch border to supply themselves with illegal drugs. The analysis of the interviews with users and dealers is not yet finished and therefore it is not possible to say what percentage of our respondents go or have gone to Holland to buy drugs. Nonetheless, it is clear that quite a few used to or still make such trips and many others buy (or bought) their doses from people, who supply themselves

over the Dutch border. How easy it can be, is clearly described by Luigi, a part-time dealer, who regularly went to Amsterdam to buy ecstasy, amphetamines and LSD.

On a week-end night you can be in Amsterdam in four hours. You leave at 4 o'clock p.m. and arrive at 8 o'clock p.m. It is already dark, you can drive home very well. You are back at midnight or 1 o'clock a.m. You hand the drugs out or whatever. At 7 o'clock a.m. I go to work as usual (Interview FF53).

Indeed, many German respondents no longer seem to regard Holland a true 'foreign' country and consider it 'normal' to go there to buy drugs. Asked if they have ever bought drugs abroad, some respondents spontaneously answered no and, only after thinking about it twice, recalled that they had been in Holland to buy heroin, hashish or other drugs.

Given this widespread practice, the drug distribution chain in Frankfurt is often very short. Indeed, if the consumers themselves buy drugs in Holland, the latter coincide with the importers. Then there is *strictu sensu* no national distribution system at all, as all German wholesale and retail dealers are by-passed by these entrepreneurial 'user-importers'. In any case, due to the Holland's closeness, a few transactions are sufficient to pass the illegal merchandise from the importer to the final user, even when the latter does not cross the border.

The ongoing analysis of penal proceedings seems to confirm the findings that emerged from the interviews with drug users and dealers. Whenever drugs are bought in neighbouring Holland, the distribution chain is usually composed of three levels: the importer, who sometimes relies on one or more couriers, the dealer, and the final customer. This is most likely the case when the drug quantities are rather small. A few hundred grams or one-two kilograms of hashish or heroin can be bought at any time in Holland by a variety of subjects (most of whom have a clean record) and reach German users with the mediation of only one or, at most, two other dealers (AGF, 1999; StAF, 1998).

Sometimes, however, the quantities involved are far from being those of the ants' typical traffic. In less than two years, for example, a Turkish national, who was born and raised in Germany, was able to import at least 50.000 ecstasy pills from Holland, relying on a net of couriers. He, then, sold them in different lots to a variety of customers, some of whom sold the pills directly to end-users, while others supplied lower-level dealers (LGF, 1996). Moreover, the couriers, who went to Holland, were partially paid with pills and some bought drugs themselves during the trips, which they then sold directly to final users (StAF, 1997). An even larger business was run by Costa, who was however never caught by the police. In a three years' time span in the early 1990s, he bought almost half a million ecstasy pills from his supplier in Holland. Though larger lots were sold to dealers, during most of his dealing activity Costa partially sold the pills directly to users in front of discos and raves (Interview FF6).

As long as drugs are imported from Holland, the Frankfurt drug distribution system hardly resembles the six-level hierarchical outline, which was foreseen by Preble and Casey in the late 1960s and has long been considered a reliable approximation of the structure of heroin markets in Europe (Lewis, 1994; Arlacchi and Lewis, 1990).

In Milan, too, illegal drugs arrive on the market through a plurality of different channels and the drug distribution chain is frequently much shorter than the six-level hierarchical model developed by Preble and Casey in the late 1960s for the New York heroin market. As heroin,

cocaine and other drugs are imported in Milan through a plurality of independent channels, the length of the distribution chain—that is, the numbers of transactions occurring between the importer and the final user—depends foremost on the amount of the substance imported and, secondarily, on the connections of the importer, the intermediate dealer(s), and the user. In some cases, there are numerous transactions and the drug distribution system tends to approach the six-level hierarchical model that was developed by Preble and Casey in the late 1960s to represent the New York heroin market. In most cases, however, especially in the market for party drugs, but also increasingly in the heroin market, the distribution chain is much shorter and two, maximally three transactions link the importer to the final users.

Even the heroin distribution system today is much shorter than it used to be. This is due to the fact that the Kosovo Albanians, who presently play an important role in the heroin smuggling business, no longer import large quantities as many Turkish smuggling rings used to do. Unlike the latter ones, Albanians apparently deposit the drugs in Eastern European countries and let heroin be smuggled into the EU by Western European couriers, who travel with Western European cars carrying relatively small quantities of drugs. These lots of heroin are quickly distributed and, with at most two transactions, reach the final users. As a police officer put it, ‘the Albanian importer sells heroin in Italy to the North African dealer, who buys half a kilogram and re-sells it to the pusher. The latter supplies the end-customer’ (Interviews MC2, MC10, and MC11).

Far from being a blueprint, the six-level hierarchical model developed by Preble and Casey seems to be only one of the possible forms a city drug market may assume. Moreover, even when this model works, it is worth remembering that individuals and groups may quickly change positions within it or play different roles in the distribution chain of different drugs. Up to the early 1990s the crew headed by Salvatore Di Marco and Antonino Guzzardi, two Sicilian Cosa Nostra members living in Milan, for example, was able to import cocaine directly from Colombia in hundred-kilogram lots. At the same time, however, the leaders of the crew used to sell one or two kilograms of heroin to a plurality of smaller dealers (TrMI, 1996).

Not even in the 1980s, when Southern Italian mafia families dominated the Milan’s drug market, was the stratification rigid. The already mentioned Sergi group, for example, usually supplied heroin and cocaine in lots ranging from several kilos to 50 grams. Antonio Schettini, a leading member of the Coco-Trovato group, for example recalls that from 1985-86 onwards, he used to buy 5-10 up to 30 kilograms from the Sergi group three or four times a month (TrMI, 1997). But occasionally the latter even sold five grams at a time. As one of the Sergi’s smallest buyers referred to the judges,

Saverio [Morabito] let me know, indeed he told me explicitly, as his boys later confirmed, that they usually did not sell drugs in the quantities that I asked for, namely five grams at time. They told me that they usually refused contacts with people asking for such small quantities. Seeing how bothered they were, I realised that they usually dealt with much larger quantities. Anyhow, Morabito accepted to give me cocaine and the first time I asked him, called a guy telling him that if I asked for cocaine, he could give it to me (TrMI, 1997: 1122-23).

At both sites empirical evidence additionally shows that the relationships between drug dealing enterprises are closer to competition than to collusion. Although some suppliers may occasionally enjoy a considerable monopolistic power over a local (usually small) market, in Frankfurt, as in Milan, most drug enterprises seem to be price-takers rather than price-givers.

That is, none of them are able to influence the commodity's price appreciably by varying the quantity of the output sold.

It is hence no chance that at both sites the wholesale and retail prices of all the main substances—with the exception of cannabis—have steadily decreased. This decline has, however, been accompanied by a comparable fall of purity levels. Only cannabis prices are reported stable in Frankfurt and increasing in Milan. Apparently following international trends, the prices for all the main illegal substances are strikingly similar in both cities, though slightly higher in Milan than in Frankfurt.

Though no rigid distribution system could be detected and even in Milan large-scale enterprises have become even rarer than they used to be in the 1980s, illegal drugs flow *ad abundantiam* in both cities. Illegal drugs are smuggled through a plurality of channels and are sold by a multiplicity of actors. The 'invisible hand' of the market makes law enforcement action even more difficult, as not even the arrest of wholesale dealers has an impact, not even briefly on drug availability. And at the retail level, the 'industrial reserve army' willing to sell with drugs seems to have no end. As Giovanni put it, 'for every five Moroccans who are arrested, there are at fifty ready to do the same job even at less' (Interview MF21).

Bibliographical references

AGF, Amtsgericht Frankfurt a. M.,

1999, *Urteil im Ermittlungsverfahren 943 Ls 84 Js 27276.6/98 vom 26.02.1999.*

Arlacchi, P.,

1998, "Some Observations on Illegal Markets", in V. Ruggiero, N. South and I. Taylor, eds., *The New European Criminology, Crime and Social Order in Europe*, London, Routledge.

Arlacchi P. and R. Lewis,

1990, *Imprenditorialità illecita e droga. Il mercato dell'eroina a Verona*, Bologna, Il Mulino, 1990.

Kitsuse, J. and A. W. Cicourel,

1963, "A Note of the Official Use of Statistics", *Social Problems*, n. 2: 131-139.

Lewis, R.,

1994, "Flexible Hierarchies and Dynamic Disorders," in J. Strang and M. Gossop, eds., *Heroin Addiction and Drug Policy. The British System*, Oxford, Oxford University Press.

LGF, Landgericht Frankfurt a. M.,

1996, *Urteil im Ermittlungsverfahren Kls-84 84 Js 9987.6/95 vom 28.08.1996.*

Paoli, L.

2000, *Pilot Project to Describe and Analyse Local Drug Markets — First Phase Final Report: Illegal Drug Markets in Frankfurt and Milan*, Lisbon, EMCDDA.

PPF, Polizeipräsidium Frankfurt a. M., K60,

1989, *Rauschgift Kriminalität: Lagebericht 1988*, Frankfurt a. M.

1990, *Rauschgift Kriminalität: Lagebericht 1989*, Frankfurt a. M.
1991, *Rauschgift Kriminalität: Lagebericht 1990*, Frankfurt a. M.
1992, *Rauschgift Kriminalität: Lagebericht 1991*, Frankfurt a. M.
1993, *Rauschgift Kriminalität: Lagebericht 1992*, Frankfurt a. M.
1994, *Rauschgift Kriminalität: Lagebericht 1993*, Frankfurt a. M.
1995, *Rauschgift Kriminalität: Lagebericht 1994*, Frankfurt a. M.
1996, *Rauschgift Kriminalität: Lagebericht 1995*, Frankfurt a. M.
1997, *Rauschgift Kriminalität: Lagebericht 1996*, Frankfurt a. M.
1998, *Rauschgift Kriminalität: Lagebericht 1997*, Frankfurt a. M.
1999, *Rauschgift Kriminalität: Lagebericht 1998*, Frankfurt a. M.

Preble E. and J.J. Casey,
1969, "Taking Care of Business, the Heroin User's Life on the Street," *International Journal of the Addiction*, 4: 1-24.

Reuter, P.,
1985, *The Organization of Illegal Markets: An Economic Analysis*, Washington, National Institute of Justice, 1985.

StAF, Staatsanwaltschaft Frankfurt a. M.,
1997, *Anklageschrift 86 Js 33622.9/96 vom 20.11.1997*

1998, *Jugendschöffengerichtsanklage. Ermittlungsverfahren 85 Js 11178.4/98 vom 25.03.1998.*

TrMI, Tribunale civile e penale di Milano,
1996a, Sezione Penale, *Sentenza nella causa penale contro Avalos Osorio Jorge Enrique + 23, Procedimento nr. 2278, 5564, 3571, 3572/94, 17 febbraio.*

1997, Corte d'Assise, *Sentenza nella causa penale a carico di Agil Fuat + 132, Procedimento n. 443/93, 11 giugno.*

Note on Interview Codes

All interviews with public and private drug treatment providers, law enforcement officials as well as users and dealers are maintained anonymous and are referred to with a code (for example MF1 or FA1).

The first letter of the code refers to the city: hence M for Milan and F for Frankfurt. The second letter points to the specific background of the interviewee. In particular, A stands for representatives of public drug treatment centres; B for representatives of private drug treatment centres; C refers to police and prison officials; D prosecutors; E judges; and, F users and dealers.

Finally, to distinguish interviews with people of the same category, a progressive number has been added according to the interview's date and/or its transcription's arrival at the Max Planck Institute.

Macro-economic analysis of heroin markets in the EU and the impact of substitution treatment, Juan Tecco²⁰, Lieven Annemans²¹, Nancy Vanoverbeke²², Fabienne Hariga²³, Chloé Carpentier²⁴

Abstract

A model was developed to simulate the career through different ‘states’ of heroin users (e.g. ‘non user’, ‘has tried’, ‘dependent treated’, ‘death’, etc.). It is based on the principle that individuals make transitions from one ‘state’ to another within a 6-months time period. The model starts with a theoretical population of >12 year-olds, all non heroin users. At year 10, it is estimated that we obtain a cross-sectional population broken down in different groups corresponding to the different ‘states’.

The model was populated with values 1/ estimated from the socio-medical literature on transition probabilities between different ‘states’ and 2/ from the economic literature on heroin price-elasticity, income elasticity and cross-elasticity towards cocaine associated at different ‘states’. However, information on the dynamics of heroin use and substitution is scarce and when available mostly applies to non-EU populations.

Calculating the 20-year demand for heroin at cohort level generated an average demand estimate of between 5.96 to 20.45 grams per person, depending on different factors. On a European population level (>12 years), the estimated demand was between 1,920,000 and 6,595,000 kilograms (street purity) over 20 years.

Different measures were introduced in the model at year 10 and their effect on the cumulative heroin demand was modeled. The largest impact was observed when modeling changes in heroin price levels (a 50% increase in the price level could have a negative impact of 72% on total heroin demand). Also the prevention of trying heroin could be a potentially effective measure (a decrease of trying with 50% would generate an almost equal impact on total heroin demand).

Modeling the impact of substitution treatment indicated that an easier access to treatment would have a larger impact than the success of treatment itself in attaining abstinence.

In the model used, it would imply a total 1-year demand between year 10 and 11 at the population level between 61,300 and 170,900 kilograms (street purity). The range is due to taking into account different parameter values, especially a variation in heroin price.

²⁰ Hôpital Universitaire Brugmann
Psychiatrie , Unité 43
Place Vangehuchten 4
1020 Bruxelles (Belgium)
E-mail: juan.tecco@swing.be

²¹ Ghent University, Belgium

²² HEDM, Belgium

²³ Modus Vivendi, Belgium

²⁴ EMCDDA, Lisbon

Introduction

Approximately 2 to 7 per 1000 people in the European Union are problematic users of opiates. This is a major concern to policy makers and therefore policy measures are frequently proposed or under investigation. Applicable information on the dynamics of heroin use and substitution is poorly available for the EU. Information providing a complete picture of the past, current, and expected future demand for heroin in different stages of addiction would allow the analysis/simulation of the possible impact of treatment and different preventive and repressive measures to restrain heroin use and addiction.

Markov models are often used to represent random processes that evolve over time. They simulate short or long-term processes, and a wide variety of outcomes can be calculated. Moreover, Markov models have both predictive and retrospective applications. The standard way to analyse a Markov model is using a cohort simulation. A cohort is run through the model and viewed probabilistically.

The purpose of this study was to develop a macro-economic model, simulating the career of a potential heroin user and the related demand for heroin at different stages of addiction.

The development of a validated economic model of heroin market behaviour and hence, after aggregation, heroin markets allowed to estimate the possible effects of substitution treatment, price and income changes on consumption and supply of heroin within the EU. The model additionally enabled to predict the relative impact of other therapeutic interventions, preventive measures and law enforcement.

The secondary goal of this study was to identify the gaps of information, and consequently indicate the nature of data needed in future research.

Methodology

First, existing economic behaviour theories and different modalities of people using heroin were identified based on the available clinical and socio-economic literature and reports. These were identified and derived consulting different databases like: Medline, Embase, HEED (health economic evaluation database) and Social Sciences Citation Index. This literature provided a number of principles, but most of all a thinking-framework and background for the creation of a macro-economic model at a cohort level.

The Markov state transition model is based on mutually exclusive “states”, in which a person can be at a given point in time. These states are exhaustive and mutually exclusive, in that at any point in time, all persons starting in the model must be in one of these states. The states were defined according to the definitions of different levels of addiction as found in literature.

A second feature of a Markov model is that it runs within discrete time frames, called “stages” or “cycles. After each of these discrete time periods, the cohort of heroin consumers

can either stay in the same state or move through the model from one state to another (“make transitions”). It is assumed that the transitions happen on average in the middle of the cycle. . The length of this interval, the model’s cycle length (e.g. 6 months) is determined by the creator of the model. Any interval may be used, but it must remain fixed for the duration of the calculation, and based on the logic history of the investigated condition.

Each transition is assigned a probability. The value of these probabilities was determined based on prevalence and incidence data as found in the literature.. The set of transition probabilities for each state must sum up to 1.0.

A separate set of probabilities must describe the initial distribution of the Markov cohort among the states immediately before the process begins. In our model, all individuals start the model at the state “non-user”.

After calculating the model at an individual and cohort level, results were additionally aggregated to calculate the heroin demand at a population level. The aggregation was vertical, that is, the individual demands, as predicted by the model are cumulated in order to predict a population demand. In other words, by using a bottom-up approach, the sum of all “individual/cohort markets” is obtained.

Finally, to validate the model, the obtained estimations were compared with data from epidemiological surveys, other observational or retrospective data, and were subject to review by experts from a reference group and other centres involved in treatment for heroin addiction.

The outcome measure of the model was the demanded quantity of heroin (in grams). Being in each state of the model is associated with a certain demand for heroin. When calculating the model, the proportion of people being in a certain state at a certain time is then multiplied by the generated demand for heroin while being in that state. In this way, we can calculate the average demand for heroin, generated by someone running through the model for a time horizon of 20 years.

In order to analyse the impact of variations in different parameters and the effects of different measures on the model results, different sensitivity and scenario analyses were performed. Finally, mainly in order to take into account inter-country variability in heroin use, a number of additional analyses were made.

The software DATA™ (version 3.5.7) of TreeAge Software Inc. was used for the development of the model and all simulations.

Results

Features related to heroin addiction

Heroin is a potent reinforcer with significant abuse potential. However, not everyone who tries heroin continues using heroin or develops debilitating addiction. The underlying factors responsible for individual differences in the probability of becoming addicted and in the

response to treatment of the addiction can be broadly categorised into three classes of factors: factors related to the individual, environmental-based factors, and treatment-related factors.

After review of the existing literature on economic behaviour of drug users and addicts, we decided to adopt the basic framework of the theory of rational addiction as developed by Becker and Murphy (1988). Within this framework, the price of addictive goods is an essential determinant of the demand for addictive goods. The extent to which a heroin user changes his demand in function of price changes of heroin, its substitutes and its complements, is in its turn determined by the price elasticity of the demand towards these price changes. Another variable determining the heroin demand is income .

The economic model: Markov state transition

Nine “states” were identified to model the career of a drug user: Non-user, Sampler, User, Ex-user, Dependent-Not treated, Dependent-Methadone treated+other drug use, Dependent-Methadone treated, Abstinent, and Death. The definition of these states is summarized in Table 1 (see Appendix). The model states and their definitions were derived from diagnoses and course specifiers commonly found in the medical literature. In order to include sources of information from other fields (Epidemiology, Health Economics, Behavioural Economics...) it was deliberately decided that the diagnosis inclusion criteria had to be taken broadly. The intention was to extend the sources of information and add state transitions not found in the medical literature. For instance, the state transition “Sampler” is not a medical diagnosis. It is found in Behavioural Economics and Epidemiological studies.

In this model, the “stages” or “cycles” are periods of 6 month. Diagnosis criteria of substance use disorders as found in the medical literature require sustained changes. Course specifiers can be applied only after the criteria have been present for at least one month. Although it has been reported that transitions could sometimes occur in shorter periods of time, since our model was created mainly with medical data, 6 month cycles are justified .

Estimated values on transition probabilities between different ‘states, as well as price and income elasticity at each state are presented in this summary.

General population:

- 6-month sampling rate: 0.06% (*varied to 0.05%*)
- 6-month death rate: 0.47%

Has sampled:

- 6-month probability to use heroin more than once: 8.9%
- 6-month death rate: 0.47%
- Demanded quantity of heroin (one time): 1g (*varied to 0,25g*)
- No elasticity towards price nor income

User:

- 6-month probability to become dependent: 15.70%
- 6-month probability to become an ex-user: 2.70%
- 6-month death rate: 0.98%
- Price-elasticity: -3.07 towards the price of heroin
- Income-elasticity: 1.15

Ex-user:

- 6-month probability to re-use heroin: 13.0%
- 6-month death rate: 0.98%

Dependent-Not treated:

- 6-month probability to enter treatment: 8.60%
- 6-month probability to stop heavy use without treatment: 0.72%
- 6-month death rate: 3.70%
- Demanded quantity of heroin: 1g/day (*varied to 0,5g/day*)
- Price-elasticity: -1.61 towards the price of heroin
- Income-elasticity: 0.60

Dependent-Methadone-treated + other drug use:

- 6-month probability of abstinence: 28.0%
- 6-month retention rate: 61.20%
- 6-month probability of aborting the program: 38.80%
- Proportion in the program with continued use of heroin: 68.60%
- 6-month death rate: 0.98%
- Price-elasticity: -1.61 towards the price of heroin
- Income-elasticity: 0.60

Dependent-Methadone-treated:

- 6-month probability of abstinence: 42.0%
- 6-month retention rate: 61.20%
- 6-month death rate: 0.98%
- Price-elasticity: -3.07 towards the price of heroin
- Income-elasticity: 1.15

Abstinent:

- 6-month probability of lapsing occasionally: 13.0%
- 6-month probability of becoming dependent again: 50.0%
- 6-month death rate: 0.98%

Objective determinants of heroin demand:

- Price of heroin: 35 Euros/g (*varied to 100 Euros/g*)
- Income: 7820 Euro per 6 months, with a yearly increase of 2%

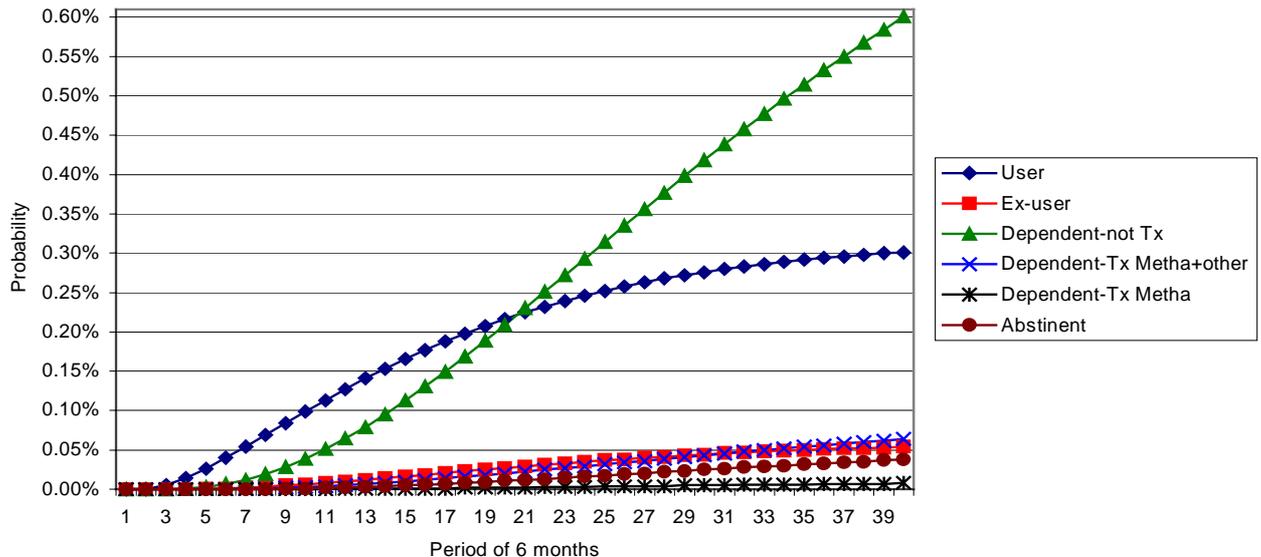
The model started with a theoretical population of >12 year-olds (all non heroin users). After 10 years, a cross-sectional population may be obtained and broken down into different 'states'.

Results

The results show that over a period of 20 years, 80.8% of the general population will never try heroin. The cumulative mortality after 20 years is 17.5%. Figure 1 shows the 20-year evolution of the cumulative probabilities for people who used heroin more than once. This means that by the end of year 20 (cycle 40), 0.62% of people entering the model at point 0 will be untreated dependent heroin users.

Figure 1

Cumulative probability evolution over 20 y. for people having used heroin more than once



The number of users grows during the first 9 years of our model. After that, the graph shows that this curve is caught up by the curve representing the number of people being dependent and untreated. This evolution from user to dependent user shows clearly the addictive character of heroin. The other curves show also an increasing trend over 20 years, showing the increasing proportion of people stopping or treating their addiction.

Calculating the 20-year demand for heroin at cohort level generated an average demand estimate of 20.45 grams per person. Calculation towards a population level using the bottom-up approach the European demand for heroin is 6,595,000 Kg.

Additional Analysis on the population level

Changing values of different parameters of the model varies the 20-year heroin demand between 5.96g and 16.95g per person.

Recalculation towards a population level using the bottom-up approach, and knowing that 86% of 375 million people in Europe are our starting cohort, the European demand for heroin then varies between 1,922,000 Kg and 5,466,000 Kg.

Impact of changes

The model is intended to serve as a dynamic tool that can be used for analysis of different changes in the hypotheses and interventions in the heroin market. Therefore, several scenarios were analysed and the results are presented in this section.

Price changes

Interventions on the supply side on the market, like a more intensive repressive policy, whereby the number of arrests would increase for instance, may drive up the unit price for heroin. Not only will the quantity offered on the market decrease, but also an increased risk for police capture is expected to drive the price up. Oppositely, a more tolerant policy may have a tempering effect on the price. The market play itself may also cause price changes. If the number of heroin users increases, for instance, the total demand for heroin will increase, causing a price increase when the supply side cannot 'keep up' with this increased demand (the heroin becomes more 'scarce'). In its turn, this price increase will then temper the demand.

In the basecase model, the price of heroin was set at 35 Euro. This price was based on the National Reports of the BIRN (Belgian Reitox Network) on drugs (1999) and are in fact Belgian prices for 1998. The price of heroin may typically vary among countries in the European Union. Therefore, a sensitivity analysis was performed, varying this price from 35 Euro per gram of heroin to 100 Euro. The table below shows the effect of these different prices on the demand. It seems that the 20-year demand per person varies between 16.95g and 5.96g.

*Effect of different prices on the demand of heroin
(sampling rate=0.0005; sampler demand=0.25g)*

Price of heroin	Demand
35	16.95g
40	14.83g
45	13.19g
50	11.87g
55	10.80g
60	9.90g
65	9.14g
70	8.49g
75	7.93g
80	7.43g
85	7.00g
90	6.61g
95	6.27g
100	5.96g

The table shows that increasing prices are accompanied by lower demands. This is mainly due to the fact that the income remained constant in this sensitivity analysis. This is an expression of the economic law that increasing prices cause lower demands - all other variables remaining constant.

A varying demand for dependent – not treated

Based on a study by Sees et al. (2000), the demand for heroin by a person dependent and not treated for this addiction was set at 1g per day. Via expert opinion, it was determined that this would make that this type of consumer would spend 80% of the available income to heroin.

Since this group of consumers provides the largest proportion of the demand, the effect of variations in this demand on the results will be analysed. Therefore, the demand of a dependent – not treated consumer was varied between 0.5 and 1g daily. This means practically in the model that, all other variables remaining constant, the proportion of the income spent on heroin will be varied between 40% and 80%. The table below shows the analysed daily consumption of a dependent – not treated consumer, the corresponding proportion of the income that is hereby spent on heroin, and the resulting demand for the population.

Effect on the result of a varying demand of a dependent – not treated consumer

Daily consumption by dependent – not treated	Proportion of income for heroin	20-year demand
0.5g	0.40	9.58g
0.6g	0.48	11.06g
0.7g	0.56	12.53g
0.8g	0.64	14.00g
0.9g	0.72	15.47g
1g	0.80	16.95g

It shows that indeed the demand of the group dependent – not treated generates a large impact on the total demand for heroin in the general population over 20 years. When daily consumption is diminished with 50% (from 1g to 0.5g), the total demand decreases with 43.45%.

Income changes

In our basecase model, a steady upward evolution of the available income (legal +illegal) by 1% per 6 months was programmed. Sees et al. (2000) reported that among heroin dependents, 64% of income was illegal, and 36% legal. This was additionally confirmed by expert opinion. Suppose that, through a set of measures, the illegal income can be reduced by 50%. This has an impact of 0.84% per 6 months on the total income. Oppositely, when a heroin addict can increase his income from criminal activities by 50%, this will have an upward impact of 0.84% per 6 months on the total income.

Income changes have a more modest impact on the demand for heroin in our cohort than price changes. A continuous total income increase of 2% per 6 months (2% on X-axis), for instance, instead of 1% per 6 months (basecase) causes the individual total average demand to increase by less than 1g.

Changes in substitution treatment

Modelling the impact of substitution treatment indicated that an easier access to methadone would have a larger impact than the success of treatment itself in attaining abstinence.

A 50% decrease in access, reflected by the number of people entering treatment, to substitution treatment will hereby cause a proportionally higher increase in heroin demand (4.2%) than the decrease in heroin demand (3.7%) caused by 50% better accessibility to methadone treatment. Analysing the effect of a higher 6-month success rate of substitution treatment showed that a 30% increase or decrease in the success of substitution treatment has a modest impact of 0.2% on the average demand for heroin.

The modest impact of treatment success on the total average individual demand for heroin in our cohort may perhaps be explained partially by the high rate of abstinent people starting to reuse heroin again. In line with this, it may well be that a better treatment access has a higher impact on the demand for heroin, since that means that people spend less time in the health state “dependent-not treated”, which generates the highest consumption of heroin.

In order to verify the above, the probability of re-becoming dependent after abstinence was varied. A 50% lower probability of restarting heroin use caused a decrease in the demand of 3%, while a 50% higher probability of restarting heroin use caused an increase in the demand of 1%. This could mean that measures focussing on sustaining abstinence after substitution treatment may be more desirable as measures focussing on the success of treatment itself.

Impact of prevention

Different projects can be elaborated with the goal of preventing people from trying heroin. In terms of our model, the effect of these type of projects is measured by their effect on the probability of sampling. Therefore, different scenarios, varying this probability for our cohort between -50% and +50% of its basecase value have been analysed. Variations in the proportion of people trying heroin has a large impact on the general demand for it. For instance, an increase of the sampling probability with 5% causes an increase in heroin demand of 4.9%. A decrease of the probability of sampling with 50% causes a 49.8% lower demand for heroin over 20 years in our cohort.

Analysis for a cross-sectional cohort

In our basecase, the model allows to estimate the amount of heroin demanded by a theoretical cohort of a population > 12 years old over a period of 20 years. Our starting cohort was not cross-sectional, in that it was assumed that everyone entering the model enters at the health state “Non-user”, meaning that there is and was no heroin use in the present nor past by the person entering the model. Future use may or may not occur, depending on the incidence-based probabilities at each health state in the model.

It is estimated that the population is cross-sectional according to the current situation in Europe at year 10. The proportion of people being in each health state at year 10 is presented in the table below. The total heroin demand per person in the general population at year 10 is 1,78g. The total heroin demand by year 11 had increased to 2,31g per person, an increase by

0.53g. Note that this is a calculation taking into account a demanded quantity of 0.5g daily for a dependent-Not treated heroin user.

*Cross-section of the population in the different health states at year 10 and year 11,
with the corresponding total heroin demand per person.*

	Year 10	Year 11	Difference
General population	0.90098	0.8963	-0.00468
Sampler	0.0043	0.00435	0.00005
User	0.00187	0.00194	0.00007
Ex-user	0.00024	0.00026	0.00002
Dependent-Not treated	0.00192	0.00209	0.00017
Dependent-Treated metha+other drugs	0.00019	0.00021	0.00002
Dependent-Treated metha	0.00002	0.00002	0.00000
Abstinent	0.0001	0.00011	0.00001
Death	0.09038	0.09473	0.00435
<i>Heroin demand</i>	<i>1.78</i>	<i>2.31</i>	<i>0.53</i>

Changes in the price of heroin caused the most variability in the results. In order to calculate a range on the cross-sectional results, the demand at year 11 was recalculated, entering a heroin price of 100 Euro per gram into the model as from year 10 in stead of 35 Euro. The total heroin demand per person in the general population at year 11 is then 1.97g. This shows that a price increase has a rather modest impact on the demand in the short term.

On a population level, the above generates a demand of 574,050 Kg at year 10 and 744,975 Kg at year 11, while the demand at year 11 with 100 Euro per gram as from year 10 was 635,325 Kg.

Discussion

This report illustrates a macro-economic model to simulate the career of a potential heroin addict. Different data were entered into the model and in this way, the average demand for heroin in a cohort >12 years was estimated over a period of 20 years. The used modelling technique was that of a Markov model.

The creation of the model was performed mainly on epidemiological observational data, within a background of the rational addiction theory of Becker and Murphy (1988), taking into account some modifications to this model as suggested or investigated empirically by different authors.

The impact of different measures on this demand was tested in this model. First, the impact of different price levels was tested. An increase in the price level caused hereby an important reduction in heroin demand over 20 years. In an additional analysis, we simulated the

possible smoothing effects from supply-side reaction. Although a smoothing effect of a measure such as price increase could be observed, this inclusion would not change the relative performance of the different proposed measures.

The model was first calculated for a cohort and thereafter, the calculation was made on a European population level. The primary result was an average demand for heroin in the general population >12 years varying from 5,96 to 20,45 grams per person, and 1,922,00 Kg to 6,595,000 Kg on a population level over 20 years. Recalculation of extra analyses towards a population level, with a sampling rate of 0.0005 and a sampler demand of 0.25g, showed that the 20-year European demand for heroin then varies between 1,922,000 Kg and 5,466,000 Kg.

Since the group of dependent – not treated consumers provides the largest proportion of the demand, the effect of variations in this demand on the results were analysed. With a consumption of 0.5g per day for a dependent – not treated, total demand came down to 9.58g per person for 20 years, compared to 16.95g per person for 1g daily.

Variations in income seemed to have a far more modest impact on the demand. In the basecase, a continuous income growth of 1% was built in the model. When entering a growth of 2% per 6 months, the heroin demand per average individual was influenced by less than 1 gram over 20 years.

Another tested scenario was the impact of a better access to methadone treatment. The effect of increasing the access up to 50% easier was tested, generating a decrease of 3.7% in heroin demand. The effect of a higher success rate of substitution treatment was very modest: increasing the treatment success by 30% lowered the heroin demand by 0.2%.

A measure that generates a large effect on the demand side of heroin is prevention. The effect of prevention can be measured by the change in the probability of sampling. This variable has been varied between –50% and +50% of its basecase value, showing an almost equal effect on heroin demand. Hence, the model shows that affecting the rate of sampling is one of the most performing intervention for influencing total heroin demand.

Analyzing the effect of price changes in this short term showed that a price increase from 35 Euro/g up to 100 Euro/g as from year 10 would have a rather modest impact on the short term demand for a dramatic price change. On a population level, however, the above generates a difference of 109,650Kg in 1 year, which is considerable.

Since for a variety of figures, no straightforward data could be found directly in literature, expert opinion was required. We believe that in a first step, it would be useful for the model's probabilities, to be reviewed and/or validated by a panel of experts. In the future, epidemiological research may focus on such variables, in order to better populate the predictive model, and hence to better estimate the impact of interventions in the market.

Conclusion

Developing a macro-economic model for heroin use was a challenging task. Many gaps were discovered in available information and a number of assumptions had to be made. Particularly, several parameter values had to be estimated, based on expert opinions. Parameter values derived from scientific literature were affected by several factors that could affect generalisation of results and extrapolation for use in an European model: small samples, specific selected populations, mostly north-American studies. The results obtained should be considered in light of these limits. In addition, several assumptions should be tested with more extensive and up-to-date European data.

However, we believe that the current model gives some interesting indications of what might be the relative impact of different measures on the overall demand for heroin. Thus according to the model, measures focusing on prevention of trying heroin could have a large impact on heroin demand, while strategies targeting at increasing the heroin price, would seem to have a larger impact. Any conclusions such as these, need to be tested much more thoroughly using more adequate European data.

Table 1: States used in the Markov model.

Non User	Refers to those who have never used heroin
Sampler	Refers to those who “sample” heroin for the first time. More specifically it indicates the very first opiate use.
User	Refers to those who use heroin repeatedly without clinically and sustained distress. The pattern of substance use is not better accounted for by dependence.
Ex User	Can be applied after the criteria for remission from heroin use have been present for at least 1 month
Dependent-not methadone treated	Refers to a maladaptative pattern of heroin use leading to tolerance, withdrawal syndromes, substance taken in larger amounts and over larger periods of time than intended. Important social, occupational or recreational impairment. Methadone is not used
Dependent-not methadone treated + other drugs	This specifier is used if the individual is on a prescribed methadone medication, but criteria for dependence or use of heroin are also present.
Dependent-methadone treated	This specifier is used if the individual is on a prescribed methadone medication. Criteria for dependence or abuse have not been met for at least one month except tolerance to, or withdrawal from methadone.
Abstinent	Can be applied after the criteria for remission from opiate dependence have been present for at least 1 month
Death	Applies for death related or unrelated to drugs.

References

Ainslie G., Picoeconomics. Cambridge University Press. 1992. In: Bretteville-Jensen A.L., Addiction and discounting, Journal of Health Economics. 1999, 18, pp. 393-407.

Alterman AI, Kampman K, Boardman CR, Cacciola JS, Rutherford MJ, Mc Kay JR, Maany I., Prediction of attrition from day hospital treatment in lower socioeconomic cocaine dependent men. Drug and alcohol dependence. 1997, 46, pp. 79-85.

Alterman et al., Prediction of 7 months methadone maintenance treatment response by four measures of antisociality, Drug and Alcohol Dependence. 1998, 49, pp. 217-223.

APA American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 4th edn. Washington, 1994.

Avants SK, Margolin A, Kosten TR, Rounsaville BJ, Schottenfeld RS. When Is Less Treatment Better. The Role of Social Anxiety in Matching Methadone Patients to Psychosocial Treatments, Journal of consulting and clinical psychology. 1998, 66(6), pp. 924-931.

Azalos R, McDuff DR, Weintraub E, Montoya I Schwartz R, Engaging hospitalized heroin dependent patients into substance abuse treatment. Journal of substance abuse treatment. 1999, 17, pp. 149-58.

Azarin NH, Holz WC (1966) Punishment. In W Honing (Ed.) Operant behavior; areas of research and application. NY: Appleton-Centurt-Crofts.

Ball JC, Ross A, The effectiveness of methadone maintenance treatment, NY, Springer-Verlag. 1991.

Becker G.S. and C.B. Mulligan, The endogenous determination of time preference, The Quarterly Journal of Economics. 1997, 112 (3), pp. 729-758. In: Bretteville-Jensen A.L., Addiction and discounting, Journal of Health Economics. 1999, 18, pp. 393-407.

Becker G.S. and K.M. Murphy, A theory of rational addiction, Journal of Political Economy. 1988, Vol 96 (4), pp. 675-700.

Becker G.S. et al., Economics of drugs. Rational addiction and the effect of price on consumption, AEA Papers and Proceedings. 1991, Vol 81 (2), pp. 237-241.

Bickel W.K. et al., The price of change. The behavioral economics of drug dependence. Behavior Therapy. 1998, 29 (4), pp. 545-565.

Bickel WK, DeGrandpre RJ, Higgins ST, Hughes JR. Behavioral economics of drug self-administration. I. Functional equivalence of response requirement and drug dose. Life Sci. 1990;47(17):1501-10.

Blair and Vogel, 1973. In: Kopp P., L'économie de la drogue.

Brooner RK, King VL, Kidorf M, Schmidt CW, Bigelow GE, Psychiatric and substance use comorbidity among treatment-seeking opioid abusers, Archives of general psychiatry. 1997, 54(1), pp. 71-80.

Brown and Silverman, 1974. In: Kopp P., L'économie de la drogue

Brown BS, Watters JK, Inglehart AS Akins C, Methadone maintenance dose levels and program retention., American Journal of drug and alcohol abuse. 1982-1983, 9, pp. 229-39.

Budney AJ, Higgings ST, Wong C, Bickel WK, Early abstinence predicts outcome in behavioral treatment for cocaine dependence. In: harris, LS (Ed.) Problems of drug dependence 1995, Proceedings of the 57th annual scientific meeting, NIDA research monograph. National institute on drug abuse. Rockville, MD, 1996.

Chatham LR, Hiller ML, Rowanszal GA, Simpson DD. Gender Differences at Admission and follow-up in a Sample of Methadone-Maintenance Clients, SUBSTANCE USE AND MISUSE. 1999, 34(8), pp. 1137-1165.

Chilcoat H, Anthony J , Impact of parent monitoring on the initiation of drug use through late childhood. Journal of the American Academy of child and adolescent Psychiatry. 1996, 35, pp. 91-100.

Chilcoat H, Dishion T, Antony J , Parent monitoring and the incidence of drug sampling in urban elementary school children, American journal of epidemiology. 1995, 141, pp. 25-31.

Chilcoat H. and C. Schutz, Racial/ethnic and age differences in crack use within neighborhoods, Addiction Research. 1995, 3, pp. 103-111.

Crum R, Lillie-Blanton M, Anthony J, Neighborhood environment and opportunity to use cocaine in late childhood and early adolescence, Drug and alcohol dependence. 1996, 43,155-161.

De Jesus AA, Umbricht-scneiter A, Hawkins W, Preston KL, Gender differences in methadone maintenance patients, Annual meeting of the college of problems of drug dependence. Inc, Nashville, TN, 1997.

DOWN: Drugs and alcohol Women's network. When a crèche is not enough. A survey of drug and alcohol services for women. London: Drug and alcohol Women's network, Glass, 1994.

Elmer GI, Miner L, Pickens RW. Genetic contributions to drug abuse. Cocaine abuse, behavior, pharmacology, and clinical applications. Edit Higgins ST and Katz JL academic press 1998. Pp 305.

EMCDDA - Survey data on drug use in European countries, 2001.

Gafni, A., Birch, S. Preferences for outcomes in economic evaluation: an economic approach to addressing economic problems. *Social Science and Medicine* 1995; 40 (6): 767-776.

Grapendaal M. et al., A world of opportunities: lifestyle and economic behaviour of heroin addicts in Amsterdam. New York: State University of New York Press. 1993. In: Bretteville-Jensen A.L., Gender, heroin consumption and economic behaviour, Health Economics. 1999, 8, pp. 379 – 389.

Greenfield L, Brady JV, Besteman KJ, De Smet A. Patient retention in mobile and fixed-site methadone maintenance treatment. Drug Alcohol Depend. 1996 Oct;42(2):125-31.

Grella CE, Anglin D, Wugalter SE, Rawson R, Hasson A, Reasons for discharge from methadone maintenance for addicts at high risk of HIV infection or transmission, *Journal of psychoactive drugs*. 1994, 26, pp. 223-232.

Gronbladh et al., Mortality in heroin addiction: impact of methadone treatment, *Acta Psychiatr Scand*. 1990, 82, pp. 223-227. In: Zanis D. and G. Woody, One-year mortality rates following methadone treatment discharge, *Drug and Alcohol Dependence*. 1998, 52, pp. 257-260.

Grossman M. and F.J. Chaloupka, The demand for cocaine by young adults: a rational addiction approach, *Journal of Health Economics*. 1998, 17, pp. 427-474

Hadreas J. and J. Roumasset, 1977. In: Kopp P., *L'économie de la drogue*.

Hawkins JD, Catalano RF, Miller JY (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychological bulletin*, 112, 64-105.

Hunter GM and A. Judd, Women Injecting Drug-Users in London. The Extent and Nature of Their Contact with Drug and Health-Services, *Drug and alcohol review*. 1998, 17(3), pp. 267-276.

Hyten C. et al., Exchange delays and impulsive choice in adult humans, *Journal of the experimental analysis of behaviour*. 1994, 62, pp. 225 – 233.

Iguchi MY, Belding MA, Morral AR, Lamb RJ, Husband SD. Reinforcing operants other than abstinence in drug-abuse treatment – An affective alternative for reducing drug-use. *Journal of consulting and clinical psychology*. 1997, 65(3), pp. 421-428.

Kaplan HI, Sadock BJ. Personality disorders. In *Pocket handbook of clinical psychiatry*. Edit Williams & Williams (1990) pp 161

Kidorf M, Hollander JR, King VL, Brooner RK. Increasing Employment of Opioid Dependent Outpatients. An Intensive Behavioral Intervention, *Drug and alcohol dependence*. 1998, 50(1), pp. 73-80.

Kopp P., *L'économie de la drogue*.

Madden G.J. et al., Impulsive and self-control choices in opioid-dependent patients and non-drug using control participants: drug and monetary rewards, *Experimental and Clinical Psychopharmacology*. 1997, Vol. 5 (No. 3), pp. 256 – 262.

Maddux JF, Desmond DP, Esquivel M. Rapid admission and retention on methadone. *Am J Drug Alcohol Abuse*. 1995 Nov;21(4):533-47.105

Magura S, Nwakeze PC, Demsky SY, Pre-and in-treatment predictors of retention in methadone treatment using survival analysis, *Addiction*. 1998, Vol 93 (1), pp. 51-60.

Matheson C, Bond CM, Mollison J. Attitudinal Factors Associated with Community Pharmacists Involvement in Services for Drug Misusers, *Addiction*. 1999, 94(9), pp. 1349-1359.

McLean AT, Arndt IO, Metzger DS et al, The effects of psychosocial services in substance abuse treatment, *JAMA*. 1993, 269, pp. 1953-59.

Milby JB, Scumacher JE, Raczynski JM, Caldwell E, Engle M, Carr MM, Sufficient conditions for effective treatment of substance abusing homeless persons. *Drug Alcohol Depen*. 1996, 43, pp. 39-47.

Monterosso J. and G. Ainslie, Beyond discounting: possible experimental models of impulse control, *Psychopharmacology*. 1999, 146, pp. 339-347.

Morrall AR, Belding MA, Iguchi MY., Identifying methadone maintenance clients at risk for poor treatment response: pretreatment and early progress indicators, *Drug and alcohol dependence*. 1999, 55, pp. 25-33.

Morrall AR, Iguchi MY, Belding MA, Lamb JR , Natural classes of treatment response: *J consult Clin Psychol*. 1997, 65, pp. 673-85.

NHSDA, Office of Applied Studies, Analysis of Substance Abuse and Treatment Need Issues, Department of Health and Human Services, Substance Abuse and Mental Health Service Administration, 1996.

Orphanides A. and D. Zervos, Myopia and addictive behaviour, *The Economic Journal*. 1998, 108, pp. 75-91.

Pacula R.L., Economic modelling of the gateway effect, *Health Economics*. 1997, Vol. 6, pp. 521-524.

Pauwels W., *Micro-economie (Vomule 1)*. University of Antwerp (UFSIA), 1999-2000.
Petry N.M. and W.K. Bickel, Polydrug abuse in heroin addicts: a behavioral economic analysis, *Addiction*. 1998, 93 (3), pp. 321-335.

Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, Goodwin FK. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. *JAMA*. 1990 Nov 21;264(19):2511-8.

Rossi C. et al., Pilot project to estimate time trends and incidence of problem drug use in the European Union (CT.98.EP.07), European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), March 1999.

Rousanville BJ, Weissman MM, Crits-Christoph K, Wilber C Kleber H., Diagnosis and symptoms of depression in opiate addicts: course and relationship to treatment outcome, *Arch Gen Psychiatry*. 1982;39, pp. 151-156.

Saxon A, Fleming C, Jackson TR, Wells E, Calsyn DA, Predictors of methadone treatment outcome. *NIDA Research monograph Series*. 1994, 153, p.143.

Schultz J, Chilcoat H Antony J, Disadvantaged neighborhoods and early initiation of drug use. World psychiatric association, Epidemiology and Community psychiatry. 1993, Groningen, Netherlands.

Sees K. et al., Methadone Maintenance versus 180-day psychosocially enriched detoxification for treatment of opioid dependence. A randomized controlled trial, JAMA. 2000, Vol. 283 (10), pp. 1303-1310.

Seivewright N. and C. Daly, Personality-disorder and drug-use – A review, Drug and Alcohol review. 1997, 16(3), pp. 235-250.

Silverman and Spruill, 1977. In: Kopp P., L'économie de la drogue

Silverman K, Chutuape MA, Bigelow GE, Stitzer ML. Voucher-Based Reinforcement of Cocaine Abstinence in Treatment-Resistant Methadone Patients. Effects of Reinforcement Magnitude. Psychopharmacology. 1999, 146(2), pp.128-138.

Skodol AE, Oldham JM, Gallaher PE. Axis II comorbidity of substance use disorders among patients referred for treatment of personality disorders. Am J Psychiatry. 1999 May;156(5):733-8.

Tyrer P, Seivewright H Studies of outcome. In Tyrer P, ed. Personality disorders: diagnosis, treatment and course. London: Wright, 1988.

Vuchinich R.E. and J.A. Tucker, Choice, Behavioural Economics, and Addictive Behaviour Patterns, Treating addictive behaviours. 1998, 2nd ed., Miller and Heather (eds), Plenum Press, New York.

Wechsberg WM, Craddock GG, Hubard RL, Preliminary Findings: Gender differences among those entering methadone treatment, National Methadone conference. Washington DC, 1994.

White and Lusksetich, 1983. In: Kopp P., L'économie de la drogue.

Widman et al., Patterns of service use and treatment involvement of methadone maintenance patients, Journal of Substance Abuse. 1997, Vol 14 (1), pp. 29-35.

Willems JCEW, Iguchi MY, Lidz V, Bux DA., Change in drug-using networks of injecting drug-users during Methadone treatment – A pilot-study using snowball recruitment and intensive interviews, Substance use and misuse. 1997, 32 (11), pp. 1539-1554.

Winston G.C., Addiction and backsliding: a theory of compulsive consumption, Journal of Economic Behaviour and Organisation. 1980, Vol 1, pp. 295-324. In: Orphanides A. and D. Zervos, Myopia and addictive behaviour, The Economic Journal. 1998, 108, pp. 75-91.

Yangita T (1973) An experimental framework for evaluation of dependence liability in various types of drugs in monkeys. Bulletin on narcotics. 25, 57-64.

Zanis D. and G. Woody, One-year mortality rates following methadone treatment discharge, *Drug and Alcohol Dependence*. 1998, 52, pp. 257-260.

The role of the Netherlands in cocaine trafficking in Europe, Toon van der Heijden²⁵

Abstract

In 1999 a Dutch parliamentary committee got indications that in the first half of the nineties with the help of police or customs officers an amount of at least 15 tons and possibly 30 tons of cocaine was imported in the Netherlands without being seized. The Minister of Justice immediately ordered a thorough investigation, which is carried out by the National Investigation Team. Part of this criminal investigation is a criminological research study on the basis of quantitative data. The purpose of this study is to verify or falsify the aforementioned thesis. If the thesis were correct, one would expect in the Netherlands between 1990 and 1995 (in comparison to other time periods or other Western European countries):

1. a decrease of the amount of cocaine seized; and/or
2. an increase in the use of cocaine; and/or
3. an increase in the amount of cocaine seized in neighbouring countries which transited the Netherlands; and/or
4. a decrease of cocaine prices.

Seizure data show that since 1980 more and more cocaine is seized in the Netherlands, in absolute amounts as well as in the proportion of the total amounts seized in Europe. The increasing trend manifests itself in the critical period (1990-1995) but also afterwards.

For the analysis of the use of cocaine, prevalence data were studied. It appears that in 1997 the proportion of the adult Dutch population that ever used cocaine is the same as the average of the most recent figures in other EU member states. As there are no comparable earlier data regarding the Dutch population, no trends can be described. But such trends can be studied for youngsters in the Netherlands. The life time prevalence among 15- and 16-year old students appeared to be significantly higher in 1996 than in 1988 and 1992. This finding also holds when the figures are compared to recent prevalence data from other EU-member states. One could conclude that these results support the central thesis. But if one compares the pattern in the cocaine prevalence of Dutch students with those of several other types of illicit drugs, the same trends appear. This makes it less likely to attribute the increase of the prevalence among Dutch youngsters to a strong increase of the cocaine supply.

Data on clients admitted to drug treatment show, that in the Netherlands the proportion registered with cocaine as primary drug is relatively high. Last year, the absolute number of

²⁵ Research & Development Coordinator
National Police Agency
P.O. Box 1603
2700 KX Zoetermeer (The Netherlands)
E-mail: toon_vanderheijden@hotmail.com

cocaine addicted clients was about six times the figure in 1988. In the most recent period the annual increases were larger than between 1990 and 1995.

As regards the transport of cocaine via the Netherlands to neighbouring countries, the amounts of coke seized in France and Germany were analysed. In France, the annual proportion of cocaine seized, that had transited the Netherlands was slightly higher between 1995 and 1998 than in the 1990-1995 period. In Germany, between 1987 and 1999 there has been a rising trend as well in the proportion of cocaine seized after importation from the Netherlands.

Regarding wholesale and retail prices of cocaine, it was found that they were low in the Netherlands in comparison to most other EU member states. Prices decreased significantly between the first half of the eighties and the middle of the nineties. However, the price fall in the Netherlands was less than average.

It is obvious that the findings in the various areas are related to each other and therefore should be interpreted from an integral perspective. The trends observed in seizures, prevalence and prices all point to the Netherlands serving as a primary gateway for cocaine to the European market. Over the years, this distribution function has become more and more important. This over all trend manifests itself before, in, and after the critical period. Even though the relationships between the underlying developments in the different areas could not (yet) be described in a quantitative manner, it is concluded that the findings of this study do not support the thesis on the import in the first half of the nineties of 15 to 30 tons of coke which weren't seized.

Introduction

In 1999, a parliamentary committee in the Netherlands found that there were indications that in the early nineties, probably between 1991 and 1994, large quantities of cocaine had been imported with the cooperation of Dutch customs and police officers (Tijdelijke commissie evaluatie opsporingsmethoden, 1998-1999, chapter 5). This caused the minister of Justice to institute an in-depth investigation, which was conducted in two ways. One was a traditional crime investigation, carried out by the National Crime Investigation Team, which comes under the National Police Agency. The other part of the investigation was a criminological study of the role that the Netherlands plays in cocaine trafficking in Europe on the basis of analyses of statistical material and literature. The results of this study are presented here.

Set up of the study

At the centre of the study is the following proposition, which was mainly deduced from the report of the parliamentary committee:

Between 1990 and 1995, at least 15 and possibly even 30 tons of cocaine were imported into the Netherlands without being seized, all this with the full knowledge of customs and/or police authorities.

Four hypotheses have been deduced from this proposition. If the above proposition is correct,

then the following could apply to the Netherlands between 1991 and 1995 (as compared to other Western European countries and/or other periods):

- a. less cocaine was seized
- b. the use of cocaine had risen considerably
- c. more cocaine from the Netherlands was seized in neighbouring countries
- d. the price of cocaine was lower or had fallen more strongly.

I shall go on to deal with the significance of these hypotheses, the support that can be found for them in the available empirical material and the contribution of each hypothesis to the plausibility of the principal proposition.

Applying to all deduced hypotheses is that, as the cocaine to which the proposition pertains forms a greater part of the total quantity of imported cocaine, the effects are expected to be more pronounced. Unfortunately, no empirical data are available on this. The quantities mentioned in the proposition become more clear if they are compared to the average quantity of cocaine annually seized in the Netherlands between 1990 and 1995, i.e. 4.5 tons. In this light, measurable effects can be expected in the various sub-fields.

Cocaine seized

If, with the cooperation of police and customs authorities, large quantities of cocaine were imported without being seized, the Dutch market had been provided for to a substantial degree. There would then be less reason to import cocaine that had the normal chance of being intercepted. As a result, relatively less cocaine would have been seized in the critical period.

The quantities of cocaine seized in Europe saw a sharp increase since the early eighties (see chart 1 and table 1). In 1980 customs and police discovered less than 300 kilos, in 1990 it was almost 17 tons. In the course of the nineties, the quantities seized rose to an all time high of 45 tons in 1997. In 1998, 34 tons were seized, the following year 44 tons. Although the increase can be partly attributed to more effective searches for drugs, it is likely that it was caused for the greater part by larger transports from South America.²⁶ This is probably related to the decrease of cocaine consumption in the USA, by far the largest market for this drug.

²⁶ According to Farrell (1995), the global interception rate for cocaine rose from 5 per cent at the beginning of the eighties to 32 per cent in the first half of the nineties. He attributes the rise to the intensification of crime investigation efforts, particularly in the USA. The Dutch and the European interception rates are unknown. Probably, nowadays they are considerably higher than the proverbial 10 per cent. The UN drugs bureau ODCCP (1999, table 13) estimates the global interception rate between 1995 and 1997 to be 37 per cent. If that would also apply to Europe, 80 to 110 tons of cocaine would have been smuggled to this continent annually, 50 to 70 tons of which would have reached the consumer. Interpol (2000, p 8) estimates that nowadays between 120 and 180 tons of cocaine are transported to Europe every year, 30 per cent of which are seized by police and customs authorities, leaving 85 to 125 tons for consumption. Incidentally, the interception rates were also calculated on the basis of global production estimates, which vary substantially, particularly as a result of the application of various assumptions as to the quantity of coca leaves needed for the production of 1 kg of cocaine powder (cf UNDCP, 1997 (figure 49), ODCCP, 1999 (table 13) and CIA, 1998 and 1999). The UN recently launched the Global Illicit Crops Monitoring Programme, which is aimed at reaching reliable production figures (UNDCP, 2000, p. 10).

Between 1985 and 1992, the number of actual cocaine users in the USA fell from 5.7 million to 1.4 million. Since 1992, this number has seen a modest rise to 1.8 million.

Not in each country in Europe is the same quantity of cocaine intercepted. Whether, and if so, where consignments of drugs are intercepted, partly depends on law enforcement effort and partly on coincidence. It is true that cocaine is only produced in South America, however it is transported to the European consumption markets along a variety of routes. Therefore, fluctuations between one year and the other or between one country and the other should not be too great store on. Only patterns and trends that are found in several countries or covering a somewhat longer period can be attributed with content (criminological) significance. Differences between countries can also be thwarted by differing registration methods. According to Farrell et al. (1996), these do not greatly affect the statistics on drug seizures.

Table 1. Cocaine seized in European countries, 1980-1999

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Austria	Kg					5	7	27	14	21
Belgium	1	14	3	25	101	62	116	270	404	90
Denmark						1	7	23	10	55
Germany	23	24	33	108	172	165	186	296	496	1,406
Finland										11
France	58	113	80	229	122	96	258	754	593	939
Greece							3	24	2	3
Ireland										3
Italy	33	63	105	223	79	112	129	330	617	668
Luxembourg						27	7	18	5	21
Netherlands	46	10	17	59	180	124	274	406	517	1
Portugal	1	76	4	46	59	70	165	222	302	793
Spain	58	30	114	215	217	303	669	1,134	3,471	1,852
Sweden						1	3	1	7	5
UK	40	21	19	96	66	85	103	407	329	499
Other	39	44	78	151	195	63	91	59	227	308
Total	299	395	453	1,152	1,191	1,114	2,018	3,971	6,994	8,099
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Austria	41	85	58	84	53	55	73	87	99	63
Belgium	598	757	1,223	2,892	479	576	838	3,329	2,088	1,761
Denmark	28	41	80	11	30	120	32	62	44	24
Germany	2,474	964	1,336	1,053	768	1,846	1,378	1,721	1,332	1,979
Greece	34	14	9	5	176	9	156	17	283	46
Finland		38					1		2	2
France	1,845	832	1,627	1,721	4,753	874	1,753	861	1,076	3,687
Ireland	1		10			22	648	11	334	86
Italy	805	1,300	1,377	2,001	6,663	2,603	2,379	1,650	2,151	2,915

Luxembourg	23	14	12	17	16	1	16	9	6	
Netherlands	4,288	2,492	3,433	3,720	8,200	4,899	9,222	11,489	8,998	10,849
Portugal	360	1,096	1,894	219	1,720	2,117	812	3,163	625	823
Spain	5,512	7,574	4,455	5,397	4,017	6,898	13,743	18,593	11,688	18,078
Sweden	9	226	61	14	29	4	29	34	234	418
UK	611	1,087	2,534	771	2,781	970	1,219	2,350	2,985	2,787
Other	277	692	424	1,724	958	1,246	1,211	1,990	2,260	821
Total	16,906	17,212	18,533	19,629	30,643	22,240	33,510	45,366	34,205	44,339

Table 1 shows that there are strong fluctuations in the quantities seized in the various countries over a number of years. In order to enable a more accurate study for the various European countries in the course of the years, charts 2 to 5 show the data of the eight principal countries separately in the years 1980 to 1985; 1985 to 1990; 1990 to 1995 and 1995 to 1999. Between 1980 and 1985 many European countries had seizures ranging from some dozens to several hundreds of kilos of cocaine. No countries were exceptional in the quantities seized. It can be noted that Eastern European countries seized far less cocaine than the countries of the European Union.

The picture changed drastically between 1988 and 1990 (chart 3), when the Spanish authorities seized by far the largest quantities of cocaine. The pattern has been changing again since 1990, with the Netherlands manifesting itself as the second most important import country. Increasingly, cocaine is transported via Eastern Europe. This pattern roughly remained intact throughout the nineties (charts 4 and 5). If the pattern of cocaine seized in the Netherlands is compared to that of the rest of Europe, some things are remarkable. In 1990, for instance, far more cocaine was found in the Netherlands than was to be expected on the basis of the trend of the eighties. This peak can be attributed to a haul in the small town of Velzen on the Dutch west coast of 2.6 tons, which constituted 61 per cent of the year total. The peak in the Dutch figures for 1994 concurs with the record quantities of cocaine found in the various other countries in Europe, particularly in Italy and France. That year the figures there and in the Netherlands peaked to unprecedented high levels, even higher than those in Spain. 1994 was the only year between 1984 and 1999 that in another EU state more cocaine was found than in Spain.²⁷ In Italy and France that year's haul was more than twice that of other years. A possible explanation of this anomaly is that the Colombian drug cartels had started experimenting with alternative transport routes.

The low in the Dutch figures for 1995 is manifest in comparison with the figures for the rest of Europe (excluding Spain). Possibly, this fall related to the problems that the drugs cartels then had with the Colombian investigation authorities. Another factor could be the destruction of coca plants, which was far more extensive in 1994 and 1995 than in preceding years (UNDCP, 1997, p. 264-265). In 1998 less cocaine was seized in the Netherlands and Spain, than was to be expected on the basis of the trend. A cause could be the high rate of

²⁷ The French statistics include seizures of cocaine in overseas territories, sometimes very large quantities, e.g. the 2,512 kgs seized in Guadeloupe in 1994.

hauls in South America: in Colombia more than 100 tons of cocaine were seized that year, double that of preceding years (Commission on Narcotic Drugs, 1999, p. 12). Viewed over a longer period, there has been a clear increase, both in the Netherlands and in Europe as a whole.

Looking more closely at the relative part that the Netherlands has in cocaine trafficking in Europe, it becomes clear that the share of cocaine found by customs and police authorities has risen from 8 per cent between 1980 and 1984, via 12 per cent between 1985 and 1989 and 21 per cent between 1990 and 1994, to 25 per cent between 1995 and 1999 (see chart 6). So, ever more cocaine is found, not only in an absolute, but also in a relative sense. The role of distribution country is also clear from the data about consignments of cocaine with the Netherlands as destination, which were seized elsewhere. In 1999, at least 13.7 tons were intercepted on their way to this country (Papenhove, 2000; Prisma team, 2000. Also see paragraph 5).

It is likely that the dominant role of the Netherlands in the cocaine trafficking within Europe is linked to Rotterdam's position of being by far the biggest container port in Europe and the intensive airtraffic of persons and goods between the former colonies of Suriname and the Netherlands Antilles, and the Netherlands (Farrell, 1998; Van der Heijden, 1999; de Volkskrant, 2000). This explains the fact that Schiphol (Amsterdam Airport) has ranked first for years on end in the chart of European airports in terms of quantities of cocaine seized (Interpol, 1995, 1997, 1998, 1999). On the basis of the above, the conclusion can be drawn that the development between 1990 and 1995 was not different from the general trend in the Netherlands since 1980. Neither have there been significantly smaller quantities in the first five years of the nineties than could be expected on the basis of the trend in the rest of Europe. On the contrary, in the course of time the position of the Netherlands as gateway to Europe became ever more important. This trend also applies to the period between 1990 and 1995.

Consumption

If the central proposition is correct, one could expect cocaine use in the Netherlands between 1990 and 1995 to have risen more strongly than in other Western European countries. This expectation is based on the assumption that an increase in the supply of cocaine leads to a larger number of users and/or a higher average consumption per user, presumably with a lower price as intermediary factor (see paragraph 6 for the price movement).

In order to make an estimate of the number of users of cocaine in a country, surveys are conducted, in which a representative part of the population is asked about the number of times that they used drugs in their life, in the preceding twelve months, or in the preceding month. This method does not give a full picture, the more so since marginalised drug users usually do not usually take part in surveys. As a result, such studies lead to lower estimates of the number of highly frequent users (cf Harrison & Hughes, 1997). Starting out from the assumption that this effect is reasonably constant, surveys can serve to study the trend in drug use (particularly that of less frequent, recreative use).

Because this study is about the development in the course of time, the prevalence is more

informative than the life time prevalence.²⁸ Unfortunately, only few data are available on the 12 months prevalence of the population in Western Europe (see table 2). Surveys revealed in only eight countries the percentage of the adult population that had used cocaine in the preceding 12 months, varying from 0.1 per cent in the former East Germany to 1.9 in Spain. The figure in Spain is considerably higher than that in other countries, which could be related to the large import of cocaine. The figure for the Netherlands is 0.7, which is just above the mean of 0.6 per cent.²⁹ Since there has only been one survey so far, it has not been possible to establish how the development has been in the course of time.

Table 2. 12-months prevalence for adults in a number of Western European countries

	Age range	1994	1995	1996	1997	1998
		%				
Belgium/Flemish part	18- 65	0.2				
Former West Germany	18-59		0.9		0.7	
Former East Germany	18-59		0.2		0.1	
Finland	18-69					0.2
France	18-69		0.2			
Greece	15-64					0.5
Netherlands	15-69				0.7	
Spain	15-64		1.9		1.6	
United Kingdom	16-59	<0.5		<0.5		1.0

As regards students, the life time prevalence provides some grip for the analysis concerned. These data have not been affected by developments that took place in a more distant past. Moreover, it is a known fact that young people use illicit drugs relatively often. Another advantage is that more data are available that are reasonably comparable, about the situation in the various European countries in the nineties (table 3. Sources: EMCDDA, 2000 and De Zwart, 2000). From the data it is found that cocaine use among students aged 15 and 16 is around 1 per cent in most EU member states. In Scandinavian countries, the life time prevalence is clearly below average, whereas Spain, the Netherlands and Italy score more than 2 per cent in the most recent surveys.

In nine EU member states the life time prevalence among students was measured more than

²⁸ The number of people ever having used cocaine in their lifetime is affected i.a. by trends in the past. The actual situation is better represented by looking at the number of people that had used cocaine in the preceding 12 months (year prevalence). Unfortunately, the year prevalence figures for the various EU countries cannot simply be compared, because differing data collection methods are being applied, different age group brackets are used for making random surveys, and the data of the various countries were not collected at the same time. Therefore one should have reservations when drawing conclusions. On the other hand, several studies have shown that the various types of prevalence figures roughly show the same trends over time (i.a. NHSDA, 1999; Kraus, et al, 1998).

²⁹ When calculating the Western European mean, the most recent figure for each country was used, and the mean was taken of the data for the former West Germany and East Germany.

once in the past decade. In almost all cases, the most recent survey scores higher than the preceding ones. Only in the UK has the number of students who have ever tried cocaine decreased relatively strongly, but this could be an artefact due to a change in the survey methodology (EMCDDA, 2000b).

Table 3. Life time prevalence among 15/16-year old students in EU member states

	1992	1993	1994	1995	1996	1997	1998	1999
	%							
Austria			0.8					
Belgium/Flemish part					0.6		1.3	
Denmark				0.5			1.1	
Finland				0.2				
France		1.1				1.5		
Greece		9.0					1.6	
Ireland				2.0				
Italy				3.0				4.0
Luxembourg				0.9			1.0	
Netherlands	2.0				4.3			4.2
Portugal			0.7	1.0				
Spain			1.7		2.5		4.3	
Sweden				0.5	0.5	0.6		
United Kingdom				3.0		1.5		

The data on cocaine prevalence can be placed in another perspective, i.e. by comparing them with data on the use of other drugs. Between 1992 and 1996 not only the use of cocaine by Dutch students increased, but also that of cannabis, heroin, amphetamines and ecstasy (De Zwart, Stam & Kuipers, 1997, tables 30 & 32). This may mean that the causes for the increased consumption of the various drugs may be valid for cocaine as well as for the other drugs. The most recent survey (conducted in 1999) shows that the lifetime prevalence for cannabis and heroin among Dutch students is approximately at the same level as three years before, which is a trend similar to that of cocaine. In contrast, the use of amphetamines and ecstasy has decreased considerably (De Zwart, Monshouwer & Smit, 2000, pp. 38 & 39).

Another perspective is that of drugs aid. If there is a strong rise of cocaine offered on the market, it is likely that the average frequency of use and the quantities consumed per user also rise, and consequently the number of cocaine addicts getting into trouble. The available data show that in the Netherlands the number of registered clients with a primary cocaine and/or crack problem has indeed risen considerably: from 967 in 1988 to 5,689 in 1999. This means the number of coke users requesting assistance has become six times as high in the last 12 years.³⁰ Graphically, the rise was almost perfectly linear between 1988 and 1993 (see chart

³⁰ This concerns the primary type of drugs consumed by assistance-seeking drug users. When interpreting the figures one should keep in mind that a considerable part of the clients of rehabilitation centres (in 1999 6,960 persons) are primarily addicted to other drugs, especially opiates, and secundarily to cocaine. Also important is the fact that the figures until the year 1996 were not corrected for double counts of clients who were

7). Since 1994, the mean annual rise has grown even stronger. In view of the fact that this trend rupture only happened at the end of the critical period and that the new trend continues in the most recent years, the data do not corroborate the central proposition of this study.³¹ Also with regard to drug aid, the situation in other West European countries can be considered (table 4). It is found that in most EU member states the number of percentage points coke users make up of the drug addicts assisted by drug aid services has risen in recent years.³² The Dutch figures are clearly the highest; only the Luxembourg percentage rate is close to it.³³ The trend in most countries confirms the picture shown in other paragraphs: ever more cocaine is being used in Western Europe.

Table 4. Cocaine users among people treated for drug problems in a number of EU member states

	1994	1995	1996	1997	1998	1999
%						
Belgium/Flemish part	10.9	11.7	7.1			
Belgium/Walloon part	2.5	2.0	2.2	3.8		
Denmark		0.2	0.7	0.7		
Germany	5.7	6.7		7.0	7.1	
Finland	1.6	0.8	0.6	0.6		
France		2.1		3.1		
Greece	1.4	0.6		0.4	0.7	
Ireland	<1.0	0.5	0.5	0.9		
Italy	1.9	1.8		2.3	3.2	
Luxembourg		8.0	13.0	15.0		
Netherlands		13.0	14.5	16.3	17.5	20.0
Portugal		4.5	1.5	1.2		
Spain	4.7		5.6	8.9		
Sweden	<1.0	0.1	<1.0			
United Kingdom	30.0	4.0	3.0	4.0		

The data on cocaine prevalence among adults and students in the various European countries do not show a uniform pattern. The statistics for students indicate a growth in the use of cocaine in Western Europe, which is not clear from the (limited) data on adults. And, while the 12 months prevalence for the Dutch population does not differ much from the Western European mean, the life time figures for students do. Important here is that the strongest rise in the Dutch measurements among students occurred between 1992 and 1996, so shortly after the beginning and shortly after the end of the period in which very large quantities of cocaine were reportedly imported into the Netherlands. It can be said that these data corroborate the

registered more than once. Later figures were subjected to correction.

³¹ It is conceivable that the rise in the number of cocaine users facing such problems as a result of their use that assistance must be sought is also determined by the fast risen popularity of crack cocaine among opiate addicts (cf NDM, 1999). Recent local surveys i.a. in Heerlen and Rotterdam have shown that the rise in cocaine basing is an important factor in the marginalisation process of drug users (Coumans, et al, 2000; Van de Mheen, 2000).

³² In Germany the absolute number of cocaine users seeking assistance rose from 3,170 in 1990 to 11,071 in 1997 (Simon et al., 1999). As in the Netherlands, the rise has been sharper since 1995 than before.

³³ Crack cocaine addicts were not included in the calculation of the Dutch percentages, because they had not been registered separately until 1997. If the group is included, the figure for 1999 is 20.8 per cent.

central proposition. Contrary to it, however, is the observation that the data of Dutch institutions for the care and treatment of drug addicts on coke users seeking assistance indicate an ever-growing use of cocaine. This cannot be explained by the proposition. Neither can the noted increase in the use of other illicit substances be attributed to the large-scale import of cocaine in the first five years of the past decade. All in all, the increased cocaine prevalence is likely to be related rather to cultural factors than to the alleged strong increase in the import of this type of drug in the critical period (cf. Abraham, 1999).

Transiting

If the central proposition corresponds with reality, more cocaine from the Netherlands would have likely to have been found in neighbouring countries in the critical period. To put it more precisely, the quantity and the percentage of seized cocaine from the Netherlands should have been significantly higher between 1990 and 1995 than in other periods. Although the quantity of cocaine used in the Netherlands is not known - estimates run from 200 to 3,000 kilograms (Van Silfhout, 1999) - it is obvious that the import of at least 15 and possibly 30 tons, would be very considerable if it were the Netherlands alone, even if the import covers approximately four years. It is therefore useful to see whether neighbouring countries experienced extra imports from the Netherlands. For France, the principal European supply (actually, transit) countries are Spain and the Netherlands, responsible for 3.7 and 1.9 per cent of the cocaine seized whose origins were discovered. As regards the transit via the Netherlands to France, the quantities vary between 9 and 34 kilograms per year (23 kgs on average; table 5).³⁴ As far as quantities seized are concerned, the Netherlands are not overrepresented, which is quite different for the heroin and ecstasy intercepted in France, of which roughly half comes from this country (OCRTIS, 1999, pp. 70, 95).

For Germany, too, Colombia is the principal country of origin (40 per cent of the cocaine come across in 1999). In the course of the years, the Netherlands has become an evermore important transit country. Between 1987 and 1993 the German authorities seized quantities ranging from 12 to 44 kilograms. Since 1994 the year total has exceeded 100 kgs (except for 1995). The upward trend is clearly visible from the percentage points of the quantities whose origins are known, in spite of the fluctuations from one year to the other. The Netherlands was good for 3 per cent of the supplied coke between 1987 and 1989, 6 % between 1990 and 1994, and 12 % between 1995 and 1999 (BKA, 2000).

³⁴ In the light of the other findings it is remarkable that the Netherlands seem to be the destination for much larger quantities of cocaine than the amounts coming from this country which were seized in France: on average 129 kgs versus 25 kgs per annum. A similar pattern is observed in Belgian seizure statistics. In 1998 and 1999 an mean quantity of 57 kgs per annum was found which had transited the Netherlands, while on average 109 kgs of coke were discovered which were destined for this country (Wouters, 2000). No data are available on the origin and destination of cocaine seized in Belgium before 1998.

Table 5. Cocaine seized in Germany or France which transited the Netherlands

Year	Quantity seized in Germany (kgs.)	Proportion of total with known origin	Quantity seized in France (kgs.)	Proportion of total with known origin
1987	17.0	6.2		
1988	12.0	2.6		
1989	21.0	1.6		
1990	39.0	1.6	26.0	1.4
1991	24.0	1.7	16.0	2.1
1992	32.0	4.9	8.9	1.0
1993	44.0	15.9	19.0	1.5
1994	105.0	5.3	32.5	1.0
1995	99.6	14.9	34.4	4.4
1996	186.0	10.4	16.7	1.0
1997	159.1	10.3	18.9	2.6
1998	158.3	15.6	26.9	3.6
1999	148.6	8.7		
2000 (first quarter)	28.0	18.9		

Prices

If the proposition on the large-scale import of cocaine is correct, the wholesale and retail prices in the Netherlands may be expected to have been lower or have fallen more strongly between 1990 and 1995 than in other periods or other Western European countries. This hypothesis assumes that illegal goods, such as drugs, are subject to price mechanisms comparable to those of legal goods. Various sources have corroborated this (Van Luijk & Van Ours, 1995; Jansen, 1998; Godfrey, 2000). The illegal character of the drugs market hampers distribution, which causes price differences between countries and within countries price differences between different locations. Assumedly, a strong rise in the quantity on offer especially affects the minimum price at wholesale level and, to a lesser degree, the retail prices.

The purity of the cocaine should also be included in the analysis. However, too few details are available for an international comparison (see e.g. ODCCP, 1999, p. 165 & 166; Interpol, 2000, p. 14). The impression is that in the course of time the purity of the cocaine on offer has increased, both at wholesale and at street level. According to Interpol (2000, p. 14), the purity does not substantially affect the price at retail level, but presumably it does at wholesale level.

In 1996, an article was published in which a comparison is made of wholesale and retail prices in various countries in Europe between 1983 and 1993 (Farrell et al. 1996; see tables 6 and 7). The statistics were complemented with Europol data as of 1997 (Europol Drugs Unit,

1997 & 1998; Europol, 1999 & 2000; see tables 8 and 9).³⁵ Although the wholesale prices show substantial fluctuations and a lot of data are missing, the general tendency was that prices fell between the early eighties and the early nineties. Leaving aside exceptional instances, the price in the Netherlands was the lowest.³⁶ A study of the period between 1997 and 2000 shows that the Netherlands is still one of the most inexpensive. It is worthy of note that the price differences between the countries and the different years were smaller on average than was the case in the eighties (chart 8). This could be an indication of a European market for cocaine that is more open nowadays and that the supply is rather constant.

In the Netherlands, the wholesale prices of cocaine in 1990, 1992 and 1993 were lower than other years (with the exception of 1998). In 1992/1993 the wholesale price was 40 per cent lower than that of 1983/1984.³⁷ This drop in prices is easily attributed to increased supply. However, in other EU member states large price drops occurred in the same period, on average 47 per cent in the countries whose data are available. The increase in supply therefore appears not to be an exclusive phenomenon for the Netherlands. The fact that the price of cocaine in other Western European countries fell about the same or even more, is an indication of supply to the Dutch market not having increased more than to other places.

Table 6. Wholesale prices (in US\$ per kg) in a number of EU member states; 1983-1993

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Belgium (West-)	50,000	45,000	54,000	27,000	36,960	48,645	22,596		17,166	27,272	19,600
Germany	64,000	61,200	61,050	69,845	64,530	44,500	48,950	52,854	38,975	42,994	37,899
France	32,750	32,450	33,000	89,474	104,720	93,483	78,683	89,622	28,076	32,083	26,775
Italy	35,000	33,000	30,000	38,346	42,240	40,508	33,894	41,364	35,232	67,022	
Netherlands	35,100	30,908						20,299		21,034	18,330
Portugal	72,250	65,550						30,257	28,835	23,529	18,900
Spain	84,000	42,000	48,000	53,910	32,800	53,298	45,192	49,900	44,040	39,215	24,500
UK	53,550	43,875		39,716	50,908	43,738	46,879	36,653			30,247

³⁵ Other sources contain only fragmented price data (e.g. ODCCP, 1999 & 2000; Interpol 2000). In order to minimise the variation caused by methodological differences, only two sources were selected for this analysis. Unfortunately, the data of these sources cannot be compared to the full either. Europol does not publish one figure for a number of EU member states but a price range. In such cases, the mean of the minimum and maximum price was calculated. All prices were converted in dollar exchange rates from 1993. Because Europe does not have a standard for drug price data collection, international comparisons of prices are a hazardous business. Caution is therefore required when drawing conclusions.

³⁶ The trend derived from the few Dutch data covering 1983 to 1993, is confirmed by J. de Vlieger, drugs expert with the Rotterdam-Rijnmond regional police, and N. de Bruijn, who in the nineties worked with the drugs department of the National Criminal Intelligence Service.

³⁷ Because of the strong fluctuations, the mean was calculated of the prices in 1983 and 1984, and 1992 and 1993 respectively.

Table 7. Wholesale prices (in US\$ per kg) in EU member states: 1997-2000

	1997	1998	1999	2000
Austria	34,616	33,921	42,986	42,986
Belgium	26,564	23,139	26,393	26,393
Denmark		33,921	42,986	42,986
France	45,160	44,481	45,086	36,070
Germany	50,727	45,939	44,367	43,852
Greece	67,655	45,354	43,492	52,764
Ireland	35,604	32,928	33,045	33,046
Italy	45,593	51,817	52,544	49,488
Luxembourg	53,129	52,005	52,787	52,787
Netherlands	31,702	13,233	28,183	48,503
Portugal	48,434	35,017	35,405	35,405
Spain	35,870	41,170	42,980	42,696
Sweden	50,389	54,566	52,920	46,973
United Kingdom	43,139	51,474	51,095	41,148

Table 8. Retail prices (in US\$ per gram) in a number of Western European countries, 1983-1993

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Belgium	120	108	140	79	119	102	56		66	48	67
(West)Germany	110	130	96	144				92	76	79	66
France	79	65	55	77	75	72	67	76	87	100	107
Greece	20									75	38
Italy	81	51	45	58	69	81	68	89	88	117	
Netherlands	70	50						51		53	46
Portugal	94	86						48	42	43	40
Spain	112	72	72	96	92	84	65	84	73	71	44
Switzerland	168	112	137	113	160			136	106	134	95
United Kingdom	107	81		110	128	118	108	100	93	49	86

Table 9. Retail prices (in US\$ per gram) in EU member states, 1997-2000

	1997	1998	1999	2000
Austria	95	93	108	108
Belgium	59	65	66	75
Denmark	160	192	183	183
Germany	84	78	76	75
Finland		187	159	159
France	127	124	126	108
Greece	135	95	90	96
Ireland	129	118	121	121
Italy	98	112	118	118
Luxembourg	177	145	147	132
Netherlands	68	37	43	58
Portugal	90	66	41	41
Spain	71	71	71	69
Sweden	94	95	92	94
United Kingdom	115	128	125	147

Most Western European countries have also experienced the tendency of falling retail prices. Between 1983/1984 and 1992/1993 the price in the Netherlands fell by 18 per cent, in other countries whose data were available the retail price fell by 29 per cent (tables 8 & 9; chart 9).³⁸ The Dutch prices have remained among the lowest. The only country where cocaine is often cheaper is Belgium. This indicates ample supply, both in an absolute sense and in proportion to demand. In the second half of the nineties this appears to apply to most Western European countries.

On the basis of the analysed data, it cannot be concluded that the Dutch retail prices in the first half of the nineties were considerably lower than in other periods under survey. Neither can it be concluded that the prices fell more strongly than in the most Western European countries.

Conclusions

If at least 15 tons of cocaine were imported into the Netherlands in the early nineties without being seized, this apparently did not lead to a decrease in the quantities seized in this country. In the entire period studied (roughly from 1980 to 1999), there has been a substantial increase in the quantities of cocaine seized every year. There was a clear rise, both before, during and after the critical period, not only in absolute figures but also in comparison to other Western European countries. It is true that in the critical period the price of cocaine in the Netherlands fell and the use rose, but these trends are also found in the years before 1990 and after 1995. Moreover, the price of cocaine has also fallen in other Western European countries and its use has grown accordingly. In the pattern of consignments of cocaine transported from the Netherlands to neighbouring countries, which were seized there, no clear deviation for the critical period was found either. Here too, a rising tendency is visible.

In as far as could be established, the trends spotted in the Netherlands in the years 1990 to 1995 hardly differ or do not differ at all from those in other Western European countries and in other periods. The relations between data on quantities seized, cocaine use and prices are plausible and indicate a gradual growth of importations. Apparently, the Netherlands plays an ever greater role in the import of this sort of drug for the European users market. In spite of the fact that the police and customs authorities seize ever more cocaine, the quantities on offer for consumers are ample.

The final conclusion of this study is that the assertion that in the first half of the nineties at least 15 and possibly 30 tons of cocaine were imported without being seized, has not become convincing.

³⁸ The drop in wholesale and retail prices in Europe, particularly between the mid-eighties and the early nineties, as noticed by Farrell, is confirmed by other sources (i.a. Korf & Verbraeck, 1993; BKA, 2000; Wouters, 2000; Interpol, 2000). A UN publication, however, states that the average wholesale price in Western Europe was higher between 1986 and 1990 than in the years 1984 and 1985 (ODCCP, 1999, fig. 123). Since 1990 both the wholesale price and the retail price of cocaine have reportedly fallen considerably.

References

1995 *Annual report on the State of the Drugs Problem in the European Union*. EMCDDA European Monitoring Centre for Drugs and Drug Addiction, www.emcdda.org. Lisbon, 1996.

1998 *Annual report on the state of the drugs problem in the European Union*. EMCDDA European Monitoring Centre for Drugs and Drug Addiction, www.emcdda.org. Lisbon, 1999.

1997 *European cocaine situation report*. International Criminal Police Organization -Interpol General Secretariat, Lyons, March 1998.

1999 *International Narcotics Control Strategy Report*. Bureau for International Narcotics and Law Enforcement Affairs, U.S. Department of State, www/global/narcotics_law/1999_narc_report. Washington, D.C., March 2000.

1998 *National Household Survey on Drug Abuse*. NHSDA, Substance Abuse and Mental Health Services Administration, www.samhsa.gov/OAS/NHSDA/Pe1998. August 1999.

2000 *Annual report on the state of the drugs problem in the European Union*. EMCDDA European Monitoring Centre for Drugs and Drug Addiction, www.emcdda.org. Lisbon, 2000a.

Abraham, Manja D.: *The impact of urban residency and lifestyle on illicit drug use in the Netherlands*. Pre-publication version of an article appearing in *Journal of Drugs Issues*, Summer 1999, pp. 565-586. CEDRO Centrum voor Drugsonderzoek UvA, www.frw.uva.nl/cedro/library Amsterdam, 1999.

Abraham, Manja D., Peter D.A. Cohen, Roelf-Jan van Til & Marieke Langemeijer : *Licit and illicit drug use in Amsterdam III. Developments in drug use 1987-1997*. CEDRO Centrum voor Drugsonderzoek UvA, www.frw.uva.nl/cedro/library Amsterdam, 1998.

Abraham, Manja D., Peter D.A. Cohen, Roelf-Jan van Til & MariNlle A.L. de Winter : *Licit and illicit drug use in the Netherlands, 1997*. CEDRO Centrum voor Drugsonderzoek UvA, www.frw.uva.nl/cedro/library Amsterdam, 1999.

Abraham, Manja D. (CEDRO) : Data from the Dutch National Prevalence Survey 1997, provided at the request of the author, June 2000.

ArgaZar<s, Fernando GarcRa : *The drug war at the supply end : The case of Bolivia*. *Latin American Perspectives*, Issue 96, Vol. 24, No. 5, September 1997, pp. 59-80.

Bertram, Eva, & Kenneth Sharpe: *The unwinnable drugs war. What Clausewitz would tell us*. *World Policy Journal*, Vol. 13 (4), Winter 1996/97, pp. 41-51.

Bie, E. de, & B. Bieleman : *Wit, witter, witst. Een onderzoek naar de kwaliteit van cocaVne in Rotterdam*. Intraval, Groningen-Rotterdam, August 1994.

Bijkerk, Ruud & Martin Grapendaal: *Inbeslaggenomen verdovende middelen 1997 en 1998*. KLPD-divisie Centrale Recherche Informatie, Zoetermeer, April 1999.

Bijkerk, Ruud & Martin Grapendaal: *In beslaggenomen verdovende middelen 1999*. KLPD-directie Recherche, Zoetermeer, 2000.

Boekhout van Solinge, Tim : *Heroïne, cocaïne en crack in Frankrijk. Handel, gebruik en beleid/ L'heroïne, la cocaïne et le crack en France. Trafic, usage et politique*. CEDRO Centrum voor Drugsonderzoek Universiteit van Amsterdam, Amsterdam/ Parijs, June 1996.

Caulkins, Jonathan & Peter Reuter: *The meaning and utility of drug prices*. Reprint from *Addiction*, Vol. 91, 1996, p. 1261-1264. RAND Drug Policy Research Center, Santa Monica, California, 1997.

Clawson, Patrick L. & Rensselaer W. Lee III : *The Andean cocaine industry*. MacMillan, Houndmills, Basingstoke, Hampshire, 1996

Complementary statistical tables to the 2000 Annual report on the state of the drugs problem in the European Union., EMCDDA European Monitoring Centre for Drugs and Drug Addiction, www.emcdda.org. Lisbon, 2000b.

Corkerey, John Martin : *Statistics of drugs seizures and offenders dealt with, United Kingdom, 1996*. National Criminal Intelligence Service, London, 1998.

Crack/gekookte coke in Nederland. Ministerie van Volksgezondheid, Welzijn en Sport, September 1997.

Criminaliteitsbeeld 1999. Kernteam Haaglanden/Hollands Midden. Prisma-team. Den Haag, February 2000.

Coumans, A.M., R.J.M. Neve & H. van de Mheen: *Het proces van marginalisering en verharding in de drugscene van Parkstad Limburg. Resultaten van het Drug Monitoring Systeem 1998-2000*. IVO, Rotterdam, May 2000.

De Zwart, W.M.: data provided at the request of the author from the fifth Peilstations survey, September 2000.

De Zwart, W.M., H. Stam & S.B.M. Kuipers: *Roken, drinken, drugsgebruik en gokken onder scholieren vanaf 10 jaar. Kerngegevens van het 4e Peilstations-onderzoek naar riskant middelengebruik*. Trimbos-instituut, Utrecht, May 1997.

De Zwart, W.M., M. Monshouwer & F. Smit: *Jeugd en riskant gedrag. Kerngegevens 1999. Roken drinken, drugsgebruik en gokken onder scholieren vanaf tien jaar*. Trimbos-instituut, Utrecht, 2000.

Druggebruik jeugd omlaag. Allochtone jongeren drukken gemiddelde in Amsterdam. Algemeen Dagblad, 7 October 2000.

Drug situation in the UK - trends and update. Institute for the Study of Drug Dependence (ISDD), WWW.ISDD.co.UK/trends, 24/01/2000.

Drug trafficking by Latin American Criminal Organisations. Europol, The Hague, June 1997.

Entwicklung der durchschnittlichen Rauschgiftpreise in der Bundesrepublik Deutschland seit 1975. Bundeskriminalamt (BKA), Wiesbaden, 2000.

Epidemiology EMCDDA European Monitoring Centre for Drugs and Drug Addiction. www.emcdda.org/activities. Lisbon, 2000c.

European Drug Situation Report 1999. International Criminal Police Organization - Interpol General Secretariat, Lyons, April 2000.

European Union situation report on drug production and drug trafficking 1999/2000. Europol, The Hague, July 2000.

Extended annual report on the state of the drugs problem in the European Union, 1999. EMCDDA European Monitoring Centre for Drugs and Drug Addiction, www.emcdda.org. Lisbon, 1999.

Fact sheet: Drug use trends. Drug Policy Information Clearinghouse. White House Office of National Drug Control Policy (ONDCP), Washington, April 1997.

Farrell, Graham: *The global rate of interception of illicit opiates and cocaine 1980-94.* Transnational Organized Crime, Vol. 1, No. 4, Winter 1995, pp. 134-149.

Farrell, Graham: *Routine activities and drug trafficking: the case of the Netherlands.* International Journal of Drug Policy 9, 1998, pp.21-32.

Farrell, Graham, Kasrfa Mansue & Melissa Tullis: *Cocaine and heroin in Europe 1983-93. A Cross-national comparison of trafficking and prices.* British Journal of Criminology, Vol. 36, No 2, Spring 1996, pp. 255-281.

Global illicit drug trends 1999. United Nations Office for Drug Control and Crime Prevention (ODCCP), www.undcp.org. New York, 1999.

Global illicit drug trends 2000. United Nations Office for Drug Control and Crime Prevention (ODCCP), www.undcp.org. New York, 2000.

Godfrey, Christine: *Modelling drug markets: empirical evidence available from economic studies.* Paper presented at the expert meeting on drug markets and modelling at the EMCDDA, Lisbon, 23-24 October 2000.

Harrison, Lana & Arthur Hughes (eds.): *The validity of self-reported drug use: improving the accuracy of survey estimates.* NIDA Research Monograph 167, National Institute on Drug Abuse, Rockville, 1997.

Jansen, A.C.M.: *Prijsvorming in de Nederlandse marihuana-sector 1990-1995; Een beleids-*

perspectief. Amsterdam, 1998 www.frw.uva.nl/cedro/jansen.

Jol, C. (Netherlands Central Bureau of Statistics) Data from the Periodic Survey on the Situation of Youngsters (POLS), provided at the request of the author, June 2000.

Joyce, Elisabeth : *Europe and the limits of international drug co-operation*. South African Journal of International Affairs, Vol. 5, No. 1, pp. 27-37.

Johnston, Lloyd D., Patrick M. O'Malley & Jeral G. Bachman: *The monitoring the future national results on adolescent drug use. Overview of key findings, 1999*. National Institute on Drug Abuse, Bethesda, Maryland, 2000.

Kennedy, Michael, Peter Reuter & Kevin Jack Riley: *A simple economic model of cocaine production*. Reprint from Mathematical and Computer Modelling, Vol. 17, No. 2, p. 19-36, 1993. Rand RP-191, RAND, Santa Monica, California, 1993.

Key, Douglas, & Graham Farrell : *Trafficking drugs in the global village*. Transnational Organised Crime, Vol. 3, Summer 1997, pp. 90-110.

Klostermann, Peter, Markus A. Rothschild & Volkmar Schneider: *Kokain: Leistungsdroge de 90er Jahre? Morphologische und kriminologisch-soziologische Aspekte*. Archiv für Kriminologie, Band 198, 1996, (1-2), pp. 16-22.

Korf, Dirk, & Hans Verbraeck : *Dealers en dienders. Dynamiek tussen drugsbestrijding en de midden- en hogere niveaus van de cannabis- cocaïne, amfetamine- en ecstasyhandel in Amsterdam*. Criminologisch Instituut 'Bonger', Universiteit van Amsterdam, Amsterdam, 1993.

Korf, Dirk J., Rob Biemond & Ruurd Jellema : *Prijs en kwaliteit van illegale drugs in Amsterdam*. Criminologisch Instituut 'Bonger', Universiteit van Amsterdam, Amsterdam, 1994.

Kraus, Ludwig, Rita Bauernfeind & Gerhard Bhringer: *Epidemiologie des Drogenkonsums. Ergebnisse aus Bevölkerungssurveys 1990 bis 1996*. Schriftenreihe des Bundesministeriums für Gesundheit, Band 107, Nomos Verlagsgesellschaft, Baden-Baden, 1998.

Kurzdarstellung zur Rauschgiftsituation in der Bundesrepublik Deutschland, 1999. Bundeskriminalamt (BKA), www.bka.de/lageberichte/rg/1999. Wiesbaden, 2000.

Lagebericht Rauschgift 1998. Bundeskriminalamt, Wiesbaden, 1999.

La géopolitique mondiale des drogues 1998/1999. Rapport annuel. OGD Observatoire Géopolitique des Drogues, Paris, Avril 2000.

Langemeijer, Marieke: *The prevalence of illicit drug use in the general population and in schools, as monitored by a number of different methods*. Published in: Trimbos-instituut (1997), Invitational conference on monitoring illicit drugs and health. Final report. Utrecht, Trimbos-instituut, pp. 11-21.

Ledwith, William : DEA Congressional testimony before the House Government Reform Committee, Subcommittee on Criminal Justice, Drug Policy, and Human Resources, Washington, August 6, 1999.

Major coca & opium producing nations. Cultivation and production estimates, 1993-1997. DCI Crime and Narcotics Center, CIA, www.odci.gov/cia/di/products/drug_crops February 1998.

Major coca & opium producing nations. Cultivation and production estimates, 1994-1998. CIA-Directorate of Intelligence Products, www.cia.gov/di/products/coca_opium February 1999.

Monitoring illicit crop cultivation. United Nations International Drugs Control Programme (UNDCP) Update, June 2000, pp. 10-11.

Multi-city study: Drug misuse trends in thirteen European cities. Co-operation Group to Combat Drug Abuse and Illicit Trafficking in Drugs (Pompidou Group). Council of Europe, Strasbourg, 1994.

National Drug Control Strategy. 2000 Annual Report. Office of National Drug Control Policy (ONDCP), www.whitehousedrugpolicy.gov/policy/ndcs00, Washington, 2000.

National drug use prevalence, the Netherlands, 1997. CEDRO Centrum voor Drugsonderzoek Universiteit van Amsterdam, Amsterdam, 1999.

Nationale Drugmonitor Jaarbericht 1999. NDM, Trimbos-Instituut, Utrecht, 1999.

Nieves, Robert, J.: *Breaking drug cartels: lessons from Colombia.* Trends in Organized Crime, Spring 1998, Vol. 3, Nr. 3, pp. 13-29.

Opsporing in uitvoering. Rapport van de Tijdelijke commissie evaluatie opsporingsmethoden. Tweede Kamer, vergaderjaar 1998-1999, 26 269, nrs. 4-5.

Ouweland, A.W., V.C.M. van Alem, L.J. de Vetten & S. Boonzajer Flaes: *Kerncijfers verslavingszorg 1999.* Landelijk Alcohol en Drugs Informatie Systeem. Stichting Informatievoorziening Verslavings-zorg (IVV), Houten, June 2000.

Papenhove, Th.G.: *Vier Colombiaanse organisaties actief in Europa met cocaine- en marihuana-smokkel.* Centrale Recherche Informatiedienst CRI, Zoetermeer, March 1995.

Papenhove, Th.G. (CRI): Data from the database Drugs Trends and Developments, provided at the request of the author, June 2000.

Per jaar gaat 7000 kilo cocaïne via Suriname. De Volkskrant, 7 maart 2000.

Prices of drugs in the European Union 1997. Europol Drugs Unit, The Hague, May 1997.

Prices of drugs in the European Union 1998. Europol Drugs Unit, The Hague, May 1998.

Prices of drugs in the European Union 1999. Europol, The Hague, July 1999.

Prices of drugs in the European Union 2000. Europol, The Hague, July 2000.

Rapport sur le trafic de la cocaïne dans le monde, 1997. Secrétariat général de l'O.I.P.C.-Interpol, Lyon, 1998.

Rapport sur la situation de la cocaïne dans le monde, 1998. Secrétariat général de l'O.I.P.C.-Interpol, Lyon, Juillet 1999.

Rapport sur la situation de la cocaïne en Europe en 1998. Secrétariat général de l'O.I.P.C.-Interpol, Lyon, Mars 1999.

Rauschgiftjahresbericht 1997 Bundesrepublik Deutschland. Bundeskriminalamt, Wiesbaden, 1998.

Report of the International Narcotics Control Board for 1999. INCB, United Nations Information Service, www.incb.org/e/ar/1999, Vienna, February 2000.

Report on the organised crime situation in Council of Europe member states B 1998. Committee of experts on criminal law and criminological aspects of organised crime (PC-CO), Council of Europe, Strasbourg, December 1999.

Reuter, Peter: *Prevalence estimation and policy formulation*. Reprint from *The Journal of Drug Issues*, Vol. 23, No. 2, 1993, pp. 167-184. RAND, Santa Monica, California, 1993.

Reuter, Peter: *The mismeasurement of illegal drug markets. The implications of its irrelevance*. Reprint from *Exploring the underground economy*, 1996, p. 63-80. RAND Drug Policy Research Center, Santa Monica, California, 1997.

Reuter, Peter: *Foreign demand for Latin American drugs. The USA and Europe*. RAND Drug Policy Research Center, Santa Monica, California, 1998.

Reuter, Peter, & Mark A.R. Kleiman: *Risks and prices; an economic analysis of drug enforcement*. *Crime and Justice: an annual review of research*, Vol. 7, pp. 289-340, 1986.

Rhodes, William, Stacia Langenbahn, Ryan Kling & Paul Scheiman: *What America's users spend on illegal drugs, 1988-1995*. ONDCP The Office of National Drug Control Policy, www.whitehousedrugpolicy.gov September 29, 1997.

Riley, K. Jack: *Crack, powder cocaine, and heroin: drug purchase and use patterns in six US cities*. National Institute of Justice/Office of National Drug Control Policy (ONDCP), December 1997.

Sandwijk, J.P., I. Westerterp & S. Musterd: *Het gebruik van legale en illegale drugs in Amsterdam. Verslag van een prevalentie-onderzoek onder de bevolking van 12 jaar en ouder*. Instituut voor Sociale Geografie, Universiteit van Amsterdam, Amsterdam, 1988.

Simon, Roland, Martin Tauscher & Tim Pfeiffer: *Suchtbericht Deutschland 1999*. Schneider Verlage Hohengehren, Balmannsweiler, 1999.

Statistics and analysis on supply of and trafficking in narcotic drugs and psychotropic substances 1996. United Nations International Drug Control Programme (UNDCP), Vienna, 1997.

The cocaine threat to the United States. Drug Intelligence Report. Drug Enforcement Administration (DEA), March 1995.

The Cali Cartel. Drug Enforcement Administration, (DEA) Washington, February 1993.

The Colombian cocaine trail. The expanding market in Europe. 1994. International Criminal Police Organization - Interpol, General Secretariat, Lyons, 1995.

The threat from serious and organised crime. 2000 UK threat assessment. National Criminal Intelligence Service (NCIS), London, May 2000.

The world geopolitics of drugs 1997/1998. Annual report. Observatoire GJopolitique des Drogues (OGD), Paris, October 1998.

Tragler, Gernot. *Dynamics and control of illicit drug consumption. Past, actual and future research work from the 'Vienna Group'*. Paper presented at the expert meeting on drug markets and modelling at the EMCDDA, Lisbon, 23-24 October 2000.

United Kingdom Drugs Prices (as at December 1999). Nexus, The NCIS criminal intelligence bulletin for law enforcement, Issue No. 7, Winter 1999/2000, p. 7.

Usage et trafic de stupéfiants en France. Les statistiques de l'année 1995. OCRTIS Office Central pour la Repression du Trafic Illicite des Stupéfiants, Paris, 1996.

Usage et trafic de drogues en France. Les statistiques de l'année 1998. OCRTIS Office Central pour la Repression du Trafic Illicite des Stupéfiants, Paris, 1999.

Valencia conference on '*Drug trafficking by Latin American criminal organisations.*' *Cocaine report 1997.* Europol, The Hague, 1997.

Van Alem, Vincent C.M. (IVV): Data from the National Alcohol and Drugs Information System (LADIS), provided at the request of the author, July 2000.

Van de Mheen, Dike (red.): *De Rotterdamse Drugscene onder de loep. Resultaten van 5 jaar Drug Monitoring Systeem in Rotterdam.* Instituut voor Onderzoek naar Leefwijzen en Verslaving (IVO), Rotterdam, 2000.

Van der Heijden, A.W.M.: *Inbeslaggenomen verdovende middelen. Jaaroverzicht 1996.* KLPD-divisie Centrale Recherche Informatie, Zoetermeer, September 1997.

Van der Heijden, A.W.M.: *Nederland luilekkerland? Trends in de drugshandel.* Tijdschrift voor de Politie, 1999, nr. 1/2, January/February 1999, p. 9-17.

Van Horne, Sheryl, & Graham Farrell: *Drug offenders in the global criminal justice system.*

HEUNI paper no. 13. The European Institute for Crime Prevention and Control, affiliated with the United Nations, Helsinki, 1999.

Van Luijk, Eric, & Jan van Ours: *De prijselasticiteit van hard drugs*. Economisch Statistische Berichten, 1995, pp. 471-474.

Van Silfhout, Marcel: 'Nederland heeft aan 3000 kilo cocaïne genoeg'. Goudsche Courant, 7 July 1999.

Van Zwol, Coen: *Crack is in Nederland heroïne allang voorbij gestreefd. Hallucinerende kruis-ridders*. NRC Handelsblad, 1 June 1996.

Vermaas, P.: *Parallel-importen en dubbelinformanten. Korthals in coke-debat: 'Het is de vraag of de puzzel ooit compleet zal worden'*. Algemeen Politieblad van het Koninkrijk der Nederlanden, Jaargang 148, 15 July 1999, pp. 16-18.

World Drug Report. United Nations International Drug Control Programme (UNDCP), Oxford University Press, Oxford, 1997.

World situation with regard to illicit drug trafficking and action taken by the subsidiary bodies of the Commission on Narcotic Drugs. United Nations Economic and Social Council, Commission on Narcotic Drugs (CND). Vienna, 22 December 1999.

Worldwide report on cocaine trafficking (data 1999). International Criminal Police Organization - Interpol General Secretariat, Lyons, July 2000.

Wouters, Guido (Belgian embassy, The Hague): data on seizures and prices of cocaine, provided at the request of the author from the databank of the Algemene Politieconstandienst, June 2000.

Abstract

The model used here derived from the Harrod-Domar model, but we have made the hypothesis that the economic system is divided into two different sectors: legal and illegal. The distinction between these sectors derives from the definition of economic trade. We use extensively the concept of economic exchange. The general trade activities that can modify the distributions and the decisions processes rules can be considered criminal only if they are considered crimes by legislative rules. The drug market is then included in the criminal sector. The drug is produced by a criminal system, it is a “voluntary” good consumption that can be purchased and consumed. The model studies the impact of the increase of criminal activity in the development of economic system.

The model’s theoretical base is the HD model. By the HD model it is possible to analyse the relations between the growth rates of two different kinds of economies. The standard HD tries to determine under which circumstances the economy is capable to obtain a steady state growth. The question posed by our model tries to evaluate the growth’s stability of the economic system in its complexity when there is a sector (the drug sector) inside the economy which takes away resources for investment in the legal sector.

The principal variable in our study is the warranted rate of growth. The rate depends not only on the propensity to save and on the capital/output ratio, but it is also affected by consumption, the investment and the savings in the drug sector. In our model the relation between the two sectors determine the drug sector growth rate.

Introduction

In this article we have studied the impact of the drug sector in the path of the legal sector development.

The model used here derived from the Harrod-Domar model, but we have made the hypothesis that the economic system is divided into two different sectors: legal and illegal. The distinction between these sectors derives from the definition of economic trade. We use extensively the concept of economic exchange. The general trade activities that can modify the distributions and the decisions processes rules can be considered criminal only if they are considered crimes by legislative rules. The drug market is then included in the criminal sector. The drug is produced by a criminal system, it is a “voluntary” good consumption that can be purchased and consumed. The model studies the impact of the increase of criminal activity in the development of economic system.

³⁹ Fondazione Carisal Area Finanza Ricerca
C.so G. Garibaldi, 194
Salerno (Italy)
E-mail: g_jov@hotmail.com

First of all, to obtain the fundamental economic equations we need to specify in a macro economic table the different economic accounts for the economy in its complexity. From both sectors we specify the accounts for: production, income distribution and capital investment

Tab1.

	PRODUCTION		DISTRIB. Y		INVESTMENT.		FIN. ACC	
	Droghe	Legale	Droghe	Legale	Droghe	Legale	Drogh e	Legale
PR.D.	B_{DD}	B_{DL}		C_{DL}	I_{DD}			
PR. L.	B_{LD}	B_{LL}		C_{LL}	I_{LD}	I_{LL}		
D. D.	Y_{DD}							
D. L.		Y_{LL}	Y_{DL}					
In. D.			S_D					
In. L.				S_L				
A.F.D.					L_D			
A.F.L.						L_L	F_{DL}	

From this macro-table we obtain the following relationships:

Drug sector production Account

$$1 \quad B_{DD} + B_{LD} + Y_{DD} = B_{DD} + B_{DL} + C_{DL} + I_{DD}$$

Legal sector production account

$$2 \quad B_{LL} + B_{LD} + Y_{LL} = B_{DL} + B_{LL} + C_{LL} + I_{LD} + I_{LL}$$

Income from drug sector

$$3 \quad Y_{DL} + S_D = Y_{DD}$$

Income from legal activities

$$4 \quad C_{LL} + C_{DL} + S_L = Y_{LL} + Y_{DL}$$

Account of creation of illegal capital

$$5 \quad I_{LD} + I_{DD} + L_D = S_D$$

Account for creation of legal capital

$$6 \quad I_{LL} + L_L = S_L$$

Criminal financial accumulation

$$7 \quad F_{DL} = L_D$$

legal financial accumulation

$$8 \quad 0 = L_L + F_{DL}$$

Drug sector production Account

The intermediate-goods for drug system production can be inside ((B_{DD}) or outside (B_{LD}) the sectors; both concourse to the drug sector income Y_{DD}.

The drug system can affect the legal system by the consumption of illegal goods C_{DL} , or by the appropriation of public or private production (B_{DL}), moreover a part of criminal production increases the criminal accumulation of capital (I_{DD}).

The legal sector

$$2 \quad B_{LL} + B_{LD} + Y_{LL} = B_{DL} + B_{LL} + C_{LL} + I_{LD} + I_{LL}$$

In the relationship (2) we have stressed the relation between the legal and illegal sectors.

A part of legal production is used to purchase intermediate legal production goods B_{LL} , but a part of legal production is used towards illegal sector B_{LD} , the remaining part is legal income. The legal production sources are: legal consumption (C_{LL}) and legal investment. The legal investment demand can be to the inside (I_{LL}) or to the outside (I_{LD}).

We can consider, by the (I_{LL}) aggregate, not only the classic type of public investment, but we can include the public expenditure for the repression activities. For example when the State purchases a new naval radar to contrast the illegal drug commerce in the south Mediterranean sea. The repression activities may affect the decision rules for the criminal agent; but the drug-trafficking system can demand to the legal production sector new and powerful motor-boats, and it is clear that the motor-boats demand affects the economic aggregate in the legal system (by new investment and skilled employment for example) by the (I_{LD}) aggregate.

A fundamental hypothesis is that the repression activities may affect the production and distribution rules in the drug system, but it can also be true that the criminal activities may affect the investment process in the legal sector: for example some motor-boat enterprises export their prevalent production goods from Italy to Montenegro or Albania, which are the new drug or clandestine “commerce” routes.

Income distribution

$$3 \quad Y_{DL} + S_D = Y_{DD}$$

$$4 \quad C_{LL} + C_{DL} + S_L = Y_{LL} + Y_{DL}$$

The drug income Y_{DD} can be divided into dependent labour drug income Y_{DL} and drug savings S_D .

Y_{DL} is the drug income from micro-illegal activities and it can be spent directly in the legal sector without money laundering. For example the income of the small drug-trafficking.

Savings and money laundering

$$5 \quad I_{LD} + I_{DD} + L_D = S_D$$

$$6 \quad I_{LL} + L_L = S_L$$

$$7 \quad F_{DL} = L_D$$

$$8 \quad 0 = L_L + F_{DL}$$

The first two economic relations specify that the legal saving S_L can be transformed into legal investment in the same sector. But the L_L aggregate can be negative, in this case the legal savings are lower than the legal investment in the same sector; But according to 7 and 8 relations the legal excess of savings would be equal to the excess of criminal savings (L_D). In this case we can note that a part of the saving from drug market will be used for investment in the same sector (I_{DD}), but a part of it will be invested in the legal sector after the money laundering activities (I_{LD}).

Formally the money laundering mechanisms can be analysed by the excess of financial accumulation in the legal sector (7 and 8).

The model

The model's theoretical base is the HD model. By the HD model it is possible to analyse the relations between the growth rates of two different kinds of economies. The standard HD tries to determine under which circumstances the economy is capable to obtain a steady state growth. The question posed by our model tries to evaluate the growth's stability of the economic system in its complexity when there is a sector (the drug sector) inside the economy which takes away resources for investment in the legal sector.

We have supposed that it is possible to consider the economy into two sectors: legal and drug sector, which is parasitic. The principal variable in our study is the warranted rate of growth (G_L). The rate depends not only on the propensity to save s_L and on the capital/output ratio v_L , but it is also affected on the consumption, the investment and the savings in the drug sector. In our model the relation between the two sectors determine the drug sector growth rate (G_D).

We cannot use the natural rate of growth because it is not easy to determine the dynamic of the behaviours of the employees inside the drug market conditioned by the economic conditions in the legal sector.

We assumed a closed economy and we did not consider the intermediate production goods for both sectors.

From the hypothesis we have:

$$1 \quad Y_{DD} = C_{DL} + I_{DD} + B_{DL} - B_{LD}$$

$$2 \quad Y_{LL} = C_{LL} + I_{LL} + B_{LD} - B_{DL}$$

$$3 \quad S_D = Y_{DL} + Y_{DD}$$

$$4 \quad S_L = Y_{LL} + Y_{DL} - C_{LL} - C_{DL}$$

$$5 \quad I_{LL} + I_{LD} + I_{DD} = S_L + S_D$$

We can note that we do not have a linearly independent equation so we need to assume more relations. The new hypotheses are:

$$\begin{aligned}
6 \quad & Y_{DL} = (1 - s_D)Y_{DD} \\
7 \quad & C_{LL} = c_{LL}Y_{LL} \\
8 \quad & C_{DL} = c_{DL}Y_{LL} \\
9 \quad & I_{LL} = v_{LL}\Delta Y_{LL} \\
10 \quad & I_{DD} = v_{DD}\Delta Y_{DD} \\
11 \quad & I_{LD} = v_{LD}\Delta Y_{DD} \\
12 \quad & B_{LD} = \beta_{LD}Y_{DD} \\
13 \quad & B_{DL} = \beta_{DL}Y_{LL}
\end{aligned}$$

$$0 < c_{LL} < 1; \quad 0 < c_{DD} < 1; \quad v_{LL} = \frac{K_{LL}}{Y_{LL}}; \quad v_{DD} = \frac{K_{DD}}{Y_{DD}}; \quad v_{LD} = \frac{K_{DD}}{Y_{LL}}$$

In equation 6 the illegal income Y_{DL} , directly used inside the legal sector, is a part $(1 - s_D)$ of the income derived from drug market activities Y_{DD} .

By 7 and 8 we assume that both legal and drug consumption depend on the legal income. The hypothesis is that the drug consumption takes away the demand for “traditional” goods in the legal sector.

In 9, 10 and 11 the investment accelerator is the investment transmission mechanism for both sectors; where v_{LL} is the capital/output ratio; the other two (v_{DD} e v_{LD}) are the capital/output inside the drug market and the illegal capital requirement for a unit of legal output, i.e. in this last case we want to stress the incidence of demand from the illegal sector for legal goods, for example the demand for motor-boat used for import (or export) of drugs. The criminal investment inside the drug sector (10) is a function of the capital/output ratio and also of the growth rate of drug income.

By 11 we assume that if the drug sector would like increases itself at a desired rate of growth it must purchase legal production goods in accord with the v_{LD} .

By 12 we assume that the legal intermediate goods need to producing illegal and 13 we assume that the legal and illegal production intermediate goods are a proportion of drug income β_{LD} and legal income β_{DL} respectively.

If we substitute 8, 10, 12 and 13 inside 1:

$$14 \quad Y_{DD} = c_{DL}Y_{LL} + v_{DD}\Delta Y_{DD} + \beta_{DL}Y_{LL} - \beta_{LD}Y_{DD}$$

or:

$$14' \quad (1 + \beta_{LD})Y_{DD} = v_{DD}\Delta Y_{DD} + (c_{DL} + \beta_{DL})Y_{LL}$$

The drug income Y_{DD} is positively related to the criminal demand of goods and services (drug, public expenditure etc.), but the impact of the demand is decreasing with the quantity of intermediate goods and services purchased by the drug production sector from the legal sector.

If we substitute 7,9, 11, 12 and 13 inside 2:

$$15 \quad Y_{LL} = c_{DL}Y_{LL} + v_{LL}\Delta Y_{LL} + v_{LD}\Delta Y_{DD} + \beta_{LD}Y_{DD} - \beta_{DL}Y_{LL}$$

$$15' \quad (1 - c_{DL} + \beta_{DL})Y_{LL} = v_{LL}\Delta Y_{LL} + v_{LD}\Delta Y_{DD} + \beta_{DC}Y_{DD}$$

The legal sector rate of growth depends on the dynamic of the legal aggregates but also on the criminal investment and on the criminal demand of goods and services.

By 5 we obtain:

$$S_D - I_{LD} - I_{DD} = I_{LL} - S_L$$

then from 3, 4, 6, 9, 10 and 11 in 5,:

$$16 \quad v_{LD} \Delta Y_{DD} + v_{DD} \Delta Y_{DD} + v_{LL} \Delta Y_{LL} = (1 - c_{DL} - c_{LL}) Y_{LL} + Y_{DD}$$

This relation is the sum of 14' and 15' that can be changed in:

$$14'' \quad \frac{\Delta Y_{DD}}{Y_{DD}} = G_D = \frac{(1 + \beta_{LD})}{v_{DD}} - \frac{(c_{DL} + \beta_{DL})}{v_{DD}} * \frac{Y_{DD}}{Y_{LL}}$$

$$15'' \quad \frac{\Delta Y_{LL}}{Y_{LL}} = G_L = \frac{(1 + \beta_{LD} - c_{LL})}{v_{LL}} - \left[\frac{v_{LD}}{v_{LL}} * G_D + \frac{\beta_{LD}}{v_{LL}} \right] * \frac{Y_{DD}}{Y_{LL}}$$

We assumed that:

$$\frac{Y_{DD}}{Y_{LL}} = q; \quad \frac{1 + \beta_{LD}}{v_{DD}} = \sigma_D; \quad \frac{c_{DL} + \beta_{DL}}{v_{DD}} = \delta_{DL}$$

and:

$$\frac{1 - c_{DL} - c_{LL}}{v_{LL}} = \sigma_L; \quad \frac{1 + \beta_{DL} - c_{LL}}{v_{LL}} = \frac{1 + \beta_{DL} - c_{LL} + c_{DL} - c_{DL}}{v_{LL}} = \sigma_L + \delta_{DL} * \frac{v_{DD}}{v_{LL}}$$

We define:

$$\frac{v_{LD} + v_{DD}}{v_{LL}} = \tau$$

Then:

$$14''' \quad G_D = \sigma_D - \delta_{DL} q^{-1}$$

$$15''' \quad G_L = \sigma_L + \delta_{DL} \tau - \left(\sigma_D \tau - \frac{1}{v_{LL}} \right) q$$

Equation 14''' and 15''' permit to study the relation between the dynamic of growth between the two sectors.

We can graph these equations:

$$\frac{q^*}{q} = \Delta \frac{Y_{DD}^*}{Y_{DD}} - \Delta \frac{Y_{LL}^*}{Y_{LL}} = G_D - G_L$$

The 45° straight line in the III quadrant represents the combinations in which $G_D - G_L = 0$ and so it shows the growth path when $\frac{q^*}{q} = 0$; if $\frac{q^*}{q} < 0$ the point is to the right from the line with $G_D < G_L$, if $\frac{q^*}{q} > 0$ then $G_D > G_L$ and we are to the left. In our example the system has $G_D < G_L$.

When we change parametrically the q value, we obtain pair values for G_D and G_L . At the E point we have the combination between the drug and legal growth rates. E point is the projection of the value for G_D from II quadrant on the III quadrant.

The relation between growth rates is represented by the HH' curve on the III quadrant. From E point if the q ratio tends to decline the legal growth rate rises, the drug ratio decreases and finally the q ratio decreasing more, the system is not stable and goes to H' where there is no growth ratio.

At this point we have the tools for the study of the relation between drug and legal growth rates.

In this case we study the effects on G_D and on G_L if there is an increase in drug consumption.

Changes in drug consumption

The central point is that a part of the accumulated income from the drug sector is assigned to purchasing luxury goods and also to investing in the legal sector. In this section we study the effect of increased marginal propensity on consumption of drug goods c_{DL} .

According to the H-D. hypothesis, in this situation both sectors are in an explosive growth phase. The increased drug consumption by the c_{DL} cause the increase of income in the drug sector, if the increase is stark the illegal capital flow causes an excess of income inside the sector. The sector must apply money laundering to hide the excess money. In the legal sector we have an inflation phase. In fact in the legal sector the increased drug demand causes a reduction of savings and the flow of liquidity from the criminal sector causes also an excess of financial investment to hide the illegal income.

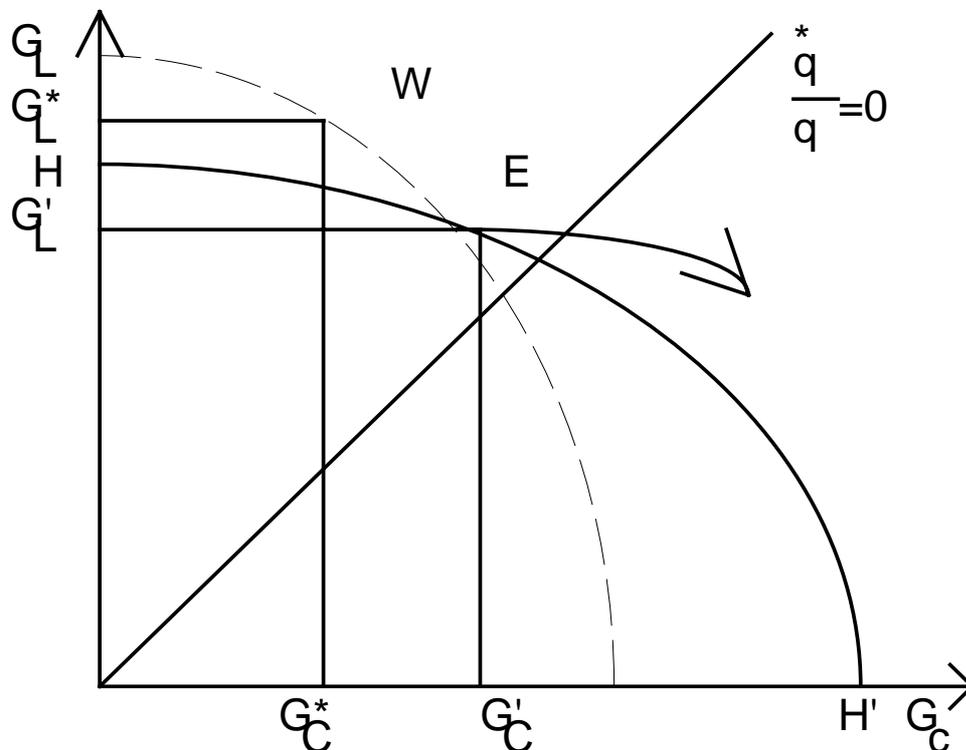
In conclusion by the increase of the drug consumption the capital appropriation of the drug sector from the legal sector increases the financial investment in the legal sector and this phenomena is registered by the legal growth rate, but in the second period when the capital is important to sustain the productivity investments, the criminal sector operates to take away savings and to export capital in more remunerative financial investment. The system is in an explosive phase and the drug sector growth rate is greater than the legal sector.

The increase of the criminal appropriation inside the legal sector.

In this step we analyse the criminal appropriation of the public expenditure or legal productive resources (Bdl).

In this case the increase of Bdl produce a shift in AA' to the right and an upward shift of the G_C (the curve in the second quadrant). In the equilibrium the legal sector must growth faster than criminal sector.

We can assume that the E point is the warranted equilibrium point and W is the effective equilibrium.



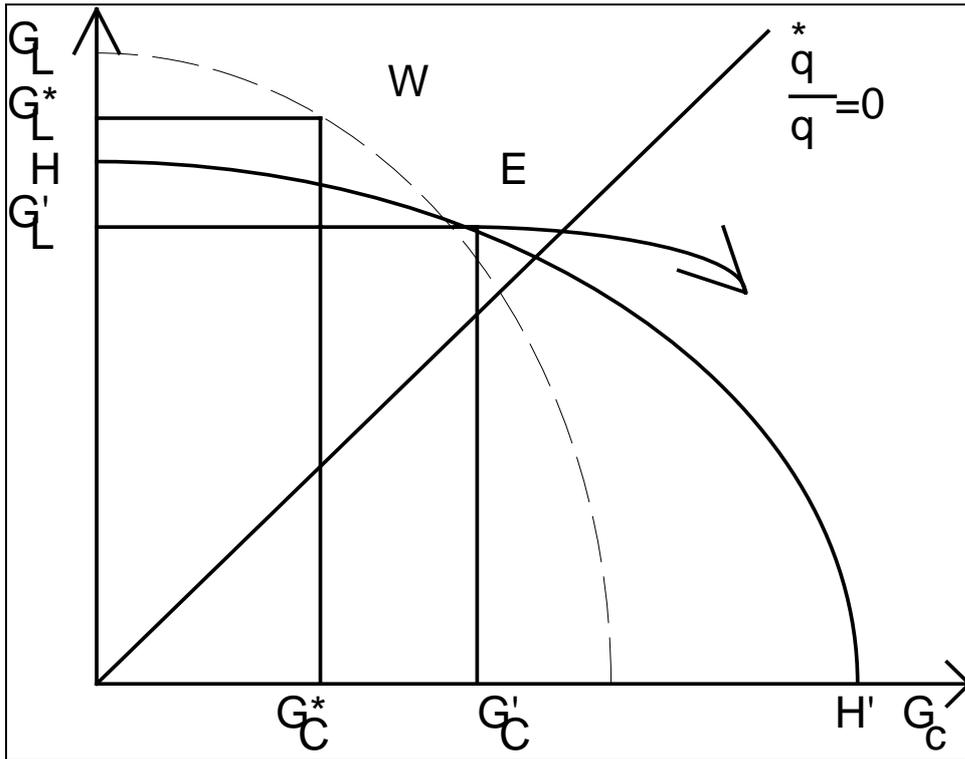
In this case the G_d is higher than G_l , and the illicit effective growth rate is higher than the warranted illicit growth, while the warranted legal rate is higher than effective growth rate. In this condition the increased Bdl causes a decreasing investment in the legal sector, because

the criminal activity takes away resources for the production, and in the same period the legal operators have no incentives to the investment activity. The growth in the criminal sector is increasing. In conclusion we can obtain an explosion phase in the criminal sector and depression in the legal sector.

The next step is the analysis of modification in the capital/output ratio

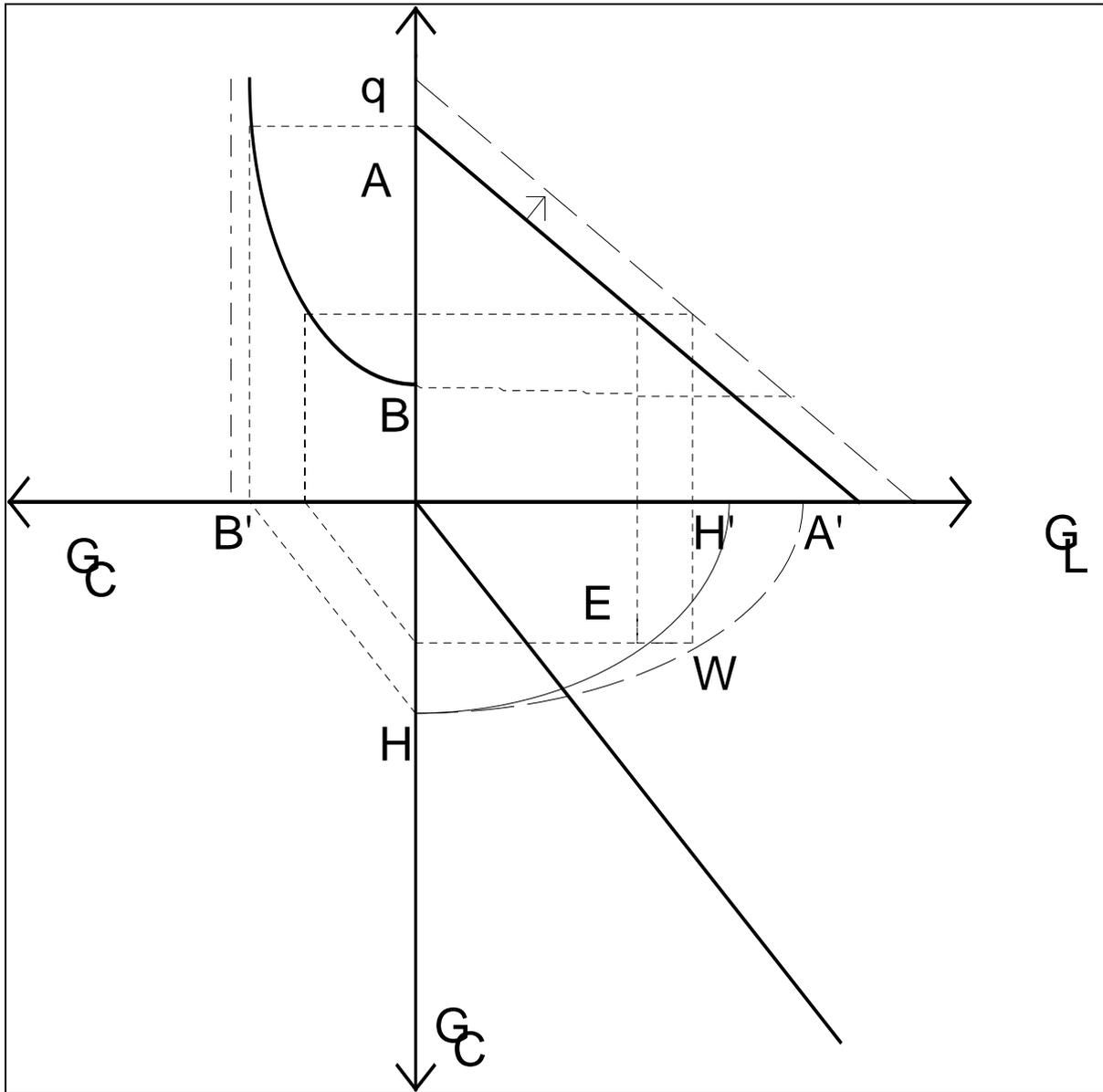
In this case we analyse the effects on the legal system of the increase of drug production activities.

In this case we have an effect on G_d and on the criminal activities δ_{dl} . In equilibrium the increased investments cause an increase on v_{dd} , therefore σ is decreasing. The same variation causes a different effect on the legal growth rate. In fact if it is true that the criminal demand of investment inside the drug sector increases the global demand of investment τ , the decreased δ_{dl} and σ contract the legal growth rates. We can suppose that the effect on the investments is broader than the others. In equilibrium we have a shift to the right of the AA' we have a new equilibrium point where the legal rate is greater than drug rate of growth.

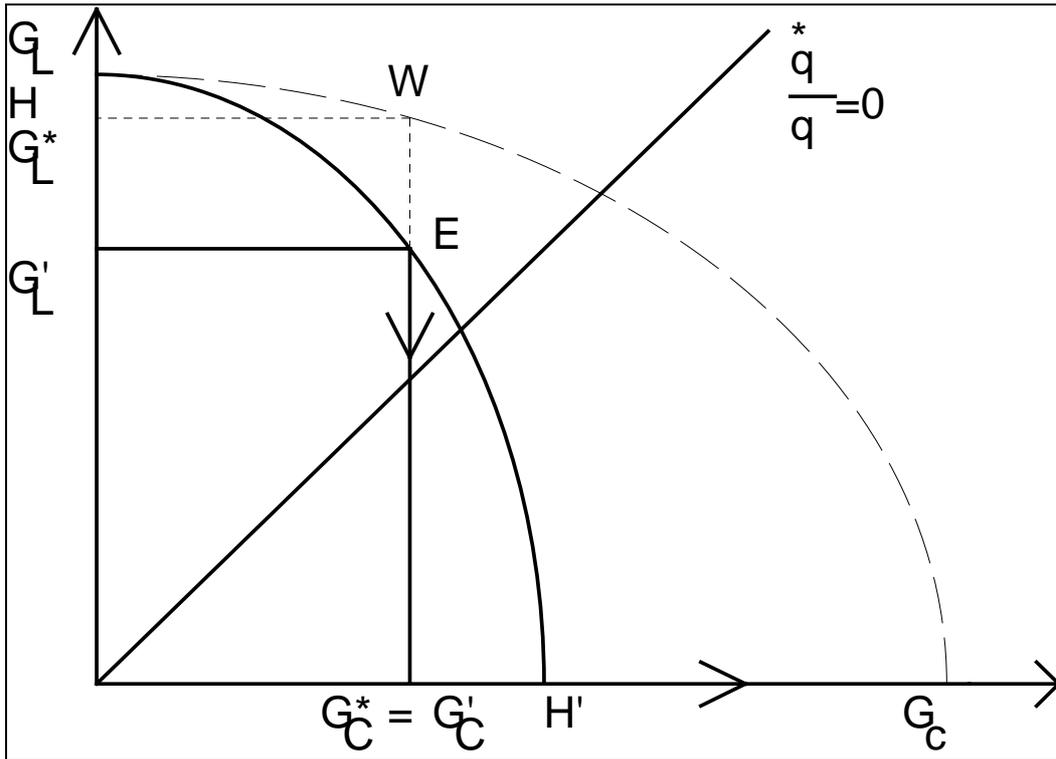


The W point is the warranted rate of growth of both sector. In this situation the warranted g_d is smaller than its own effective. In the legal system the warranted is greater than effective. In this situation the legal system is in decreasing phase and the drug system is increasing.

In the next step we assume that the drug sector invests directly on the legal sector, this investment increases the capital/output ratio v_{lc} .



The increased capital/output ratio has a positive effect on the global demand of investment τ . In this case we have a increased legal growth ratio with the same drug growth ratio.



If the warranted rate of growth is in W point and the effective rate of growth is in E point we have a decreasing phase in the legal sector. In fact the warranted rate is greater than the effective, the more investment in the legal sector from drug sector are not enough to sustain the legal demand.

The increased legal investment inside the same sector has different effect on the system.

Dynamics and Control of Illicit Drug Consumption: Past, Actual, and Future Research Work from the “Vienna Group”, Gernot Tragler⁴⁰

Abstract

This presentation focuses on *dynamic models* of illicit drug consumption that have been, actually are, or will be analysed in the near future by the members of the *Department of Operations Research and Systems Theory* at the *Vienna University of Technology* and their colleagues at different institutions all over the world. Past work has mainly concentrated on the current U.S. cocaine epidemic, for which both *descriptive* and *normative* (in particular, so-called *optimal control*) models have been developed and analysed. Actual work continues this stream of research, but has also started to involve *age-specific* aspects of drug epidemics. Future work aims at validating existing models with *European data* and developing/analysing models of *European-specific problems* of drug use. One of these problems is to investigate the interrelation between supply, demand, and prices. In all models, special emphasis is placed on the *dynamics* of drug use as well as on the *inter-temporal cost-effectiveness* of drug control interventions.

NB: The paper of this communication was not submitted for inclusion in the Proceedings of this expert meeting.

⁴⁰ Institute of Econometrics, Operations Research and Systems Theory
Vienna University of Technology
Argentinierstrasse 8/1192
1040 Vienna (Austria)
E-mail: tragler@e119ws1.tuwien.ac.at