THE LONG TERM DEVELOPMENT OF CRIMINAL OFFENSES IN THE FEDERAL REPUBLIC OF GERMANY, 1985 - 2030

by
Ulrich C. H. Blum
and
Thomas Feltes

ABSTRACT

Based on a disaggregate Monte Carlo simulation model, we will compute paths of long term development of criminal offenses in the Federal Republic of Germany until the year 2030 based upon hypotheses on the long term development of crime. The use of this approach permits us to relate probabilities to different outcomes of the forecasts.

INTRODUCTION

The use of Monte-Carlo methods have proven very successful in the simulation of future population development paths (PFLAUMER, 1968; BLUM, 1987), as it permits one to associate probabilities with certain simulation outcomes and to include very complex probability distributions.

In this paper we extend this approach by adding a model component describing the number of criminal offenses as a function of disaggregate population data to the population model. Using two sets of alternative assumptions on the probable long term development of certain crimes we derive results which show the impact of the changing demographic structure and the decline of total population on crimes and suspects in Germany.

EMPIRICAL AND THEORETICAL CONSIDERATIONS

The data base

In order to exploit fully the underlying population component of the model, data on criminal offenses had to be available in a disaggregate form differentiating between age groups, sex and German and other nationalities.

About 68,000 criminal offenses in 1985 were committed by foreigners not permanently living in Germany or by members of the allied forces; these were subtracted from the respective total and not included in the forecasts.

Furthermore it should be noted that, even though the offense rate has been corrected as mentioned above to exclude certain categories of foreigners, it will still remain higher than the respective rates of the German population owing to the high number of criminal charges which can only be laid against foreigners (for instance for violation asylum or immigration laws).

The data used was taken from the official police crime statistics which contain the number of suspects booked. It may be argued that the resulting values will considerably differ from the number of convicted persons. Moreover, further difficulties lie in a certain diffusion of offenders over time within the legal process (FELTES, 1987), which is related to the overloading of courts or the behavior of judges or prosecutors, and results in many different outcomes (convictions, out of court settlements, dismissals). Thus we considered the number of booked offenders as more representative for criminal activity, even if this includes not-guilty suspects. However, it should be known that in many areas criminal offenses are not (or not totally) brought to the notice of the legal system. A considerable variation between the real and the known number offenses and suspects may thus be assumed, with large variations among different types of crimes; nor is the relation between the size of this grey zone and criminal activity precisely known. In the U.S., for instance, an increase of registered offenses was paralleled by a decline in real offenses; and this may also be true in the German context. We thus may conclude that the forecasts are credible so long as there is no sharp change in the ratio of real to registered number of criminal offenses.

The theory of the stability of deviant behavior and punishment

The theory of the "stability of punishment" posits that in the long run the share of deviant behavior is fairly stable for a given social system (BLUMSTEIN, COHEN, 1973; TREMBLAY, 1986). Thus, changes in the numbers of offenses may be mostly the result from redefinitions of criminal offenses, different propensities of notifying the police, etc..

In the German context, this theory of stability may be supported by the observed saturation of police intervention, which implies a stable or even decreasing rate of notifications to the police since 1980. From this we follow that our simulation approach can be justified.

Criminal activity and substitution of offenses

There is evidence of a substitutional relationship between different types of criminal offenses: that is, increased security and protective measures taken in one area (for instance, against theft) may result in more crime in other areas both spatially and criminally available. For instance, robbery, fraud or damages of property may increase after break and enter crimes are prevented by sophisticated security systems; or those crimes are diverted to less protected areas where lower income people live. Additionally, crime rates may be subject to societal and economic change: the increasing rates of economic ("white collar") crime (fraud, corporate crime) or drug abuse are prominent examples.

Thus, it seems necessary first to define a simulation process based on the constancy of present criminal activity and, as an alternative, to define a simulation process which varies in the number of offenses induced by changes in technology, in the sectoral structure of the economy and employment as well as by saturation processes.

THE SIMULATION MODEL

The population component

In the population component, total population in Germany is differentiated according to sex and ethnic groups (German, Turks as predominant foreign group, and other foreigners), a break-down justified on grounds of distinctly different reproductive patterns.

Using age specific survival rates (transition probabilities), the forecasting for the next consecutive period is performed. The number of male and female births of each group is computed by multiplying vectors of age specific fertilitities of each group with the vector of female population and splitting the result according to the sex proportionality factor.

The resulting component model may be written in matrix form. In distinguishing among different ethnic groups, the model based on annual values and annual forecasts, may be called disaggregate. This contrasts, for instance, with the model presented by PFLAUMER (1986), which consists of only one population group and summarizes groups of five years of age.

Probability was included in our model using a routine which generates normally distributed random numbers, with a zero mean and a given variance to which the fertility rates were subjected.

The crime component

Each simulation of the crime component was based on the results of a population simulation, i.e. sets of six normally distributed random vectors (three groups, two sexes) with 101 components (due to the disaggregation from age 0 to age 100 in the model). We used data on the number of criminal offenders, broken down into 13 different types of offenses according to sex, German or foreign population, and age (seven age groups: 0-13, 14-17, 18-20, 21-24, 25-29, 30-60, 60-100); and, assuming a normally distributed variation of criminal activity (using Monte-Carlo techniques), development paths for different offenses were computed based on the results produced by the population model.

The data

In the population model, the following data were used:

(1) Population in Germany, divided by age, sex and ethnic group; given the availability of data in these categories, 1981 data were used and projected to 1985 using existing data on births and mortalities.

(2) Age specific fertility rates of the ethnic groups in Germany; we took 1981 rates for the German population and 1985 rates for all foreign groups (2).

(3) Survivorship rates; they were taken from the 1970-72 census.

(4) Crime data; these were available in the following subdivisions:- total number offenses committed by age group of the defendant and the type of offense;- total number of male and female offenders;- total number of German and foreign offenders. Using this data, a table of criminal offenses distinguishing between sex, membership in the German group or the group of foreigners, and age groups was computed.

We assumed that each available subdivision was also representative of the two other categories where it was not explicitly given.

Additional assumptions on the simulations

Each simulation was based on 200 runs evaluating all years from 1985 to 2030. The variation of birth rates was considered to be 20% in each age group and ethnic subdivision with the following reasoning: With a present net reproduction rate of 0.65(3) a variation of 20% about covers an interval from 0.5 to 0.8. The former value is considered to be lower bound —at least one child per woman— the latter represents the average German net reproduction rate of the last 20 years.

The variation of suspect rates(4) was assumed to be 10%. After calculating a first scenario solely based on these assumptions, a second scenario was developed extended by variations of some suspect categories due to reasoning given in the second chapter:

Table 1: Changes of suspect rates in simulation 2

Type offense	Period of Change	Annual Change	Compounded Change
Simple theft	1985 - 2000	- 1 %	-14 %
Severe theft	1985 - 2000	- 2 %	- 26 %
Fraud	1985 - 2030	+ 1 %	+ 57 %
Econ. Crime	1985 - 2030	+ 2 %	+ 244 %
Property Damage	1985 - 2030	+ 1 %	+ 57 %
Drug abuse	1985 - 2000	+ 1 %	+ 16 %

The reason for the decrease of the first two categories and an increase of the next two may be found in the well known improvements in security and protective measures; the limitation seems reasonable considering that the underlying technological changes will have entered the markets by the year 2000. The limitation of the increase in drug abuse may be justified on grounds of a saturation process.

RESULTS OF THE SIMULATIONS

Population development

Figure 1 shows that total population in the year 2030 will amount to about 42 million people. The distribution resulting from a variation of birth rates of 20% is slightly unsymetrical and shows some distinct peaks resulting from the overlay of different population groups. The small span of 0.5 million people and a variance of only 90 000 people give ample evidence of the stability of the demographic process.

Development of registered suspects

The results shown in table 2 give evidence that the decline in the number of registered suspects of 40% in scenario 1 (and 34% in scenario 2) will be much larger than the decline of total population over the period of 45 years, which will amount to 30%. It is the changing age structure paralleling the population decline which leads to this result as the number of juveniles and young adults (age 14 to 25) decreases much faster (by 54%) than the number of people who are 26 years or older (by 21%). A third strong reduction occurs over the last fifteen years as the baby boomers of the sixties go into retirement and thus join a group with a very low level of criminal activity.

The next fifteen years

The reduction of total population of 6% will be exceeded by the decline of the number of registered suspects of 16%; and even the number of registered suspects per 100,000 inhabitants will fall by 12% as a result of the rapidly changing age structure. From long term cohort surveys we know that the criminal careers of teenagers and young adults break off—in most cases between the age of 25 and the age of 35— and we can be rather sure that this group will not take its

former criminal behavior into adult life. Beyond that we know that this breaking off is rather independent from the sanctioning mechanisms society offers.

If we consider reductions in certain suspect categories as included in scenario 2 due to the better securing of property, the number of suspects per 100,000 inhabitants will still fall by 15%. This effect of the special German age structure will be even more striking in certain categories: the decline will be 28% for robbery and extortion by means of threats, 28% for theft under aggravating circumstances, 20% for dangerous bodily injury and 31% for drug offenses; even if an increase in the suspect rates is assumed in this last category, the reduction will still be 19%.

The long term prospect

In a long term perspective covering the period until the year 2030, we will not only find a considerable decline in the number of suspects—this decline will be especially strong in the years after 2015 due to the beginning of retirement of the baby boomer of the sixties—but also large differences between the categories of offenses: rape, theft under aggravating circumstances and drug offenses will go down by one third or half of their present value or even more if a reduction in the respective offense rates are assumed in scenario 2. The decline of theft without aggravating circumstances will be smaller; suspects in this category are already nowadays to be found quite often among elderly people committing shoplifting.

Even if we assume a rise of offense rates concerning fraud, property damages, violation of laws concerning the economic field and drugs over the next 45 years, their effect on absolute numbers will be largely offset by the changing age structure and population decline in both scenarios.

The evaluation of the stochastic results

Table 3 and figures 2 and 3 summarize the results found. Generally speaking, we see from table 3 that the standard deviations of all categories of offenses are very small with respect to the underlying variation of birth rates by 20% and crime rates by 10% and we conclude that the process as modelled here is very stable. Figures 2 and 3 show that total numbers of suspects have several peaks due to the aggregation from different categories again based on different population groups. The span between maximum and minimum values as well as the standard deviation increases from

scenario 1 to scenario 2 because the latter assumes a more polarized development between different suspect categories.

CONCLUSION

Generally speaking, the absolute number of suspects in Germany will decline considerably over the next 45 years and a large part of the reduction will already be felt in the next 15 years.

These changes will have a strong impact on the judicial system and the police: The courts, prosecutors and police will be confronted with fewer cases, which, however, might become more difficult to handle and to solve due to an increase in white collar crimes, especially fraud and offenses against laws governing the economic field. The problem of overburdened courts will be replaced by the question of how to reallocate free personal resources — a problem already beginning to be felt in Germany. Police will have to live with the phenomenon already being seen since the beginning of the eighties that an ever decreasing number of citizens calls for their help or reports offenses. However, we can be rather sure that the decline in crime will not draw the same public attention as its increase in the past 30 years.

TABLE 2: ESTIMATION OF REGISTERED SUSPECTS, 1985-2030

TYPE	SCENARIO 1				SCENARIO 2		
	1985	2000	2015	2030	2000	2015	2030
	(1000 SUSPECTS)				(1000 SUSPECTS)		
MURDER AND MANSLAUGHTER	3	2	2	2			
RAPE	4	3	3	2			
ROBBERY AND EXTORTION BY MEANS OF THREATS	18	13	13	9			

CHANGE (%) TO PREVIOUS PERIOD		-16	-8	-23	-17	-2	-19
TOTAL POPULATION (MILLION)	60.5	56.9	50.0	42.1	56.9	50.0	42.1
CHANGE (%) TO PREVIOUS PERIOD OFFENDERS		-6	-12	-16	-6	-12	-16

TABLE 3: STATISTICAL PROPERTIES OF THE DISTRIBUTION OF NUMBER OF SUSPECTS, 2030

TYPE	SCENARIO 1			SCENARIO 2		
MEAN	MEAN	MODAL	ST. DEV.	MEAN	MODAL	ST. DEV.
MURDER MANSLAUGHTER	1,703	1,720	63			
RAPE	2,300	2,240	90			
ROBBERY AND EXTORTION BY MEANS OF THREATS	9,221	2,240	281			
DANGEROUS AND GRIEVOUS BODILY INJURY	37,228	36,380	1,192			

SLIGHT BODILY INJURY	60,243	58,600	2,361			
THEFT WITHOUT AGGRAVATING CIRCUMSTANCES	279,266	277,400	7,246	237,783	233,300	6,170
THEFT UNDER AGGRAVIATING CIRCUMSTANCES	58,784	57,520	1,846	42,547	41,560	1,336
FRAUD, EMBEZZLEMENT, FORGERY	158,196	161,900	6,759	250,022	242,000	10,680
RESISTING A PUBLIC OFFICER, FELONIES AGAINST PUBLIC ORDER	35,131	35,400	1,327			
INSULT ASSAULT AND BATTERY	36,655	35,400	1,562			
DAMAGE OF PROPERTY	43,999	43,680	1,473	69,539	69,560	2,328
VIOLATION OF LAWS IN THE ECONOMIC FIELD	8,451	8,160	497	21,014	20,360	1,236
DRUG OFFENSES	22,955	22,680	699	26,916	26,460	820
TOTAL OFFENDERS	754,132	756,500	10,520	830,303	829,400	12,860

About the Author(s):

Ulrich Blum (born 1953), Research Assistant and Professor at the Universities of Karlsruhe and Montreal, Habilitation in economics (1986), Ph.D. in economics (1982), Diploma in industrial engineering (1979). August Losch Award for outstanding contributions to regional science (1982), Alexander v. Humboldt Scholar (1986/87). Publications in economics, regional science, transporation science, public finance, and demography.

Thomas Feltes (born 1951), Research Assistant and Professor at Universities of Bielfeld, Hamburg, Heidelberg and Montreal, Ph. D. in law (1979), both state degrees in law (1976, 1981), M.A. in paedagogigs (1978). Government of Canada Award Holder (1986/87). Publications on juvenile law, criminology, police.

The authors are indebted to the Alexander von Humboldt Foundation for the support of this work during Blum's tenure as Alexander von Humboldet Research Scholar at the Universite de Montreal and to the World University service of Canada for the fellowship grant during Feltes' tenure as Government of Canada Award Holder.

REFERENCES

Blum, U. (1985), Prognoserechnungen zur Veranderung von Grobe und Struktur der Bevolkerung in der Bundesrepublik Deutschland, 1981 - 2081, Institut fur Wirtschaftspolitik und Wirtschaftsforschung, Karlsruhe.

Blum, U. (1987), Forecasting German Population Development with Monte Carlo Methods: Further Evidence Based on a disaggregate Model, Institut fur Wirtschaftspolitik und Wirtschaftsforschung, Universitat Karlsruhe, Discussion Paper 1/87, Departement de sciences economiques cahier

Blumstein, A. and J. Cohen (1973), A Theory of the Stability of Punishemnt, J. Crim. Law Criminol. 64, 198-207.

Feltes, T., (1987), The Development of Sentencing, Sanctioning and imprisonment in the Federal Republic of Germany and the Theory of the Stability of Punishment, Centre international de criminologie comparee, Universite de Montreal, Montreal, forthcoming.

Pflaumer, P. (1986), Forecasting German Population with Monte Carlo Methods, Economics Letters 21, 385-390.

Tremblay, P. (1986), The Stability of Punishment: a Follow-up of Blumstein's Hypothesis, Journal of Quantitative Criminology 2, 157-180.