

***On the Economic Analysis of Costs and Benefits
of Crime Prevention***

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Report for the 20th German Congress on Crime Prevention: On the Economic Analysis of Costs and Benefits of Prevention¹

1. Introduction

The report on the economic analysis of costs and benefits of prevention should initiate and motivate the discussion about these issues at the *20th German Congress on Crime Prevention*. Although economics and economic aspects have been part of the scientific analysis of crime prevention in the international community and literature for a long time, this is a new – and to some extent – unfamiliar perspective in Germany. The choice of the topic is, however, not really a surprise given the development and evolution of the congress over the two decades of its existence.

While in the 1990s, the focus of the annual congresses lay on the initial and basic sensitization and information about crime prevention by offering a forum for exchange of experiences, ideas and practices, around the turn of the century the scope of topics moved to questions of crime prevention for the society as a whole. With varying emphases, topics in crime prevention at the municipal level (e.g. 1995, 1996, 1998, 2004), in prevention of violence in sports (e.g. 2000, 2006), in prevention of crime against immigrants (e.g. 2003, 2009) and frequently and regularly on the protection of children and youth (e.g. 2005, 2007, 2010) were at the center of the congresses over the years. Besides the intensive discussion and elaboration of these subject matters, the congress started already in its early years to systematically collect and provide data, evidence and information on many aspects of crime prevention. Starting with the approaches on the documentation of results and experiences in 1997, already in 2001 the report of the congress at Dusseldorf set out the principles of evaluation of crime prevention. At the same time further sources of information were presented.

The choice of the topic in 2015 has to be seen in this tradition: The economic analysis of prevention, i.e. in particular the elaboration of their impacts and benefits while taking account of the associated costs, should contribute to the understanding of effective and efficient prevention, but will also be helpful for its reasoning. Of course, the economic discussion and analysis is not detached from the experience and knowledge of the diverse, directly and indirectly contributing actors to the field of crime prevention and their specialized disciplines. It should rather be seen as a valuable addition.

The report therefore aims to give an idea of the possible contribution of economic analysis of crime prevention and provides an overview. By doing so, it should mo-

¹ Short version of the report “*Kosten und Nutzen von Prävention in der ökonomischen Analyse*“ (in German), prepared for the 20th German Congress on Crime Prevention, Frankfurt/Main.

tivate the discussion and an intensified interdisciplinary dialogue about approaches, practices and theories and make them understandable across disciplinary languages. This may thus enable an informed discourse involving all interested actors.

2. Economics of Crime

Why should economics study (crime) prevention? As a first reason, crime leads to considerable economic losses for the individual and the society as a whole. Examples include the tangible and intangible losses of crime victims, the public and private expenditure for prevention, or the public spending for police, judiciary, penitentiary, and probation assistance. The choice of the relevant means for optimal prevention and combating of crime is therefore a traditional economic allocation problem: scarce public (and to some extent private) resources have to be allocated to enable the most efficient possible use.

Already in the 1960s, the economist and later Nobel laureate Gary Becker began with the transfer of economic principles of rational choice theory to the area of crime. It was not his primary goal to develop a theory of criminal behavior, but he was interested to answer the question of minimizing social harm resulting from crime. To achieve this purpose, the government has to choose about the intensity of sanctions and threatening or deterrence instruments under consideration of the available resources (and the other public commitments).

The determination of the optimal level of prevention is then carried out based on a mathematically formulated social loss function. It shows that by optimal choice of the deterrence parameters, i.e. in particular probability of getting arrested or convicted and the expected strengths of the penalty, social damage can be minimized efficiently. Efficient so, because crime prevention not only reduces the damage, but also incurs costs.

Minimizing the social loss function denotes the optimal level of acceptable social loss due to crime or – vice versa – the tolerable level of crime in society taking into account the possible avoidance costs. In short, because the social loss function is defined upon the social preferences, it defines the socially tolerable levels of crime. Conversely, it means that the benefit of approved criminal offenses and crimes equal the saving of costs that would have to be spent for effective prevention and deterrence.

The high content of persuasion but also the restrictive assumptions of the theoretical model and its extensions have led to a large number of empirical studies trying to quantify and validate or invalidate the assumed and derived relationships and their implications. Nevertheless, the economic model of crime clarifies that crime is a “normal” social phenomenon. Its complete elimination should be sought neither to be possible nor affordable by the state.

Since the model is formulated in very general fashion, the determination of the opportunity cost in accordance with the respective social welfare function remains an empirical question. The empirical quantification of the related figures has become a major topic of empirical economic research. Economic and in particular econometric methods are suitable for studying and identifying causal dependencies: conditional on the available data the statistical-mathematical formulation and estimation allows to obtaining exact and interpretable quantitative effects. These are usually unambiguous in their direction and magnitude given the underlying model and precision of the estimation. The economic mindset – expressed in the theoretical, statistical and mathematical tools – is therefore particularly suitable to model and analyze the relationships between crime and the economy.

3. Reasons for Cost-Benefit- and Cost-Effectiveness-Analyses

In 2013, there were almost 2.4 million robberies conducted in Germany according to the police crime statistics (Federal Ministry of the Interior, 2014). In the same year, nearly 47,000 cases of crimes against sexual self-determination were registered. The number of the reported murders and homicides was 2,122 in 2013.

What is the level of damage of these offenses to society? And is the damage caused by murder and manslaughter greater than the damage caused by the thefts? How much should the state spend to curb crime? Do investments in early childhood education have a greater preventive effect on crime prevention than investments and expenditures for the correctional? Should offenses than be convicted by fines more often and not by imprisonment?

An objective answer to these questions can only be given when all costs or benefit-cost relations of the action of interest and the alternative use of the available resources would be compared in a single unit. For this assessment, economics has developed the methods of cost-benefit analysis and cost-effectiveness analysis. If they are carefully conducted, their use and results can contribute to a more objective and evidence-based practice in the design of policy and the societal debate about crime prevention.

Especially in the Anglo-Saxon world, cost-effectiveness analysis and cost-benefit analysis have been used to evaluate public interventions and programs for many decades. The basic reasoning for their use is quite simple: any government intervention leads to changes in the behavior of the (economic) actors and, thus, has a direct impact on the present and especially the future prosperity and wealth of a nation. In face of scarce public resources, these should be distributed in the most efficient manner to the various alternatives of public spending (and public priorities). These alternatives include all imaginable (and sensible) policy interventions that have a welfare-enhancing effect.

Since the mid-1990s, cost-benefit analysis and cost-effectiveness analysis have been conducted for the evaluation of judicial measures, but have also been used for the evalu-

ation of prevention in the Anglo-Saxon countries, in particular in the United States and the UK. In contrast, comparable analysis or even the basics of an “evaluation culture” are almost non-existent in Germany up to date. With the only exception of individual teams of researchers who have studied selected questions of the economics of crime in the past 15 years, there is lack of both the systematic analysis but also a continuous economic dialogue in criminology and prevention. This is not only surprising but appears to be a serious omission, as economic considerations can contribute to an objectified discussion on the use and allocation of limited public (and private) resources.

Why should the damage of crime or its prevention be economically measured, i.e. in monetary units? Economists, however, cannot be surprised by this question. The major subject of economics is the allocation or efficient distribution of scarce available resources to the needs of society. To ground the associated decisions on a well-informed basis, the conversion of the costs and benefits of public as well as private interventions into a single dimension provides a sensible means for comparison. Moreover, in order to enable the comparison across different fields of action, monetary values contain a further important advantage.

They allow, firstly, for comparison of the relative harm or suffering of the individual, and secondly, for comparison of the aggregate loss or the aggregate suffering of the society as a whole due to crime with those of other social evils. Thirdly, monetary values are a necessary precondition for the implementation of cost-benefit analyses for consideration of alternative preventive interventions. The economic instruments thus represent an approach to make the advantages and disadvantages of certain programs or interventions comparable with alternative uses (including the option to do nothing).

4. Cost-Benefit- and Cost-Effectiveness-Analyses: Aspects of Implementation

Although there are a number of different approaches available to the economic evaluation of interventions and activities, cost-benefit analysis and cost-effectiveness analysis have become the most common methods. The main difference between the two approaches is that cost-effectiveness analysis considers only the cost of the activity in monetary values but not its impact. The cost-benefit analysis, in addition, evaluates also the effects (i.e. the benefits) of the program or intervention in monetary values.

The cost-effectiveness analysis relates the cost of a specific measure to a pre-specified outcome. Hence, cost-effectiveness expresses how much „input“ is necessary in order to achieve a particular result (or „output“). It thus establishes a first simple link between effort (e.g. in thousands of dollars or euros) and the returns. The cost-benefit analysis extends the cost-effectiveness analysis by also expressing (or translating) the program results in monetary values. With regard to crime prevention, it therefore allows to determine how much harm avoidance can be achieved (expressed in euro) per euro spent. It thereby clarifies, how efficiently (or economically) a certain goal can be reached. Efficiency is expressed by the benefit-cost ratio.

The approaches and the tools that have been developed for the conduction and implementation of a cost-effectiveness analysis or a cost-benefit analysis in the international scientific community over the last decades require the processing of the following six steps in application:

1. Determination of the scope
2. Obtaining estimation results about the program impacts
3. Quantifying the benefits and costs in monetary terms
4. Calculation of the present value and assessment of the cost-effectiveness
5. Identification of the distribution of costs and benefits
6. Reviewing the robustness of the implications and conclusions by performing a sensitivity analysis

Here, steps 2 and 3 in particular, i.e. the determination of program effects and the obtaining of estimation results as well as the quantification of the associated benefits and costs in monetary terms, require – in addition to suitable data – an extensive and qualified scientific expertise.

5. Estimation of the Program Impacts

A fundamental precondition for the validity of a cost-benefit analysis is first to answer the question, whether the project or program works. This means that the program's impact has to be estimated in relation to the situation that would have occurred in the absence of the program, i.e. the causal effect of the program has to be identified (via impact analysis or evaluation). Without a causal evaluation and knowledge of program success no meaningful cost-benefit analysis can be carried out.

For a meaningful evaluation of the program impact, first of all the outcome of interest has to be defined clearly. This outcome variable should be based on the program objectives, i.e. it has to operationalize the purposes and targets of the intervention quantitatively. The outcome variable is of fundamental relevance since it is the basis for the interpretation and valuation of the potential benefits. For the evaluation of the impact it is not important whether a change of the outcome of interest would have occurred even in the absence of the program. The causal impact is the change of the outcome that is solely due to the program or intervention, i.e. the additional success or failure.

The fundamental evaluation problem arises from the fact that the additional success due to the program (i.e. the treatment effect) is not directly observable. Since every individual situation can be observed at the same time only once, and thus only in a particular state (for example, the number of car thefts in the region x in the period y), the difference between the outcome of the program (treatment) and the outcome without program (control) cannot be observed.

Hence, the causal effect of the program on the outcome of interest cannot be quantified directly. Therefore, the main problem at the core of each (microeconomic) impact analysis can be seen in the absence of data on the counterfactual situation (i.e. the situation without the intervention). In order to solve this problem and to estimate the effect of the program, the literature suggests a number of different evaluation methods. A group of methods that has gained particular interest are so-called social experiments. They randomly assign the observation objects into a treatment group and a control group, comparable to a laboratory experiment. When carefully implemented, we can assume that the random allocation (randomisation) produces the correct counterfactual, and therefore bias of the results due to self-selection can be ruled out. Since a random assignment is not always possible, the so-called quasi-experimental methods have achieved a likewise high attention. They reproduce the experimental situation under certain assumptions and by use of statistical or econometric methods.

The identification and correct estimation of program impacts as the basis for the cost-benefit analysis is very complicated and requires to taking the scientific standards into account. Any bias or deviation of the estimated effects from the true effect will be translated (and maybe exaggerated) in the subsequent assessment of the monetary values in favor or to the detriment of the real benefit-cost ratio. This can lead to severely biased implications. In order to ensure a thorough evaluation of projects and programs, therefore, they should be planned already before the start of the implementation of activities. This ensures a meaningful economic and scientific monitoring, and the impact estimates are more likely to be achieved in reasonable time and with acceptable effort.

6. Assessment of Costs

The third step, the estimation and assignment of monetary values to program benefits, is the most difficult within a cost-benefit analysis. It should be noted that costs and benefits have an inverse relationship: the costs of crime correspond to the benefits to society caused by preventing or reducing the crime. To ensure a correct assignment of benefits, those who bear the costs of crime have to be identified accordingly. In addition, both the tangible as well as the intangible costs have to be taken into account.

Tangible costs of crime include for example costs of medical care, expenditure for the police and the judicial system or lost wages of the crime victims (and the lost legal wages of the convicted criminals). Although these costs seem simple to be measured at first glance, data are generally not available or accessible in a standardized form. However, even the availability of information on the tangible costs does not ensure that they can be specifically assigned to a single offense or to a particular victim.

Intangible costs include psychological and emotional costs, such as fear, pain, suffering and loss of quality of life. Compared to the tangible costs, they are character-

rized by a larger inter-personal variation. Moreover, not only the actual victims bear the intangible costs of crime but also the potential victims and society as a whole are affected. Since market prices are not available for these costs in general, various methods for measurement have been proposed in the literature.

Nevertheless, a monetary valuation of intangible costs can usually only be achieved by using population averages. Therefore, the individual suffering will be over- or underestimated, and already the attempt of a monetary valuation of suffering can be criticized on ethical grounds. Nevertheless, the alternative of not taking the intangible costs into account in cost-benefit considerations is certainly still more unsatisfactory.

A full enumeration of all costs of crime also requires to assigning a monetary value to homicides or crimes resulting in death to human life. Such an assessment is not specific to criminology, but relates or should relate to all areas in which a judgment of fatal risks is required. For this assignment, the concept of the value a statistical life has been introduced. It determines the socially accepted willingness to pay for avoiding impersonal, i.e. not individually taken risks of death. Such payments are expressed, for example, in the damage sum of a motor vehicle liability insurance that is guaranteed in the event of a traffic death, or the damage sum of an accident insurance to hedge the risks at work. The calculation of the value of the statistical life can be carried out by the estimation of so-called compensatory wage differentials, i.e. wage premiums for work risks.

Over the past two decades, a significant progress in the estimation and determination of the tangible and intangible costs of crime has been made. The results of the related literature show that the intangible costs of crime are higher for almost all considered offenses than the tangible costs. In particular for violent crimes like assault or sexual assault that may induce only little or even no material damage, there are substantial intangible costs. Only for property crimes, such as car theft and burglary, the intangible costs are correspondingly low.

7. Aspects of Good Practice

Due to the high methodological standards, cost-benefit analyses require a thorough examination in order to provide reliable and robust results. The main limitation for the validity of results may arise from misapplication, e.g. through lack of care or lack of experience. As any cost-benefit analysis is just an extension of the underlying evaluation of program effects, the calculation of the benefit-cost ratios cannot be more robust (or trustworthy) than the underlying estimates of the program effect. In other words, a cost-benefit analysis is only as strong as the weakest link in the chain of analytical steps.

For this reason, the evaluation of the program effects has to be carried out with the same care and diligence as the planning, design and implementation of the program itself. Other limitations can arise from the remaining uncertainties with regard to the determination and assignment of the costs and benefits as well as the assessment of their future developments. One should always keep in mind the high degree of subjectivity of the cost-benefit analyses. The choice of the variables and information used to approximate the costs and benefits, their consideration, their weighting, and their judgment require very many decisions to be taken by the researcher.

Moreover, in order to make cost-benefit analyses comparable, the methodological standards used should be transparent and consistent, too. For this purposes, scales have been suggested that should indicate the quality and trustworthiness of the studies. One example is the so-called *Maryland Scientific Methods Scale* that categorizes the different study designs with regard to certain quality criteria. In short, it rates the trustworthiness of the estimation results based on the methodological quality of the identification strategy. There are alternative scales available in the literature, which are based on similar considerations.

8. Examples of Cost-Benefit-Analyses

In particular in Anglo-Saxon countries cost-benefit analyses have reached a considerable importance. Prominent examples from the US are the High Scope Perry Preschool Program and the Prenatal/Early Infancy Project (Elmira Program or Nurse-Family Partnership) that have achieved a wide awareness due to the associated comprehensive evaluations, cost-benefit analyses and – last but not least – the obtained results. The Perry Preschool program was started in 1962 in the US state of Michigan and supported poor parents with small children. Its aim was to improve the opportunities for participation in the education system and thereby to reduce the expected negative consequences of poor socio-economic origin. Elmira included prenatal and postnatal midwifery visits for economically disadvantaged first-time mothers. Both programs have been monitored and analyzed as long-term studies over several decades. Their findings were remarkable in terms of the effectiveness of investments and interventions in early life.

In the area of prevention and crime policy, the work of the Washington State Institute for Public Policy (WSIPP), Olympia (WA) is a best-practice example for provision of systematic evidence-based policy advice. Since 1997, the institute examines prevention and criminal justice programs with the goal of identifying effective and efficient programs to reduce crime. At the core of the work is a cost-benefit model, which has set standards over the years, both politically as well as academically. Already by 2006, nearly 600 evaluation studies of prevention and criminal justice programs were conducted using the model to assess the costs and benefits. The results have been used by politics and are

regarded as well-informed recommendations for actions and decisions.

The examples of the Perry Preschool Program and ELMIRA project clarify that activities and interventions aimed primarily at participation in education or avoiding adverse circumstances in early or very early childhood can have significant preventive effects in terms of later delinquency or crime in general. Even among the interventions analyzed by the Washington State Institute for Public Policy, prevention programs for children and youth have shown to be particularly effective and – at the same time – efficient.

The large economic effects, but also the high utility of such programs demonstrates that criminal policy and preventive activities should not be regarded too narrowly or by specific disciplines only. Other, at first sight only indirectly related interventions can have much larger and more economic effects.

9. Conclusions

Although for some areas and regions, very comprehensive and carefully-crafted evidence on costs and benefits of prevention programs are available, a unified basis or a common set of standards is still missing. Evidence-based policy should use the best available information on the decision subject to enable (and ensure) consistent and valid decisions. The introduction of uniform quality standards can therefore be regarded as an important prerequisite.

By and large, from the cases, aspects and results of cost-benefit-analyses discussed in the report I can derive the following eight conclusions and postulations for Germany:

1. The interdisciplinary discourse and dialogue should be strengthened to broaden the information base derived from evaluation results and cost-benefit analyses of prevention programs and activities for a constructive and critical interpretation in comparison with other policy fields competing for the available financial resources.
2. A systematization and collection of available information on the basis of pre-defined quality criteria to improve and inform decisions with respect to prevention and criminal policy in Germany.
3. Comparison of the German experiences and results with available international evidence in order to derive and distinguish general and specific implications for further development of effective and efficient prevention policy.
4. The establishment of an “evaluation culture” in the field of prevention and criminal policy that meets the methodological standards for identification of causal effects of interventions and programs, and the interdisciplinary scientific discussion and interpretation of results in order to prevent misperceptions due to lack of competence.

5. Development of the foundations for conduction of systematic cost-benefit analyses by improving the information base with respect to the definition, assignment and estimation of tangible and intangible cost and benefit indicators.
6. Orientation of this work on the common international standards, experiences and results to ensure consistency of the applied methodologies and comparability between analyses within Germany but also in international comparison.
7. Interdisciplinary and scientific discourse on the results: This allows for a substantial discussion of the empirical facts on prevention with consideration of the specific impacts, the relevant governance and potential alternatives.
8. Restriction of recommendations and implementation to efficient programs. A program is inefficient if the design, implementation and expenditures are disproportionate to the achieved objectives and impacts.

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