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Is there a correlation between social benefits and property crime?

A panel data study of OECD countries over the years 1997 to 2007

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Abstract

According to economic theory, an increase in income inequality leads to an increase in property crime rates. The social benefits funded through taxation are one of the means for the state to regulate income inequality. While income inequality and crime is a carefully investigated topic, social benefits and crime is not. This paper investigates what effect public social benefits have on the different types of property crimes. An empirical study is performed, which collected data from 21 OECD countries over 11 years. Two sets of regressions are conducted, one which included all 21 countries and one consisting of six countries from northern Europe. We found that the property crime rates correlate positively with *Total*, *Unemployment*, *Family*, and *Incapacity* social expenditure. Similarly, there is a negative correlation between property crime rates and *Housing* and *Health* social expenditure. When the targeted sample of northern Europe is examined, it is clear that the results follow the same trend as the OECD sample, except with a weaker significance level.

Key Words: Crime, property crime, social expenditure, transfers, welfare programs, income inequality

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1 INTRODUCTION

Becker's (1968) model of rational criminal behavior is based on the assumption that the individual does what he can to maximize his utility. The model predicts that the risk of getting caught and the resulting punishment strongly influence criminal behavior. Other factors have been shown in empirical work to have an effect on crime, and in addition to these, there are other factors that are theoretically believed to have an impact on crime, even though empirical work concludes conflicting results.

One of the variables that is believed to have a strong influence on crime is income inequality. Economic theory of crime predicts that income inequality increases crime rates. According to the theory, high inequality means that you will have rich individuals living next to poor individuals. This leads to higher incentives for the poor people to allocate their time to criminal activity and take the belongings of the rich people. The greater the inequality, the higher the incentive for the poor to commit crimes. If returns from illegal activities increase or legitimate wages decrease, this will serve as an incentive for the individual to allocate more time to illegitimate activities (Ehrlich 1973).

"The economic motivation behind crime is essentially the appropriation of the property of somebody else or the pursuit of illegal activity at the risk of being caught and punished. Therefore, it is natural to expect that crime offenders be found among those who have relatively more to gain from these activities and relatively little to lose in case of being caught. These presumably belong to the neediest groups in society, their number being larger and the motivation being stronger the more unequal the distribution of resources in society." (Bourguignon 1999, p.190)

Therefore, reducing income inequality seems to be the policy to implement if a government wants to reduce crime rates. Most industrialized countries offer their population a social security system, however, they vary to different degrees. These programs are financed by taxes, an instrument through which the government can achieve a redistribution of income and wealth. By comparing measures of inequality before and after redistribution of income by means of taxes, one can conclude that the redistribution through social transfers reduces inequality (Brown & Jackson 1990, p.299). Sala-i-Martin (1995) states that the social safety net provided by the government is a preventative measure, to persuade the poor from engaging in harmful and illegal activities. "Income inequality leads to higher levels of crime and, therefore, to the need for public welfare protection." (Sala-i-Martin 1995, p.15) Assuming that offenders who are caught go to jail, Sala-i-Martin means that social transfers act as a mechanism to reduce property crime by increasing the gain from non-criminal activities.

Demougin & Schwager (2000) predict that poor people will only commit crimes if the utility from that exceeds the utility from legal work. Benefits are seen as a raise in legal income and hence an opportunity cost of crime. Increased crime rates and an improved social security system both result in higher social costs. We believe that we could capture the effect of a country's social security system by looking at the benefits given to the population. An analysis of the correlation between property crime and social benefits could be of interest when evaluating how much to spend on social benefits. Since we are only interested in how a change in the transfers paid by government affect crime rates, we will only take public expenditure into consideration and exclude all private transfers.

While previous research on income inequality and crime is extensive, the opposite is true regarding social expenditures and crime. We believe this is an important area to develop since there are high social costs involved with preventing crimes. A possible gain would be if the government could spend less money on law enforcement but still get a reducing effect on crime. This would happen if social expenditure resulted in an increase in the opportunity cost of crime and therefore lead to decreased crime rates.

Previous research we have taken part of has only included observations from one country or state. Since the disparity in social expenditure will mostly depend on the number of receivers rather than on changes in policies; our contribution to this area of research therefore consists of our inclusion of a sample of countries when evaluating the effect of social benefits on property crime. The comparison of multiple countries was used because it would be hard to find significant changes in transfer policies in a country like Sweden where all municipalities have the same benefit policies and where no significant changes can be seen over time. In our OECD sample on the other hand, we observe a considerable disparity in social expenditure, which we believe will affect property crime rates in a negative way through its redistributing effect. It is also hard to draw conclusions valid for more than the country observed. An international study could clarify if there exists a general correlation between social expenditure and crime.

The results indicate that the overall level of social expenditure has a positive impact on crime, inconsistent with the theory predicted by Sala-i-Martin (1995) and Demougin & Schwager (2000). When observing the effects on crime from the different social expenditure categories we see a tendency of *Housing* and *Health* social expenditure having a negative impact on crime, consistent with the theory, while *Unemployment*, *Family*, and *Incapacity* social expenditure affect crime in a positive way. Our findings indicate that certain social expenditure categories seem to be more suitable if a government wants to reduce crime rates by reducing inequality. However, the overall level of social expenditure correlates positively with crime.

1.1 HYPOTHESIS AND DELIMITATION

We have formulated our hypothesis based on the current state of knowledge from economic theories and previous research:

Social benefits have a negative correlation with property crime rates in OECD countries.

Social benefits are a method for the government to redistribute income to benefit the poor in society. The redistribution method decreases income inequality, a variable which is supposed to correlate with property crime rates. According to economic theory of crime, high inequality will lead to high property crime rates since monetary gain is the biggest motivator of property crimes. Seen as a utility maximization decision, most offenses that have a direct financial motivation will therefore be committed by the individuals with the lowest income, the lowest opportunity cost, and consequently the least to lose when committing property crimes. Social benefits will therefore lead to decreased property crime rates.

In order to perform our empirical study, some limitations must be set. When looking at previous empirical research on crime, most research is done with data from only one country. However, because we want to look at social expenditure, we must ensure that we have real differences in benefits that are not solely due to the number of people receiving these benefits. This excludes all countries which have the same benefit policy in all counties or municipalities because this would give us no differences in social expenditure levels. Therefore, we decided to do an international study on OECD countries. In order to ensure a high quality of the dataset we excluded some of the countries that did not have a sufficient number of observations. Missing observations also affected the dataset, which is why we had to limit our time span to the years of 1997-2007. The dataset includes 11 years and 21 countries.

In the scope of our thesis we chose to look at five out of nine categories of social expenditure, as well as the category *Total Social Expenditure*. These six constitute our explanatory variables together with a vector of control variables chosen with respect to theory and previous research.

The theoretical framework used in this thesis offers an explanation for the correlation between property crime rates and social benefits. As a result, we have included three different categories of property crimes as well as a variable adding all of the property crimes together. We have also included homicide as a comparative explained variable that, according to the theory, should not correlate with social benefits to the same degree.

2 THEORETICAL FRAMEWORK AND PREVIOUS RESEARCH

2.1 CRIME AND INCOME INEQUALITY

2.1.1 BECKER

There exist various theoretical disciplines regarding the determinants of crimes. There are theories belonging to the field of social studies and psychology as well as economic theories, where the latter of which is the focus of this thesis. One common trait of these theories is the thought that an increase in the risk of conviction will decrease the number of offenses committed by a person.

In his work from 1968, Becker states that “It’s useful in determining how to combat crime in an optimal fashion to develop a model to incorporate the behavioral relations behind the costs [...]” (p.173) The behavioral relations surrounding the supply of offenses are important for our thesis and presented here.

A general view among economists is that a person will commit an offense if the expected utility from that offense exceeds the expected utility from devoting time to other activities. Becker states that “some [people] become “criminals”, therefore, not because their basic motivation differs from that of other persons, but because their benefits and costs differ.” (Becker 1968, p.177). In other words, it is the individual’s choice to become a criminal but different starting points make us differently prone to committing offenses. This approach can be shown as a function relating the number of offenses to the probability of conviction, the punishment of getting caught and other variables, such as the income available in other activities and the offender’s agreeability to commit an offense:

$$O_j = O_j(p_j, f_j, u_j)$$

where p_j is the probability of getting caught, f_j the punishment in monetary terms and u_j represents all other influences .

The individual will act so he maximizes his utility. This behavior can be expressed as a function of income:

$$E(U) = p_i U_i(Y_i - f_i) + (1 - p_i) U_i(Y_i)$$

where $E(U)$ is his expected utility from committing a crime. Y denotes his monetary and psychic income from an offense. U is his utility function and p is his probability of being convicted and

caught, while f denotes his punishment in monetary terms, for example a fine or the monetary equivalent from an imprisonment. This expected utility from committing an offense will be compared with the known utility from legal work and the individual will consequently choose the alternative with the highest expected utility.

As observed in the relation above, an increase in either the probability of getting caught or the punishment will reduce the expected utility of an offense. This will lead to a decrease in offenses committed since the price of the punishment that the individual has to pay is higher or the probability of paying the price is higher. This can be expressed by the two following relations:

$$O_{p_j} = \frac{\partial O_j}{\partial p_j} < 0 \quad \text{and} \quad O_{f_j} = \frac{\partial O_j}{\partial f_j} < 0$$

Changes in u_j would also change the expected utility of an offense, for example if the income available from legal activities increased.

The aggregated function for offenses is the total sum of all offenses and can be written as:

$$O = O(p, f, u)$$

and it is expected to have the same properties as the individual functions, in other words, a negative relation to p and f . When constructing the aggregate function we keep in mind that all individuals are different and the variables in the personal offense functions would differ, but for simplicity Becker chooses to consider only the average values.

Becker continues by stating that if a government only wishes to deter possible offenders from committing crimes, a solution would be to increase p to a value close to one, or f could be chosen so that the punishment exceeds the gain from committing an offense. In doing so, the government could reduce the crime rate to almost zero. Changing p or f would however change the social costs of crime. An increase in p would increase the social cost of combating crimes, the cost of apprehension and conviction. A higher f would lead to higher social costs because of higher costs related to punishments. In order to both decrease crime rates and keep social costs at an acceptable level, one must consider other variables affecting crime as well.

2.1.2 CHIU & MADDEN

Chiu & Madden (1998) investigate a model where risk-neutral agents have different legal incomes which the agents can choose to supplement with income from offenses. This research is only

theoretical and can be seen as a further development of Becker's more general model. The model supports the empirical findings that show a relationship between income inequality and property crime. Chiu & Madden only take burglary into consideration. Assuming that a person who is caught ends up in prison and that the offender chooses his target by assessing and evaluating the signal of quality sent out by the house, Chiu & Madden confirm that an increase in income inequality may lead to increased burglary rates.

The mechanism by which income inequality is related to burglary is described in the following way by the authors: Assuming a burglary is punished by imprisonment; since imprisonment leads to a loss of legal income during the period of imprisonment, individuals with a lower income and hence a lower opportunity cost will consequently have a greater incentive to commit an offense, compared to individuals who earn more. This is because the risk involved in committing a burglary is less of an opportunity cost, because individuals with lower income have less to lose if caught. Chiu & Madden state that increased inequality, creating greater disparity between the rich and the poor, will affect crime rates in two ways. Firstly, the alternative to devoting time to illegal activities is less attractive for individuals. Secondly, the potential gain from an offense is greater. The model assumes risk-neutral agents who are equally immoral and are basing the decision to commit a burglary exclusively on expected utility maximization.

2.1.3 PREVIOUS RESEARCH ON CRIME AND INCOME INEQUALITY

Economic theory of crime, as suggested by Becker (1968) and Chiu & Madden (1998), supports a direct relationship between property crimes and income inequality due to a utility maximization behavior by the individual. However, empirical research conducted thus far has given inconsistent results.

All the works referred to in this thesis are conducted with observations within one country only, Belgium, Sweden, Brazil, Great Britain (England and Wales), and the USA, respectively. This is advantageous because researchers do not have to take differences in measurement or data collection between countries into consideration. Consequently, the difficulty is to verify the theory in a more general way than it is for only one country.

2.1.3.1 RESEARCH CONSISTENT WITH THE THEORY

By using a one-period uncertainty model where the individual has to select his optimal participation in either of the two possible activities, one legal and one illegal, Ehrlich (1973) finds a negative correlation between law enforcement and crime in a sample of states in the USA. It shows that more law enforcement, more specifically stricter punishments or an increased risk of getting caught, has a deterrent effect on all crimes. Ehrlich also finds a positive correlation between property crime and income inequality while relatively lower effects are reported between inequality and crimes against the person. Ergo, the findings are consistent with the theory that individuals see crimes with material gain as an occupational choice and try to maximize their utility. The impact of income inequality on property crime has been established by other researchers, which will be discussed below (Hooghe, Vanhouette, Hardyns & Bircan 2011; Nilsson 2004; Scorzafave & Soares 2009; Witt, Clarke & Fielding 1998; Choe 2008).

Hooghe, Vanhouette, Hardyns & Bircan (2011) investigate the effect of income inequality, income level, and unemployment on crime in Belgian counties between 2001 and 2006 to be able to determine which aspect of deprivation that best explains crime rates. Their findings show that inequality has a significant positive effect on property crime rates. The effect is negative on violent crimes, though. “This allows us to speculate that larger gaps in income, and thus also in available resource and property levels, apparently offered a positive opportunity and incentive structure for property crime.” (Hooghe, Vanhouette, Hardyns & Bircan 2011, p.18). An even stronger correlation exists between unemployment and crime rates. Since research is based on observations from only six years, the researchers were not able to conduct a reliable trend analysis, however, they conclude that six years should be seen as enough to consider the pattern they have found to be quite robust.

The Swedish income inequality has varied extensively since the 1970's. Using municipality data, Nilsson (2004) investigates if these changes in income inequality have affected the crime rates by letting three different measures of inequality comprise the regressions. At the 1 percent significance level for overall crime, burglary, and auto theft, and 5 percent significance level for robbery, Nilsson finds a positive correlation for the population with income below 10 percent of the median income. The results for 20 and 40 percent of median income vary from being statistically significant at the 1 percent level to being non significant at the 10 percent level. As a comparison Nilsson tries to explain the violent crime category “Assaults” with the same explanatory variables. The results are weak, which is coherent with the economic theory predicted by Becker (1968).

Scorzafave & Soares (2009) verify the relationship between income inequality and property crime by using data from the municipalities in the state of São Paulo, Brazil. The authors have chosen to include drug trafficking in the concept of property crimes. The findings confirm the hypothesis of a

relationship between inequality and property crimes. The empirical results show that the rates of property crimes fell as a reaction to lower inequality levels in São Paulo.

There is also a verified relationship between property crimes and both unemployment and income inequality in England and Wales (Witt, Clarke & Fielding 1998). All five property crime categories used are shown to have a positive correlation with inequality. Robbery, burglary, and vehicle theft seem to be most responsive to changes in income inequality.

Another empirical study conducted on US data validates the findings of an effect of income inequality on robbery (Choe 2008). A strong influence of inequality on burglary is also found. The crime data indicates autocorrelation and the researcher therefore chooses to introduce a lagged dependent variable to correct for this. After this correction, results are weaker but still valid for burglary and stronger for robbery. However, Choe fails to find a statistically significant relationship for total crime and overall property crime. The fact that there is no significant relationship between income inequality and total crime is in line with theory that predicts a relation between property crimes and income inequality. The total crime rate should therefore have a weaker correlation with income inequality. The result for overall property crime, however, must be seen as conflicting with the theory.

2.1.3.2 RESEARCH INCONSISTENT WITH THE THEORY

Other researchers have found a significant correlation between all types of crimes and income inequality or between violent crimes and income inequality. These results are inconsistent, or partly inconsistent, with the economic theory of crime (Brush 2007; Sachsidá, de Mendonça, Loureiro & Gutierrez 2010; Kelly 2000; Fowles & Merva 1996).

Research conducted on US panel data (Brush 2007) shows a positive and significant relationship between crime and income inequality. Unlike Kelly, who found different results regarding property and violent crimes, Brush's findings indicate similar results when letting property crimes and violent crimes be explained by the same variables. In general, an offender has less to gain from violent crimes and these crimes should therefore have a weaker correlation with income inequality. Brush's findings on property crimes are consistent, while his findings on violent crimes are inconsistent, with the theory.

Kelly's research (2000) shows results contradictory to the findings of Ehrlich (1973). When looking at US data on urban counties from 1994, inequality has no effect on property crimes, although there is a significant influence from poverty and police population. However, inequality seems to have a strong

effect on violent crimes. An attempt to verify the results over time was made by including data from the years 1981 and 1991 but failed due to lack of variability in the explanatory variables.

Another study (Sachsida, de Mendonça, Loureiro & Gutierrez 2010) conducted with Brazilian observations from 1981 to 1995 shows a statistically significant positive effect of homicide on crime. This result is contradictory to the theory. Analogously with these findings are the results from a work conducted with US observations over the years 1975-1990 (Fowles & Merva 1996). A strong significance is found between inequality and the crime categories aggravated assault and murder/non negligent manslaughter. However, no significant relationship between income inequality and the crime categories robbery and burglary was found.

It is clear that redistribution methods, like social benefits financed by taxes, have a negative effect on income inequality. The notion that income inequality is correlated with property crime therefore implies that social expenditure should be correlated with crime as well. Since the empirical research on social expenditures and crime is limited, we see the empirical work on inequality and crime as a way of exploring the correlation between social expenditure, as a redistribution method decreasing income inequality and crime.

2.2 CRIME AND TRANSFERS

2.2.1 SALA-I-MARTIN

“The main point of this paper is that transfers and other social safety net mechanisms are a means to buy social peace, a way to reduce social unrest. They are a way to *bribe* poor people out of activities that are socially harmful, such as crimes, revolutions, riots and other forms of social disruption.” (Sala-i-Martin 1995, p.4).

In a model extended from Becker's, Sala-i-Martin (1995) wants to show that social benefits act as a mechanism to reduce the incentive for people to commit offenses by an increase in the income they can earn through means of legal activities. He introduces a public welfare system as part of the model and assumes that monetary gain is the only motivation for an individual to commit an offense.

Sala-i-Martin justifies higher social expenditures instead of devoting resources to law enforcement with the fact that there is a maximum limit in how much a person can pay, namely everything they own. When a person must forfeit all their possessions, he no longer has anything to lose; as a result he

has no incentive to stay with legal activities. Increased social expenditure will, in contrast with spending on law enforcement, work as an opportunity cost to criminality, resulting in more people choosing legal work over criminal activity since the expected utility of committing an offense is now lesser than that of legal work. This reasoning assumes that the criminal is imprisoned to jail where he will lose all income for the period of time to which he is sentenced. It works as a kind of reversed harder punishment which, according to this theory, should lead to a decrease in property crime rates.

Sala-i-Martin shows in a theoretical way, that people will only commit an offense if the expected utility of committing that crime is higher than the income that person could gain from legal work for the same amount of time. This result implies that the poor in society are more likely to become criminals since richer people will earn more than they would get from an offense.

What would happen if the government decided to increase the social expenditure? According to the model by Sala-i-Martin, social expenditure acts as an opportunity cost as a means to being penalized. When social expenditure increases, while keeping the average income constant, property crime rates will decrease, since a larger proportion of the population will earn more from legal work than from committing crimes. “Hence, governments may want to use transfers as a mechanism to bribe people out of crime: **when transfers are high, crime does not pay.**” (Sala-i-Martin 1995, p.14). It should be noted that this result presumes an increase in transfers relative to income.

If the government can reduce crime through public welfare, how come spending on public welfare is not increased until property crime levels are down to zero? As Sala-i-Martin explains, public welfare is financed by taxation. An increase in the social expenditure would therefore lead to a raise in taxes. A tax increase could in turn influence private decisions on saving and spending which would reduce growth. The government must balance the costs from increased crime rates with the distorting effects from a tax increase.

In conclusion, Becker’s and Sala-i-Martin’s theories suggest that the government theoretically can reduce property crime rates to zero either by increasing the punishment and the risk of getting caught or by increasing social expenditure. However, both methods have disadvantages in the form of higher social costs. The challenge therefore seems to be to find the balance associated with minimized social costs and maximized utility.

2.2.2 DEMOUGIN & SCHWAGER

Demougin & Schwager (2000) conclude what has been previously mentioned; the government can influence the probability and the opportunity cost of getting caught by means of changing the law

enforcement spending, or the social transfers, because these variables are believed to influence the individual's propensity to commit crimes.

Demougin & Schwager introduce a model with two different types of agents; type I with transfers as the only income and type II with high income. Type I agents will take part in criminal activity if the expected utility is higher than the gain from transfers. Type II agents are the possible tax payers, with an income so high that the opportunity cost of committing crimes will lead to no type II agents being criminals. The high opportunity cost will also lead to no type II agents discontinuing legal work to live on transfers. The question is how much these individuals are willing to pay for transfers towards the poorer agents. According to the authors, the reason for the type II agents to care at all, is because transfers increase the income for the type I agents and thereby the opportunity cost in committing crimes. This in turn reduces the risk of type II agents becoming victims of crime. Thus, transfers can be seen as a creation of safety as a public good.

Money funded by means of taxation will be spent on both law enforcement and social transfers. However, the authors emphasize that there can be no social transfers, without first having spent on law enforcement, since it must be possible to revoke the transfers in order for them to function as an opportunity cost. Public spending on law enforcement will work as an increase in the risk while redistribution through social transfers will increase the opportunity cost. The decision pertaining to the level of transfers is determined by whether there is a difference between the gain of offenders and the loss of victims. In the case of no excess burden, transfers paid by taxes are not optimal, while in the case of a sufficiently big excess burden, transfers can help reduce crime rates. The trade-off resulting from the more affluent choosing between saving their income and increasing the income of the poor is a cost minimizing behavior.

The aggregate model is thus a relationship expressing the crime level as a function of law enforcement and social transfers. Demougin & Schwager show that the greater the difference between the benefit of the crime for the offender and the damage of the crime for the victim, the greater is the likelihood that social transfers will be used as a means to reduce criminality. This wedge between gain and damage is a deadweight loss. If this deadweight loss is big enough, the type II agents will feel the demand for increased public safety created through redistribution of income. If there is no excess burden of criminality, taxes will be set so low that there will be no transfers paid. However, this situation is not very realistic and redistribution as a means of reducing crime rates must therefore be seen as a more probable situation.

2.2.3 PREVIOUS RESEARCH ON CRIME AND TRANSFERS

Contrary to the extensive empirical work done on inequality and crime, there is very little research to find on social expenditure and crime.

Allen & Stone (1999) tested if increased market earnings, cash transfers or in-kind transfers affected crime rates and which kinds of poverty reductions affected crime rates the most. They observe what proportion of the population is recognized above the poverty line because of market earnings and transfers respectively. They look at which factor, market earnings or transfers, raises which proportion of the population above the poverty level, and use the change in the proportions from year to year as an explanatory variable for property crime.

The authors hypothesize that poverty reductions will have different impacts on property crime rates, due to different effects on legal and illegal activities. These effects will impact crime in a positive or negative way, in the article referred to as pro-crime and anti-crime effects, where a positive impact refers to an increase in the crime rates. The effect on crime is dependent on the overall impact of these effects. The research is done with time series data and three different property crime categories are used as explained variables. The results show a positive and significant correlation between the property crime rates and the different poverty reductions systems, the exception being in-kind transfers and auto theft. The results suggest that the pro-crime effects outweigh the anti-crime effects of poverty reduction mechanisms. Thus, this study is inconsistent with the theories presented by Sala-i-Martin (1995) and Demougin & Schwager (2000).

Howsen & Jarrell (1987) tried to empirically establish the link between public assistance payments and property crime rates in the state of Kentucky in the USA. When using observations from 120 counties they fail to verify the connection and instead draw the conclusion that public assistance payments seem to have no impact on property crime rates. Howsen & Jarrell's findings are thus inconsistent with the theory predicting higher transfer levels to lower the crime rates. However, they find poverty to have a significant and positive effect on property crime rates.

As was discussed in section 1.1 Hypothesis and delimitation, we chose to do an international study because we believed that using observations from a geographical area with the same policies would give misleading results. If all counties have a very small disparity in policies regarding transfers, the factor deciding the total amount of transfers would be the number of receivers instead of the level of the transfers. In order to get a result where the government can see if it is worth spending money on transfers or not, we need observations dependent on different policies rather than the number of

receivers. We therefore regard our thesis, with a broad disparity in social expenditure spending, as an important follow-up to Howsen & Jarell's work on a restrained geographical area.

3 METHOD

3.1 THE MODEL

We chose to work with logarithmic values of the crime and social expenditure rates. This will be easier to interpret since a log-log function means that the results are in the form of elasticities; more specifically a one percent change in a social expenditure variable will give a certain percentage change in crime rates. We kept the control variables in linear form which means that the results will be presented as semielasticities, more specifically a one unit change in any of the control variables correspond to a certain percentage change in crime. The social expenditure variables will be used together in the regressions because they are simultaneously active in the government's attempt to reduce income inequality.

We work with a fixed effects model since it creates unbiased and consistent estimators. There is less risk that omitted variables, if any, will affect our results. By using fixed effects estimation we eliminate the impact of measurement errors that fluctuate over time in a uniform way across countries, or across countries but remain stable over time.

$$\text{Log}(\text{Crime}_{it}) = \alpha_i + \beta_t + \text{Log}(\lambda \text{socx}_{it}) + \gamma X_{it} + \varepsilon_{it}$$

The model above consists of the explained variable **Crime_{it}** which is any of the crime categories, the **country fixed effect dummy α_i** , the **time fixed effect dummy β_t** , the **social expenditure variables SocX_{it}**, the **vector of control variables X_{it}**, and the **error term**. The fixed effect variables will control for any non-random time and country specific effects on the crime rates. That is, **α_i** and **β_t** will help to explain any unobserved country and time specific effects on the crime rate. The fact that the countries and certain years show large disparity in crime rates, due to omitted variables, is controlled by **α_i** and **β_t** and makes the results more accurate.

$\text{Log}(\text{Crime}_{it}) =$	α_i	β_t	$\text{Log}(\lambda \text{socx}_{it})$	γX_{it}	ε_{it}
Property Crime	Country Fixed Effect	Time Fixed Effect	Total SocX	Police Population	Error Term
Homicide			Housing SocX	Urban Population	
Robbery			Health SocX	Total Unemployment	
Domestic Burglary			Unemployment SocX	Males per 100 Females	
Homicide			Family SocX	Young Males	
			Incapacity SocX	GDP/capita	
				GINI-coefficient	
				Probability of getting caught	

3.2 THE DATASET

We have collected roughly 4,000 data observations from 21 countries¹ over the time period of 1997 to 2007. The observations are collected from the OECD, UNODC, Eurostat, and the World Bank.

The first group of regressions we ran included countries from the OECD sample over the time period of 1997 to 2007. These regressions only had the first six control variables in their vector and hence lacked the *GINI-coefficient* and the approximation of the *Probability of getting Caught*. Problems of finding enough observations for the whole sample were the reason for this exclusion.

¹ Australia, Austria, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United States

The *GINI-coefficient* and the *Probability of Getting Caught* are two variables with theoretical support as explanatory variables to crime rates and they are commonly used in empirical work, see 3.2.3 Control variables. We therefore wanted to include them in a smaller sample where data was available. Because the countries in our sample have different levels of means-tested benefits, we decided to run a second set of regressions with a sample of six northern European countries, assumed to be more homogenous with respect to this quality; Sweden, Finland, Denmark, Norway, Germany, and the Netherlands. Looking at the statistics on means-tested benefits as percentages of total social benefit expenditures in a study by Kvist, Fritzell, Hvinden and Kangas (2012, p.80), these countries show a lower level of means-tested benefits than the UK. The countries in our smaller sample are also believed to be more homogeneous with respect to culture, religion, legal system and other variables hard to quantify. The data for the *GINI-coefficient* and *Probability of Getting Caught* was almost complete for these countries and therefore possible to include in the regressions. We excluded a small group of countries with the same data quality on these two variables since they were geographically spread out compared to our northern Europe cluster.

3.2.1 CRIME

Table 3.1: Descriptive statistics, Crime Rates

<u>Variable</u>	<u>Obs.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Min</u>	<u>Max</u>
Property Crime	215	719	450	131	2411
Robbery	228	80.9	55.9	14.5	266
Domestic Burglary	229	366	306	45.2	1580
Vehicle Theft	220	299	212	34.2	950
Homicide	220	1.63	1.09	0.44	6.68

Note: All variables are measured in number of crimes per 100,000 inhabitants. The total number of observations is 231. Three digits are used except for when the number exceeds a thousand.

We chose to include three property crime categories in our analysis. All variables are measured in crimes per 100,000 inhabitants of the particular country's population. This will give us comparable observations not depending on the size of a country's population. The first variable in Table 4.1, *Property Crime*, is the combined crime rates of *Robbery*, *Domestic Burglary*, and *Vehicle Theft*.

It is clear that the economic theory of crime presented above fits property crimes better than violent crimes. However, according to Bourguignon (1999), it cannot be dismissed that violent crimes are more common among the poorer in society as well. The reason is that violent crime rates may be determined by largely the same variables as property crime rates. In order to validate whether or not

our findings are consistent with the theory we also include the category *Homicide*. This allows us to make a comparison case.

There is a high likelihood of having biased observations when working with crime statistics over different geographical areas. When looking at the descriptive statistics we can observe that there is a big difference in the crime rates. This is something we will address later in section 6 Discussion.

3.2.2 SOCIAL EXPENDITURES

In order to use data from different geographical areas, we need a common definition of social expenditure. OECD, which is the organization supplying our data, defines social expenditure in the following way:

“The provision by public and private institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer.” (OECD 2012, p.6).

Since we wanted to look at how the government can affect property crime rates, we chose to use only **public expenditure** data. Hence we excluded all private spending on social expenditure. An inclusion of mandatory private spending would mean that we take, for example, payments made by companies to sick employees into consideration. This would affect our results since the government could, in order to get the same effects on crime rates, choose to legislate on private spending instead of funding the benefits themselves. Our exclusion of non-public expenditure implies that countries with a high total social expenditure level might attain a lower rank among the countries in our sample if a large proportion of their benefits are private and vice versa. The changes are typically minor since a large fraction of the benefits are public. However, since we only want to capture the effect from governmental benefits these changes are not of interest to us.

OECD has defined the distinction between public and private expenditure in the following way:

“Public social expenditure: social spending with financial flows controlled by General Government (different levels of government and social security funds), as social insurance and social assistance payments [...]. All social benefits not provided by general government are considered private.” (OECD 2012, p.8).

The categories of social expenditure that we focus on in this thesis consist of the following benefits (OECD 2012):

- *Incapacity-related benefits* – care services, disability benefits, benefits accruing from occupational injury and accident legislation, employee sickness payments.
- *Health* – spending on in- and out-patient care, medical goods, and prevention.
- *Family* – child allowances and credits, childcare support, income support during leave, sole parent payments.
- *Unemployment* – unemployment compensation, severance pay, early retirement for labor market reasons.
- *Housing* – housing allowances and rent subsidies.
- *Total* – all public social expenditures taken together.

Table 3.2: Descriptive statistics, Social Expenditures

Variable	Obs	Mean	Std. Dev.	Min	Max
Total SocX	229	21.6	3.98	13.0	30.4
Housing SocX	218	0.25	0.22	0.00	0.91
Health SocX	231	5.83	0.87	3.86	8.36
Unemployment SocX	231	1.04	0.72	0.22	3.80
Family SocX	229	2.08	0.90	0.42	3.80
Incapacity SocX	229	2.79	1.17	0.83	5.82

Note: All variables are measured in percent of GDP. The total number of observations is 231. Three digits are used except for when the number exceeds a thousand.

The social expenditure categories are all measured as percentages of each country's GDP. The variables that we believe have most impact are *Unemployment*, *Housing*, and *Health SocX*. Benefits are supposed to support the poorer in society and thereby decrease inequality. Apart from these, we have also used *Total*, *Incapacity*, and *Family* social expenditure.

As can be seen in the descriptive statistics table 4.2, there is a large disparity in social expenditures between countries and over time. As was discussed in section 1.1 Hypothesis and delimitation, a high variation in social expenditure is desirable for our results. When looking at the smaller sample with

northern European countries, the differences in social expenditure are smaller but still significant with a standard deviation of 3.00 for *Total SocX*.

Governments can reduce income inequality by supporting poorer households with social benefits, funded by taxes. This can be proved by comparing the GINI quota based on pre-tax income and post-tax income (Le Grand, Propper & Smith, 2008, p.174).

There is a belief however, especially in the US and the UK, that benefits are only a short-term income relief and no long-term solution, since it might create a culture of dependency. Benefits reduce the incentives for people to spend their time on legal work, especially if the benefits received leave the individual better off than an employment would do. This could eventually turn into a poverty trap, making it harder for poor people to get out of poverty (Le Grand, Propper & Smith, 2008, p.175). The way of seeing individuals as rational agents trying to maximize their utility is consistent with the theory of crime.

According to Allen & Stone (1999), transfers have different kinds of effects on property crime rates. Depending on the magnitude of these pro and anti crime effects the outcome on property crime will be different. Other researchers emphasize the difficulties in forecasting the effects of social benefits on the rates of property crime. On the one hand, social benefits represent a legal income and a higher opportunity cost if committing crimes and getting caught. On the other, the same benefits give potential criminals ample time to engage in criminal activities instead of looking for a job to increase their income (Howsen & Jarrell 1987).

3.2.3 CONTROL VARIABLES

In order to avoid a bias due to omitted variables we include a vector of control variables. These explanatory variables are chosen with respect to economic theory and previous empirical research.

Table 3.3 Descriptive statistics, Other Control Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Police Population	228	297	101	153	480
Urban Population	231	70.3	10.7	48.9	88.6
Unemployment	231	7.37	3.98	1.80	20.6
Males per 100 females	231	96.0	2.08	90.3	99.9
Young Males age 15-24	231	0.07	0.01	0.05	0.09
GDP per Capita	231	27443	16945	4066	106902
Probability of Getting Caught	50	0.14	0.14	0.03	0.53
GINI-coefficient	41	25.3	1.93	21.0	29.2

Note: *Police Population* is measured as number of policemen per 100,000 inhabitants; *Urban Population*, *Unemployment*, and *Young Males* is measured in percent of total population; *Males per 100 Females* is the number of males per 100 females; *GDP per Capita* is measured in current US\$; *Probability of Getting Caught* and the *GINI-coefficient* are proportions between 0 and 1. The total number of observations are 231, except from the *Probability of Getting Caught* and the *GINI-coefficient* with 54 observations. Three digits are used except for when the number exceeds a thousand.

The variables *Police Population* and *Probability of Getting Caught* can be seen as two measures of a country's law enforcement. The variable *Probability of Getting Caught* is a ratio of the number of convictions to the total number of crimes reported. The variable is an approximation since there are always a number of unrecorded cases in crime statistics. The variable *Police Population* is reported as the number of policemen per 100.000 inhabitants. Corresponding to theory both these variables are expected to have a negative relationship with crime. Becker (1968) predicts that higher spending on law enforcement will reduce property crime rates. There is a possibility though, that lower crime rates can generate lower spending on law enforcement, since it is not needed any more, in the same way that high criminality could cause higher spending on law enforcement (Cameron 1988).

Population density has empirically been found to have a strong impact on both violent crime and property crime (Hooghe, Vanhouette, Hardyns & Bircan 2011) with higher crime rates in urban regions. This is because urban areas facilitate the interaction between criminals and potential criminals to a higher degree, and thus increases the risk of the potential criminals to enter criminality, compared to rural areas. We therefore include a measure of the *Urban Population* to control for differences between countries.

Among others, Hooghe, Vanhouette, Hardyns & Bircan (2011), and Sachsida, de Mendonça, Loureiro & Gutierrez (2010) have found a positive correlation between *Unemployment* and crime rates. *Unemployment* will affect the individual's income in a negative way. A lower income will in turn lead to a decreased opportunity cost of crime which will lead to an increase in the risk of engagement in criminal activity. The longer time period a person is unemployed, the greater is the risk of becoming a criminal. (Ehrlich 1973). We use an unemployment measure including both genders in percentage of total population.

It is well established that young people in general, and young men in particular, have a higher tendency of committing crimes. It is common in empirical work on crime to use a measure of *Young Males* as an explanatory variable on crime and it tends to have a positive effect on property crime rates (Dahlbäck 1990; Clarke, Fielding & Witt 1998). In order to take the fact that males in general have a higher tendency of committing crimes into consideration, we also include the variable *Males per 100 Females*.

GDP per Capita can be seen as a measure of average income when comparing the countries in our sample. It gives us a chance to see the absolute differences in income between the countries. Higher income will increase the opportunity cost of crime and hence lead to a decrease in property crime rates. On the other hand, higher income will also lead to a higher expected utility of committing an offense since the victims are better off, which is why we cannot know if *GDP per Capita* will be positively or negatively correlated to property crime rates (Sachsida, de Mendonça, Loureiro & Gutierrez 2010). *GDP per Capita* is normally used as a control for country specific business cycles. Still, we value it to be a valid estimator for average income.

As said above, relative to legal undertakings, a poorer individual will expect a higher crime utility than a richer individual. Poorer individuals will have less to lose from a punishment if they are caught and therefore a lower opportunity cost to crime. Higher inequality will lead to a bigger fraction of poorer individuals having a higher expected utility from crime than from legal work. Because of this we include the *GINI-coefficient* as a measure of income inequality.

4 RESULTS AND ANALYSIS

4.1 RESULTS FROM THE OECD SAMPLE REGRESSIONS

In order to answer the hypothesis we conducted ten tests, sorted into two series, with the OECD sample to see what effect social expenditures have on crime. The results are presented with three decimals in the tables. When explained in the text, only one decimal is used in order to increase the readability. In table 5.1, data from the regressions are presented with two sets of explanatory variables:

- 1st series *Total SocX*
- 2nd series has *Housing*, *Health*, *Unemployment*, *Family*, and *Incapacity*

As a short comment on the SocX variables, we notice that *Total SocX*, *Unemployment SocX*, and *Incapacity SocX* have a positive effect on all crime categories, except *Robbery*, whereas *Health SocX* has a negative effect on all crime categories, except *Robbery*. *Housing SocX* correlation with the different crime rates is always negative while the effect of *Family SocX* is always positive.

4.1.1 RESULTS FROM REGRESSIONS WITH TOTAL SOCX AS EXPLANATORY VARIABLE

4.1.1.1 SOCIAL EXPENDITURE VARIABLES

The results indicate that *Total SocX* has a positive correlation with all crime categories except *Robbery*. In other words, an increase in *Total SocX* increases all crime categories, except *Robbery*. These results are inconsistent with the economic theory, which predicts a negative correlation between *SocX* and the property crime categories. These results are consistent with the previous research by Allen & Stone (1999), which concludes that a higher level of social expenditure will have an increasing effect on crime.

Total SocX has two significant effects, positively for *Vehicle Theft* and negatively for *Robbery*. A 1 percent increase in *Total SocX* increases *Vehicle Theft* with 1.1 percent and 1 percent increase in *Total SocX* and decreases *Robbery* with 0.5 percent. Apart from being significant, *Vehicle Theft* and *Robbery* are the crime rates most affected by *Total SocX*.

4.1.1.2 CONTROL VARIABLES

An observation is that the support variables only have a minor effect, except for *Young Males* aged 15-24, which has a major explanatory power.

Among the control variables, we note that *GDP per Capita* has a high significance level on all crime rates, even though the effect of *GDP per Capita* seems to be very close to 0 on every crime category.

Young Males seem to have a strong, positive and significant correlation with all crime rates, except *Robbery* which is strongly negatively influenced and *Homicide* which is not significantly correlated. That is, even though the data indicates a correlation, the evidence is not strong enough to be able to draw a conclusion. An increase of 1 percentage point in the proportion of *Young Males* will result in an increase of 5.7 percent on *Property Crime*, 10.2 on *Vehicle Theft* and 8.3 percent on *Domestic Burglary*. Obviously the government cannot adjust this variable in order to regulate the crime rate. The results for *Young Males* are consistent with previous research by Dahlbäck (1990) who found a strong positive effect for all property crime rates except from shoplifting which showed opposite results, although the effects were not significant.

The other control variables show a low correlation with the different crime rates. The regression on *Homicide*, which was included as a mere comparative study seems to follow the trend of the other crime rates but with a lower significance level in general. This tendency is consistent with the empirical findings by Brush (2007) which indicated that property crimes and violent crimes are affected by the same variables.

4.1.2 RESULTS FROM REGRESSIONS WITH DETAILED SOCX VARIABLES AS EXPLANATORY VARIABLES

4.1.2.1 SOCIAL EXPENDITURE VARIABLES

The regressions performed with the detailed SocX variables show that the variables can be divided into two groups. *Housing SocX* and *Health SocX* have a negative correlation with all crime rates, whereas *Unemployment*, *Family*, and *Incapacity SocX* have a positive correlation. The crime category of *Robbery* is an exception to these findings, with a positive correlation for *Housing SocX* and *Health SocX* and a negative correlation with the different crime rates.

Furthermore, we see that our comparative variable *Homicide* is affected in the same way by the different SocX-variables, as the other crime rates, except *Robbery*. Thus, *Robbery* seems to be an exception to the observed trends.

The impact from *Housing SocX* is similar for all crime categories. An increase of 1 percent in *Housing SocX* decreases crime rate by 0.1 – 0.2 percent. *Homicide* is the only crime category that is not significantly correlated with *Housing SocX*. In absolute values *Housing SocX* has the weakest average effect on crime.

Overall, *Health SocX* has a significant negative effect on crime. *Robbery* is the only exception with a significant and strong positive effect from *Health SocX*. *Health SocX* is the variable with the strongest impact on most crime rates. Apart from the effect on *Robbery*, it ranges from -1.2 to -0.4.

Except for the nonsignificant effect on *Robbery*, *Unemployment SocX* has a positive effect on the crime rates with an even effect around 0.2.

Family SocX shows a positive correlation with all crime rates even though the only significant results are for *Property Crime* and *Domestic Burglary*. Similarly with *Unemployment SocX*, *Family SocX* also has an effect on all crime rates ranging between 0.0 and 0.2.

Incapacity SocX has a significant positive effect on crime, except the non-significant negative effects on *Robbery*. *Incapacity SocX* has the strongest positive impact on crime, in the same way as *Health SocX* have the highest negative impact, ranging from 0.2 to 0.4. In other words, when *Incapacity SocX* increases with 1 percent the crime rates increase by between 0.2 and 0.4 percent.

The results indicate that different categories of social expenditures affect crime in different ways. *Housing SocX* and *Health SocX* seem to affect crime in a way consistent with the theory predicted by Sala-i-Martin and Demougin & Schwager. An increase in these benefits will give decreased crime rates. On the other hand, the effects of *Unemployment*, *Family*, and *Incapacity SocX* are consistent with the empirical results by Allen & Stone. These benefits will affect crime positively and should hence not be used if the government wants to decrease crime rates by increasing social expenditures.

4.1.2.2 CONTROL VARIABLES

In conformity with the results when *Total SocX* was the explanatory variable, *GDP per Capita* has a significant but close to zero effect on all crime categories, except the non-significant value for *Homicide*.

We still see high values on the coefficients for *Young Males*, but the significance level is slightly weaker than in the regressions with *Total SocX*.

The control variable *Police Population* returns very small values in the regressions and these are often non-significant. This is inconsistent with the theory that predicts law enforcement to be one of the most important explanations of the crime rate, therefore this is also a disappointing result.

When examining the significance levels closer we can see that *Unemployment*, *Males per Female*, and *Young Males* all have a high significance level on the four property crime categories, but not *Homicide*.

Table 4.1 Basic Results: Sample of OECD countries, 97-07

	Property Crime		Vehicle Theft		Robbery		Domestic Burglary		Homicide	
Total SocX (log)	0.393		1.078***		-0.536**		0.333		0.270	
	(0.245)		(0.304)		(0.261)		(0.281)		(0.358)	
Housing SocX (log)	-0.138***		-0.116***		-0.148***		-0.200***		-0.071	
	(0.036)		(0.045)		(0.044)		(0.039)		(0.057)	
Health SocX (log)	-0.368*		-0.534**		0.495**		-0.608***		-1.195***	
	(0.191)		(0.237)		(0.227)		(0.202)		(0.294)	
Unemployment SocX (log)	0.225***		0.246***		-0.061		0.208***		0.192**	
	(0.055)		(0.068)		(0.062)		(0.055)		(0.080)	
Family SocX (log)	0.191*		0.166		0.047		0.247**		0.056	
	(0.108)		(0.128)		(0.133)		(0.113)		(0.164)	
Incapacity SocX (log)	0.176*		0.411***		-0.093		0.329***		0.337**	
	(0.098)		(0.119)		(0.119)		(0.103)		(0.147)	
Police Population	-0.001	-0.002***	-0.003***	-0.004***	-0.001	-0.001	0.001	-0.001	5.35e-06	0.001
	(0.001)	(0.001)	(0.001)	0.001	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Urban Population	-0.025*	0.002	-0.057***	-0.029*	0.003	-0.013	-0.018	0.015	-0.005	0.022
	(0.013)	(0.013)	(0.017)	(0.017)	(0.014)	(0.016)	(0.016)	(0.015)	(0.020)	(0.021)
Unemployment	0.022***	0.022***	0.009	0.018*	0.043***	0.051***	0.023***	0.026***	0.010	-0.001
	(0.007)	(0.008)	(0.009)	(0.010)	(0.008)	(0.010)	(0.008)	(0.009)	(0.011)	(0.013)
Males per 100 Females	0.155***	0.114**	0.118**	0.068	0.157***	0.245***	0.184***	0.124**	0.061	-0.019
	(0.046)	(0.047)	(0.058)	(0.058)	(0.050)	(0.057)	(0.055)	(0.051)	(0.070)	(0.073)
Young Males age 15-24	5.712*	7.127**	10.219**	2.109	-12.658***	-3.387	8.286***	10.502***	7.891	-3.530
	(3.163)	(3.357)	(3.977)	(4.083)	(3.407)	(3.966)	(3.792)	(3.567)	(5.274)	(6.254)
GDP per capita	-1.17e-04***	-7.99e-06***	-1.26e-04***	-7.93e06***	-5.25e-06***	-8.15e-06***	-1.14e-04***	-6.03e-06***	-5.77e-06**	1.87e-06
	(1.60e-06)	(1.78e-06)	(2.04e-06)	(2.20e-06)	(1.74e-06)	(2.16e-06)	(1.90e-06)	(1.92e-06)	(2.37e-06)	(2.71e-06)
Constant	-8.054*	-4.342	-4.766***	2.286	-8.638*	-18.983***	-12.517**	-7.634	-6.454	1.928
	(4.312)	(4.575)	(5.496)	(5.721)	(4.728)	(5.582)	(5.187)	(5.011)	(6.489)	(7.072)

Note: The coefficient is the effect of the explanatory variable on the explained crime variable. Standard errors are in parenthesis. All regressions are made on a fixed effect to exclude any year or country specific effects. All crime and SocX variables are logarithmic. The panel data is made on 4122 observations including 21 countries over the years 1997-2007. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

4.2 NORTHERN EUROPE COMPARISON SAMPLE

The regressions performed with the OECD sample showed a tendency of different SocX categories affecting crime rates in certain ways. In order to see if these results are robust and not only true for the OECD sample, we also ran regressions with a smaller and more homogeneous sample. The north European countries Sweden, Finland, Denmark, Norway, Germany, and the Netherlands are assumed to have lower levels of means-tested benefits than the other countries in our sample. They can also be assumed to have similar cultures, the same religion and the same legal system.

We also extended our vector of control variables with the variables *GINI* and *Probability of Getting Caught*. These variables were not included in the OECD sample because the observations for a lot of the countries were insufficient. The results can be read in Table 5.2 below.

4.2.1 RESULTS FROM REGRESSIONS WITH TOTAL SOCX AS EXPLANATORY VARIABLE

The results for *Total SocX* vary in a similar range as in the OECD sample with *Robbery* as the only variable affected negatively by *Total SocX*. The variables are nonsignificant for all crime categories.

The two extra control variables that we added in these regressions, *GINI* and *Probability of Getting Caught* are nonsignificant for all crime categories, with the only exception being *Probability of Getting Caught* on *Property Crime*. The effect from the *GINI* seems to be very small and fluctuates around 0. A 1 percentage point increase in the *Probability of Getting Caught* will result in a 0.5 percent increase in *Property Crime*. Apart from that, the variable negative but close to 0 for *Vehicle Theft*, *Robbery*, and *Domestic Burglary*. The effect on *Homicide* is 0.4 positive but nonsignificant. The results for the variable *Probability of Getting Caught* are inconsistent with the theory which predicted a negative correlation.

Apart from that, we observe no big disparities in the effects of the control variables, with mostly nonsignificant values.

4.2.2 RESULTS FROM REGRESSIONS WITH DETAILED SOCX VARIABLES AS EXPLANATORY VARIABLES

For all of the SocX variables except *Housing SocX*, we can observe a strong increase in the effect on crime compared to the OECD sample regressions. The results on *Homicide* are once again very intriguing as the effects from the different SocX's, apart from *Housing SocX*, are higher on *Homicide* than on the other crime rates.

Looking at the SocX variables, we notice that *Health*, *Family*, and *Incapacity SocX* are all significant in both *Domestic Burglary* and *Homicide*. *Unemployment SocX* is only significant in the case of *Homicide* while *Total* and *Unemployment SocX* have insufficient significance levels for all crime rates. None of the SocX variables are significant in *Property Crime*, *Vehicle Theft or Robbery* so even though the coefficients may hold some explanatory power, there is not enough significance to draw any valid conclusions.

For the two extra variables, *GINI* and *Probability of Getting Caught*, we observe one significant value with a rather strong effect. A one percentage point increase in the *Probability of Getting Caught* will result in a 1.2 percent increase in *Homicide*. The other values are nonsignificant with a very low effect.

Table 4.2 Basic Results: Sample of OECD countries from northern Europe, 98-06

	Property Crime		Vehicle Theft		Robbery		Domestic Burglary		Homicide	
Total SocX (log)	0.188		0.365		-0.840		0.308		0.891	
	(0.494)		(0.590)		(0.566)		(0.617)		(0.993)	
Housing SocX (log)	-0.149		-0.090		-0.155		-0.06		0.028	
	(0.112)		(0.144)		(0.131)		0.109		(0.219)	
Health SocX (log)	-0.377		-0.575		-1.146		-1.587**		-3.259**	
	(0.703)		(0.908)		(0.826)		(0.689)		(1.378)	
Unemployment SocX (log)	0.152		0.089		0.057		0.156		0.734*	
	(0.183)		(0.236)		(0.215)		(0.180)		(0.359)	
Family SocX (log)	0.473		-0.247		-0.286		0.798**		1.238*	
	(0.363)		(0.469)		(0.427)		(0.356)		(0.712)	
Incapacity SocX (log)	0.262		0.679		0.703		1.222***		1.878**	
	(0.406)		(0.525)		(0.477)		(0.398)		(0.796)	
Police Population	0.001	-0.000	-4.52e-04	-0.002	0.010***	0.007**	0.004	-0.001	0.007	0.000
	(0.002)	(0.003)	(0.003)	(0.057)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Urban Population	-0.022	-0.013	-0.119***	-0.052	-0.042*	0.047	-0.019	0.065	-0.044	0.104
	(0.020)	(0.044)	(0.024)	(0.057)	(0.023)	(0.052)	(0.025)	(0.043)	(0.040)	(0.087)
Unemployment	0.005	-0.007	-0.029	-0.020	0.016	0.017	0.012	-0.013	0.007	-0.114
	(0.018)	(0.036)	(0.022)	(0.047)	(0.021)	(0.0426)	(0.023)	(0.036)	(0.037)	(0.071)
Males per 100 Females	-0.595***	-0.484***	-0.575***	-0.483***	-0.276*	-0.183	-0.490***	-0.330**	-0.272	-0.008
	(0.117)	(0.123)	(0.140)	(0.159)	(0.134)	(0.145)	(0.146)	(0.121)	(0.235)	(0.241)
Young Males age 15-24	21.831	18.910	23.791	20.728	2.613	5.114	13.707	2.654	22.803	7.012
	(17.028)	(16.238)	(20.358)	(20.968)	(19.538)	(19.079)	(21.269)	(15.923)	(34.262)	(31.826)
GDP per Capita	-1.60e-06	-2.03e-06	-3.75e-06	-5.32e-06	-1.79e-07	-1.42e-06	1.72e-06	3.31e-06	-8.33e-06	2.17e-06
	(3.32e-06)	(4.47e-06)	(3.97e-06)	(5.77e-06)	(3.81e-06)	(5.25e-06)	(4.15e-06)	(4.38e-06)	(6.68e-06)	(8.76e-06)
GINI-coefficient	0.012	0.022	0.010	0.001	0.022	0.025	-0.003	-0.002	0.042	0.038
	(0.014)	(0.014)	(0.017)	(0.018)	(0.016)	(0.017)	(0.018)	(0.014)	(0.029)	0.028
Probability of Getting Caught	0.534*	0.462	-0.049	0.055	-0.122	-0.084	-0.087	0.399	0.448	1.226*
	(0.267)	(0.355)	(0.319)	(0.459)	(0.306)	(0.417)	(0.334)	(0.348)	(0.537)	(0.696)
Constant	63.579***	52.626***	68.334	56.403***	34.255**	17.215	51.878***	32.845**	23.466	-5.955
	(10.989)	(12.375)	(13.138)	(15.980)	(12.608)	(14.540)	(13.725)	(12.135)	(22.110)	(24.254)

Note: The coefficient is the effect of the explanatory variable on the explained crime variable. Standard errors are in parenthesis. All regressions are made on a fixed effect to exclude any year or country specific effects. All crime and SocX variables are logarithmic. The panel data is made on 1096 observations including 6 countries over the years 1998-2006. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

4.3 COMPARATIVE ANALYSIS

Table 4.3: Sign comparison

	Property Crime		Vehicle Theft		Robbery		Domestic Burglary		Homicide	
	All	Northern	All	Northern	All	Northern	All	Northern	All	Northern
Total SocX	+	+	***	+	**	-	+	+	+	+
Housing SocX	***	-	***	-	***	-	***	-	-	+
Health SocX	*	-	**	-	***	-	***	**	***	**
Unemployment SocX	***	+	***	+	-	+	***	+	**	+
Family SocX	+	+	+	-	+	-	**	**	+	+
Incapacity SocX	+	+	***	+	-	+	***	***	**	**

Note: (+) represents a positive effect on the crime rates while a (-) represents a negative effect. The circled values are the ones where the sign on the effect have changed between table 5.1 and 5.2. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

When comparing the results from the two sets of regressions we see that the results have a generally weaker significance in the northern Europe sample compared to the OECD sample. However, the tendency with the SocX categories affecting crime in different ways is the same in the northern Europe sample. *Housing* and *Health SocX* are negatively correlated with crime while *Total*, *Unemployment*, *Family*, and *Incapacity SocX* are positively correlated with crime.

The deviations from this tendency can be seen in Table 5.3. Four out of six of these deviations originate from the crime category of *Robbery*. The deviations originate from different SocX categories, except from *Family SocX* with two deviations. The only SocX variable without deviations is *Total SocX* where all crime categories are affected positively in both samples.

Thus we see a tendency of the SocX variables affecting the crime rates in the same way in both samples, albeit that the smaller sample show less significant values. *Housing* and *Health SocX* have a negative impact on crime while *Total*, *Unemployment*, *Family*, and *Incapacity* have a positive impact on crime.

5 DISCUSSION

In this section we would like to address some potential sources of errors as well as briefly address the fact that we cannot know with certainty that our explanatory variables do not have a reverse causation with crime.

Crime rates:

The likelihood of having biased observations is high when working with crime statistics in a cross-sectional comparison. Eurostat lists possible reasons for the disparities in crime rates between countries that are not due to differences in actual crime rates (Eurostat 2012):

- Differences in the point at which crime is measured (for example, when reported to the police, on identification of suspects, etc.)
- Differences in the rules by which multiple offences are counted
- Differences in the list of offences that are included in the overall crime figures
- Different legal and criminal justice systems

The countries in our sample are western countries which either belong to the group of countries using a common law legal system, the USA and Australia, or a civil law legal system, the rest. Since we decided to run fixed effect regressions we could not include a dummy for these two legal systems. However we believe that the actions we analyze are illegal in all countries in our sample. It could rather be a problem of how countries classify different offenses which could lead to the same offense getting registered in different crime categories depending on the country. The countries were asked to adhere to a standard definition when the numbers were assembled which should reduce the disparities due to different legal systems.

- Rates at which crimes are reported to the police and recorded by them

Differences in reporting can originate from either an individual's propensity to report a crime or the police's tendency to record reported crimes. The propensity to report a crime may vary over time and between countries, as well as between different types of crimes. There is a risk that underreported crimes could be correlated with income and income inequality variables if people living in poorer areas or countries are less prone to report offenses, or if the police personnel in these areas are not as assiduous in recording crime reports (Brush 2007). Almén (2011) concludes from previous that it seems like most researchers make an assumption regarding the variation in crime rates because this will give unbiased estimates when using a fixed effects regression

method. Either you assume that the crime rates vary over time but remain stable between countries, or that the crime rates remain stable over time but vary between countries.

The law enforcement variables *Police Population* and *Probability of Getting Caught* only take public spending on law enforcement into consideration. There is a possibility that higher income inequality will lead to lower property crime rates since the richer will have more money to spend on protection of their property (Dahlberg & Gustavsson 2008).

Social expenditure:

There is no guarantee that the countries in our sample have classified all benefits in the same manner. This means that certain benefits can be registered in different SocX categories depending on the country. There also exist differences in the taxation of benefits between countries which affect cross-country comparisons (OECD 2012). Apart from that, differences between the countries are in our interest. A benefit that is public in some countries but private in others provides us with some of the disparities that are the reason for our thesis.

Geographical area:

Previous empirical research has focused on a smaller geographical area, often counties within a country or in a state. Since we have had some trouble finding complete data series for cross-country comparisons we conclude that doing a research on only one country makes it easier to find data for the social-economic variables. It seems like most countries do the data collections on their own but that the international organizations not always collect this information. The results from one country analyses could be seen as more reliable because of this data advantage but can on the other hand not be used for drawing conclusions valid for others than that particular country.

GINI-coefficient:

Due to the fact that we were unable to find complete data series for the *GINI-coefficient*, the values we use originate from two databases, Eurostat and the World Bank. The measures were similar and we concluded that we could merge the data sets. However, the Eurostat data series provided more observations and the *GINI*-variable might be biased towards those observations.

Causality:

We have to interpret our results cautiously since some of the variables we are using could have a reverse causation to crime to the one we are investigating in this thesis. We cannot know for sure that the causality goes from social benefits affecting crime and not the other way around. It is possible that offenders have a higher tendency of being dependent on social benefits since deciding to become a criminal has led to a lower legal income for the individual and hence a possibility to take advantage of the governmental benefits.

The same goes for the crime deterrence variables *Police Population* and *Probability of Getting Caught*. Increased crime rates could lead to a decision to increase the police force in order to stop the rise in crime rates. In this case a change in the crime rate will lead to an adjustment of the police force to fit the crime situation. In our model we assume that investments in police population will affect the crime rates. The variable *Probability of Getting Caught* will also be affected by increased crime rates if a country decides to keep the size of its police force. This would possibly lead to a decrease in the risk of getting caught.

The results for the two deterrence variables are shown to have the opposite effect from what the theory predicted; an increase in these variables results in an increase in crime. These results could be due to reverse causation or the fact that a larger police force is likely to detect more crimes.

6 CONCLUSION

We will base our conclusion on three findings.

- We can observe a trend of the effect social expenditure has on crime when looking at the two samples taken together. Some social expenditure categories seem to have a positive effect on the crime rates while others seem to have a negative effect.
- The results from the regressions on *Homicide* crime rates follow the trend of the other property crime categories and are therefore contradictory to the economic theory.
- We notice some very ambiguous results in the *Robbery* crime category that are inconsistent with the other crime rates. The results are also inconsistent between the two samples.

When observing the OECD sample, we see a clear tendency for what effect, positive or negative, each social expenditure category has on crime. The ones that have a positive correlation with crime, and therefore are inconsistent with the economic theory of crime are *Unemployment*, *Family*, and *Incapacity SocX*. The categories of social expenditure that have a positive correlation with crime, and therefore are in line with the theory, are *Health* and *Housing SocX*, where an increase in either of these two will result in a decrease in the crime rates. *Health SocX* is also the social expenditure category that is shown to have the highest impact on crime. These finding corresponds to what is said above about benefits as an opportunity cost of crime.

The comparison in section 4.3 shows that the same tendencies can also be found in the northern European sample. This could indicate that some social expenditure categories have the property of decreasing crime rates while others have the property of increasing crime rates, even though the effect of all social expenditures taken together seem to increase the crime rates. This indicates that spending on *Health* and *Housing* social expenditure seem to be more suitable if a government wants to reduce crime rates by reducing inequality. However, four out of six of the social expenditure categories have a positive effect on the crime rates and are therefore inconsistent with the theory predicted by Sala-i-Martin (1995) and Demougin & Schwager (2000). Therefore, we cannot accept the hypothesis that social expenditure has a negative correlation with property crime rates.

The theory that supports this thesis suggests that property crime rather than violent crime will be affected by the different social expenditures since the offender see crime as an occupational choice. A priori, one would expect property crimes to have a higher expected utility than violent crimes and therefore a stronger correlation with social expenditure. On the contrary, our results show that the *Homicide* category is affected to the same rate and in some cases even stronger than that of property crimes. Our findings are in line with those made by Brush (2007), who finds income inequality to correlate in the same way with both property crime and violent crimes.

The regressions performed with *Robbery* as the explained variable have indicated that *Robbery* in many cases is affected in the opposite way compared to the other crime categories. It is also highly inconsistent with itself in our two samples with sign changes for four out of six social expenditure categories. A reason for this could be that *Robbery* is correlated with a variable that is omitted in our model. However, this would mean that *Robbery* is to a high degree explained by a variable that does not seem to affect either property crimes or *Homicide* largely.

Finally, taking all our findings into consideration, we see a tendency that certain categories of social expenditure are negatively correlated with crime and could possibly be used by the government as a method to reduce crime rates. However, we conclude that the total level of social expenditure, as well as three other categories of social expenditure, do not correlate with property crime rates in the way we expected them to. *Homicide* seems to be affected in the same way as the other crime categories, which is not what we expected. Since our research stretches over rather few years and also contains a number of missing observations, we cannot know with certainty that the implications drawn for this are correct for more than this study. It can rather be seen as an attempt to investigate if social expenditure can explain disparities in crime rates.

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APPENDIX

The observations in this thesis are taken from four different databases, which are presented here:

Eurostat, the statistical office of the European Union

- Vehicle Theft (total number of offenses)
- Robbery (total number of offenses)
- Domestic Burglary (total number of offenses)
- Homicide (total number of offenses)
- Police Population (total number of offenses)
- GINI-coefficient

<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

OECD, Social expenditure database

- Total social expenditure (In percent of GDP)
- Unemployment social expenditure (In percent of GDP)
- Housing social expenditure (In percent of GDP)
- Incapacity related social expenditure (In percent of GDP)
- Health social expenditure (In percent of GDP)
- Family social expenditure (In percent of GDP)
- Total number of males 15-19, 20-24 (In percent of total population)

http://www.oecd.org/document/9/0,3746,en_2649_33933_38141385_1_1_1_1.00.html

The World Bank Open Data

<http://data.worldbank.org/>

- Urban Population (In percent of total population)
- Unemployment (In percent of total labor force)
- GDP per Capita (Current US\$)
- Total population
- Female population (In percent of total population)
- GINI-coefficient

UNODC – United Nations Office on Drugs and Crime

<http://www.unodc.org/>

- Total persons convicted in criminal courts
The information are taken from the 6th until the 10th United Nations Survey on Crime Trends, (1995-1997, 1998-2000, 2001-2002, 2003-2004, 2005-2006)