

The Changing Economy and Demography of Saskatchewan and its Impact on Crime and Policing

Phase II Report: Influences on Criminal Behaviour - Theory and Evidence



Prepared by:

Stuart Wilson

Ken Sagynbekov

Taylor Pardy, and

Jason Penner

Department of Economics,
University of Regina

CCJS

Collaborative Centre for
Justice and Safety

University
of **Regina**

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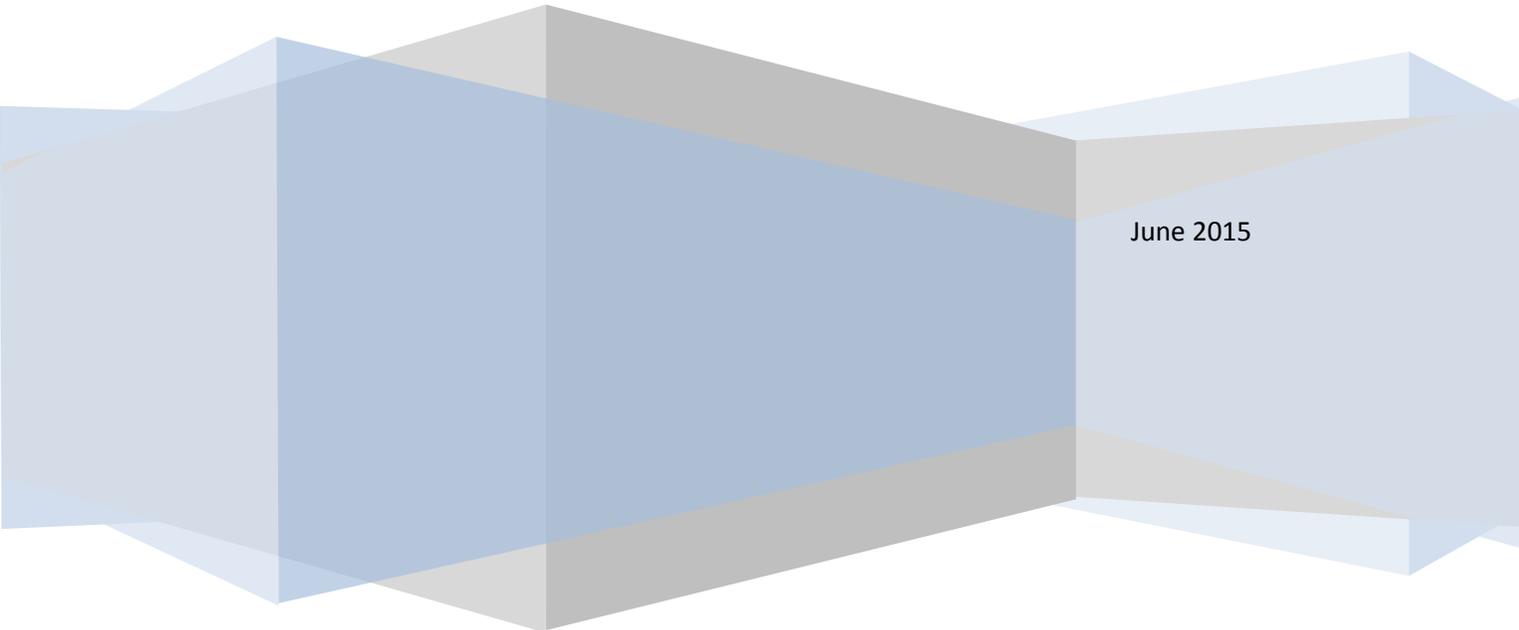
*Research Collaboration Project between the Royal Canadian Mounted Police “F”
Division and the University of Regina’s Collaborative Centre for Justice and Safety*

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Stuart Wilson, Ken Sagynbekov, Taylor Pardy, Jason Penner

Department of Economics, University of Regina



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Author Profiles

Dr Stuart Wilson is an Associate Professor and past Head of the Department of Economics at the University of Regina. He earned his PhD in Economics from Queen's University at Kingston, and conducts research on the links between demographic change, public policy, savings and investment, and economic growth. Among his works are articles in the *Review of Economic Dynamics*, *Empirical Economics*, the *Australian Economic History Review*, and a chapter in the McGill-Queen's University Press book, *Canadian Immigration Policy for the 21st Century*. He teaches courses in macroeconomics, econometrics, and population economics at the University of Regina.

Dr Ken Sagynbekov is an Assistant Professor of Economics at the University of Regina. He earned his PhD in Economics from the University of Mississippi, USA. His research primarily focuses on Public Choice theory and applied microeconomic analysis of health and crime. His recent research works were published in the *Journal of International Trade and Economic Development*, the *Journal of Obstetrics and Gynecology Canada*, and the *Journal of the Indiana Academy of the Social Sciences*. He is a member of the Expert Advisory Council to the Deputy Minister, Policing and Corrections, Ministry of Justice of Saskatchewan. He teaches courses in economics of crime, economics of health, and econometrics at the University of Regina.

Mr Taylor Pardy completed a Master of Arts in Applied Economics and Policy Analysis at the University of Regina. His graduate project was a study of the economic, demographic and social factors which have contributed to changes in criminal activity in Saskatchewan between 2001 and 2011. He has worked with the Canadian Home Builders' Association as a Research Analyst on municipal housing in Saskatchewan.

Mr Jason Penner is a Policy Analyst with the Saskatchewan Ministry of Agriculture. He completed a BA in Economics and Geography at the University of Regina, and an internship researching taxation policy in Saskatchewan with the Canadian Federation of Independent Business. He is currently completing his final project for a Master of Arts in Applied Economics and Policy Analysis at the University of Regina, which focuses on the criminal behaviour and educational attainment of Saskatchewan youth.

Feedback and correspondence welcome at: stuart.wilson@uregina.ca

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Executive Summary

This report is the second preliminary report of a larger research project focusing on the changing economy and demography of Saskatchewan and its impact on crime and policing. The first report presented an overview of economic, demographic, policing, and crime trends over the last two decades in Saskatchewan and its ten major cities, with the additional context of developments in the other Prairie Provinces, and in Canada as a whole. This second report presents a review of the literature on the theoretical and empirical determinants of criminal behaviour and crime.

On the basis of economic theory, the factors that are believed to be **important determinants of crime** are:

- levels of income
- unemployment
- inflation
- poverty
- inequality
- educational attainment
- age
- differences in family structures
- immigration
- ethnic differences
- punishment for offenses
- policing
- crime prevention strategies

The empirical evidence concerning the influence of these factors on crime is reviewed in this report. The literature is vast, with various methodologies and data used. The survey literature repeatedly points out that it is very important to use appropriate methods and to corroborate results with those from a range of data sets in order to make valid inferences.

Empirical studies provide support for the inferences that **criminal activity will be reduced** with:

- an increase in police size and/or resources
- an increase in the severity of punishment
- an increase in incarceration
- an increase in employment opportunities for young men with low skill and education levels
- a decline in inflation

There is weak empirical support for an impact of poverty and inequality on crime, and mixed results when trying to determine the impact of changes in unemployment on crime.

There appears to be a link between increased immigration and reductions in property crime in Canada in the long run, although research on this link in Canada is limited.

Other demographic factors are associated with an elevated propensity for criminal behavior. They are:

- youthfulness
- belonging to broken or lone-parent households
- belonging to visible minority groups

However, these demographic factors tend to mask underlying related socio-economic factors linked to crime, such as:

- poor employment prospects
- high unemployment
- financial instability
- high absolute and relative poverty
- neighborhood disadvantages
- social instability

At this point in time, little research exists on the effectiveness of crime prevention strategies, but the evidence is encouraging for continued development, implementation, and assessment of such strategies to reduce crime.

Natural resource booms, like those recently experienced in Saskatchewan and North Dakota, have the potential for creating a “perfect storm”. Large numbers of young workers are quickly brought into a resource region, work long hours and receive high wages, and are accommodated in work camps detached from the greater community. These environments have been found to increase crime rates, particularly for drug-related offenses and violent crime.

The findings contained in this second report will be used in subsequent phases of the larger research project, to assist in the development and use of an empirical model to examine and test for the determinants of crime in Saskatchewan over time. The model will also be used to forecast the probable evolution of crime rates over time with continued resource development and the expansion of the Saskatchewan economy, to assist policy-makers and police forces plan for the future.

Table of Contents

Author Profiles.....	i
Acknowledgements.....	i
Executive Summary.....	ii
List of Tables and Figures.....	vi
1 Introduction.....	1
2 Economic Modeling of Criminal Behaviour.....	3
2.1 Illustrative Example.....	4
2.2 Returns to Crime.....	5
2.3 Costs of Crime.....	5
2.4 Illustrative Example Revisited.....	7
2.5 Time Preference.....	8
2.6 Attitudes to Risk.....	9
2.7 Model Predictions.....	10
2.8 Aggregate Trends.....	11
2.8.1 Economic Factors.....	12
2.8.2 Demographic Factors.....	13
2.8.3 Policing, Prevention and Punishment.....	14
2.9 Summary: Economic Modeling of Criminal Behaviour.....	15
3 Empirical Evidence.....	16
3.1 Economic Factors.....	16
3.1.1 Income and Business Cycles.....	16
3.1.2 Unemployment and Crime.....	18
3.1.3 Inflation and Crime.....	21
3.1.4 Poverty and Inequality.....	23
3.1.5 Summary: the Impact of Economic Factors on Crime.....	24
3.2 Demographic Factors.....	25
3.2.1. Education.....	25
3.2.2 Age.....	27
3.2.3 Family Structures.....	31
3.2.4 Immigration and Ethnic Differences.....	32

3.2.5 Summary: the Impact of Demographic Factors on Crime	35
3.3 Policing, Prevention, and Punishment.....	35
3.3.1 Punishment.....	35
3.3.2 Policing	38
3.3.3 Crime Prevention.....	39
3.3.4 Summary: the Impact of Policing and Justice System Factors on Crime.....	41
3.4 Natural Resource Booms: Perfect Storms?	41
3.5 Summary: Empirical Evidence	42
4 Non-Economic Theories of Crime.....	45
4.1 Criminals as Victims of Oppression	46
4.1.1 Conflict Theory	46
4.1.2 Labeling Theory	46
4.1.3 Marxist Theory.....	46
4.1.4 Feminist Theory	47
4.1.5 Empirical Support for Oppression-based Theories.....	47
4.2 Biological Theories.....	48
4.3 Psychological Theory	49
4.4 Social-Psychological Theories	50
4.4.1 Social Learning Theory.....	50
4.4.2 Social Bonding Theory	51
4.5 Sociological Theories	51
4.6 Common Themes in Non-economic Theories of Crime and the Economic Theory of Crime.....	52
4.7 Summary: Non-economic Theories of Crime and Empirical Support.....	54
5 Conclusion	55
Bibliography.....	57

List of Tables and Figures

Figure 1: Criminal Code Violations by Age, Canada, 2011 (per 100,000 residents)	28
Figure 2: Criminal Code Violations by Age and Gender, Canada, 2011.....	29
Figure 3: Criminal Code Violations by Age and Type of Offense, Canada, 2011	29

1 Introduction

This report is the second report of the research project titled, *The Changing Economy and Demography of Saskatchewan and its Impact on Crime and Policing*, part of the Research Collaboration Project between the Royal Canadian Mounted Police “F” Division and the University of Regina’s Collaborative Centre for Justice and Safety. This research project aims to examine the socio-economic determinants of crime, identify how economic and demographic changes in Saskatchewan and its cities have influenced changes in crime rates, and to speculate how crime rates might evolve with continued resource development and the expansion of the Saskatchewan economy.

The first report provided an overview of the economic and demographic changes that have occurred over the last two decades in Saskatchewan as a whole and in its ten major cities, and the coinciding changes in policing and crime rates (Wilson & Sagynbekov, 2014). After two decades of slow economic and population growth, the Saskatchewan economy shifted into a higher gear in 2006 in response to higher commodity prices. Saskatchewan experienced an export boom, increased resource exploration and development, a construction boom, and increased immigration and inter-provincial in-migration. The province benefitted with higher median incomes and reduced poverty rates. Crime rates have fallen since 2003, and yet are still among the highest in the country. Saskatchewan has also been dealing with a rise in drug-related offenses since 2009. Three cities in the province with higher than average crime rates share the characteristics of low median incomes, high rates of poverty, and high proportions of aboriginal peoples with the associated characteristics of youthfulness, low educational attainment, low household income, high rates of unemployment, and high rates of poverty. Two cities in the province with high rates of violent crime and drug-related offenses share the characteristics of fast population growth and high median incomes. These facts were presented in the first report.

The objective of this second report is to provide a comprehensive survey of the literature concerning the influences on criminal behaviour, with a particular focus on economic, demographic, policing, and justice system factors. This survey will motivate the development and use of an empirical model, in the third phase of this project, which will be used to examine and characterize these links and how they have evolved over time. The empirical model will then be used to speculate how crime rates may evolve with continued resource development and the expansion of the Saskatchewan economy, to assist policy-makers and police forces plan for the future.

The emphasis in this second report is primarily on the literature which describes the economic theory and the use of quantitative methodologies to uncover the determinants of criminal behaviour. Section 2 provides a model of individual behaviour under a set of simplifying assumptions, which is applied to criminal behaviour. Examples are provided to illustrate individual decision making and how changes in the environment will lead to changes in the decision-making process and to outcomes. The model is then used to provide a set of testable predictions and to highlight the economic, demographic, policing, and justice system factors that are presumed to influence criminal behaviour and crime rates. The empirical evidence is reviewed in Section 3 to uncover if and how these factors influence crime. Section 4 provides a brief overview of theories developed in other disciplines, and supporting evidence on the determinants of criminal behaviour, and Section 5 concludes this report.

2 Economic Modeling of Criminal Behaviour

Economists have exhibited keen interest in examining and explaining criminal behaviour and trends, the economic motives for crime, and the economic impact of crime. The ground-breaking work by Becker (1968) is viewed as seminal to the economic study of crime, with Ehrlich (1973) providing early important modeling enhancements. Sensationalized recent work by Levitt, including sections in popular books under the *Freakonomics* series name, have attracted much attention to economic methodology applied to the study of crime (Levitt, 2004; Levitt & Dubner, 2005). In this section, the framework and assumptions that economists use to study criminal behaviour will be introduced. Readers interested in other highly accessible introductions to the economics of crime are encouraged to consult Rosenthal (2005), Hellman & Alper (2006), Harrison & Theeuwes (2008), and/or Albertson & Fox (2012).

The central assumptions that economists make in order to begin modeling human behaviour are that the individual in question is rational, and wants to achieve the greatest level of satisfaction possible over the lifecycle, subject to a series of constraints. The individual makes choices including what skills to acquire in education and training opportunities, how to translate those skills into earnings by choosing career pathways, and what goods, services, and investment assets to buy, all to achieve the greatest level of overall satisfaction or well-being over time. The constraints facing the individual are defined by the resources available to the individual, including financial wealth, time, abilities and skills. The environment in which the individual operates also places constraints on opportunities and decisions, as defined by social, regulatory, and legal systems.

Economists make these assumptions, with the rationality assumption and the desire of the individual to maximize satisfaction, to model criminal behaviour. Although the assumption of rationality for a criminal may be a strong assumption for many, it is the requisite starting point in economic study. The rational individual is faced with many opportunities and decisions for consideration. One of those opportunities may be to commit an illegal act. These illegal opportunities are as widespread as the ability to drive faster than the speeding limit as posted on roadways, to buy and sell illicit drugs, to break, enter, and steal, and to assault another individual.

When presented with the opportunity to drive at excessive speed to make an appointment, the rational individual will weigh the expected benefits of reaching a destination at the most preferable time and the thrill of fast driving or racing, as examples, versus the expected costs of a possible accident, and of the possibility of being pulled over by an officer, being further delayed, and being issued a speeding ticket. The individual considering a premeditated assault will weigh the benefits of inflicting pain and harm, and instilling a sense of fear in the victim, and any other associated benefits, with the costs of being caught, charged, and punished. The eighteenth century philosopher, Jeremy Bentham wrote, "the profit of the crime is the force which urges man to delinquency: the pain of the

punishment is the force employed to restrain him from it. If the first of these forces be the greater, the crime will be committed; if the second, the crime will not be committed” (Bentham, 1838, p. 399).

Under the assumption of rationality, the individual will engage in the illegal act if the net expected benefits (the expected benefits less the expected costs) are greater than zero. This is summarized by the following simple formulaic mathematical expression:

Expected Net Benefit = Sum of Expected Benefits – Sum of Expected Costs

$$E[NB] = \sum_{i=1}^{n_b} E[B_i] - \sum_{j=1}^{n_c} E[C_j] \quad (EQ1)$$

2.1 Illustrative Example

Let’s examine the simple example of speeding in more detail. Consider John Doe, a self-employed salesman who is faced with being late for an appointment with a client to complete a sale. If he is late, the client will cancel the appointment and go to a competitor. John believes that, if he exceeds the speed limit, he will very likely get to his appointment on time and complete the sale. The sale is worth \$1,000 in additional income to him. By speeding, let’s assume that this will place additional costs of \$20 on the use of his vehicle for speeding rather than going at a normal pace. Now, let’s also make the following additional assumptions. First, there is a probability that traffic conditions will cause him to not reach his destination on time, even when speeding. That probability is 5%. Second, there is a probability that he will get pulled over by the police, be late for his appointment, and get a \$200 fine. That probability is 4%. Third, there is a probability that he will be in an accident and miss his appointment, and incur costs of \$23,000 in damages and fines. That probability is 1%. If there are no other significant benefits or costs to be considered, will a rational John Doe speed?

What are his expected benefits? There is a 90% probability of John Doe meeting his appointment with a return of \$1,000 in income. What are his expected costs? There is a \$20 cost to operating his vehicle above the speed limit. There is a 4% chance that he will be caught and be fined \$200. There is a 1% chance that he will be in an accident and be responsible for \$23,000 in damages and fines. Putting this all together we have the expected benefits of speeding equal to \$900 (90% of \$1,000), and the expected costs of speeding equal to \$258 (\$20 + 4% of \$200 + 1% of \$23,000). Using expression (EQ1) in summative form, we have:

$$E[NB] = \sum_{i=1}^{n_b} E[B_i] - \sum_{j=1}^{n_c} E[C_j], \text{ so that,}$$

$$\sum_{i=1}^{n_b} E[B_i] = 0.9 \times \$1,000 = \$900, \text{ and}$$

$$\sum_{j=1}^{n_c} E[C_j] = \$20 + 0.04 \times \$200 + 0.01 \times \$23,000 = \$258, \text{ and thus,}$$

$$E[NB] = \$900 - \$258 = \$642 > 0. \quad (EG1)$$

A “rational” John Doe, who will choose to engage in a specified behaviour when the expected benefits of that behaviour exceed the expected costs of the behaviour, will therefore choose to speed in order to get to his appointment on time.

2.2 Returns to Crime

The returns to a successful crime are most often considered as accruing to the offender, although there may be cases when others benefit, including accomplices, ring leaders, and unattached individuals who may receive some form of benefit from knowing the act had been committed (e.g. perhaps someone else is considering the choice to commit the same act, and is encouraged by another’s success). Returns are often placed into two categories: tangible and intangible returns. Tangible returns include money, goods and services; these items are easy to quantify in monetary values. Intangible returns include feelings of power, revenge, success, peer approval, and the thrill of danger and conquest. Let’s assume that we can place a monetary equivalent value on these items. Perhaps as a controversial illustration, but hopefully meaningful nonetheless, let’s assume that an individual would be willing to pay up to \$2,000 to role-play the part of an instigator of a forceful sexual encounter with a prostitute; this might be an approximation of the value of a sexual assault to an offender, in this framework to model human behaviour.

In the speeding example above, the tangible monetary gain was \$1,000 and the value of the intangible monetary gain was assumed to be \$0. The probability of successfully achieving these returns was 90%. And so, the expected value of returns to the act of speeding was \$900.

2.3 Costs of Crime

The costs of crime accrue to the offender, to victims, and to society as a whole. Offenders may face costs associated with committing illegal acts. For example, a person choosing to commit a premeditated assault must devote time, and other resources, perhaps purchasing special concealing clothing, in order to complete the task. Crime may affect specific individuals, for example, a victim of assault may experience physical and emotional pain. Crime may affect society as a whole as well, as others may experience fear and less security knowing that a neighbor has been assaulted; the justice system and social service providers may also experience costs in dealing with the assault and its after-effects.

We will only consider the costs to the person contemplating a crime as entering into the decision. These are called private costs. Other costs (for victims, and for society overall) are not considered relevant to the decision maker since they are borne by others. The costs of committing a crime include those to plan and execute a crime, such as expenditures for materials, tools and supplies. There may also be intangible costs incurred in committing a crime, like feelings of guilt, anxiety and fear of being

caught. These costs must also include opportunity costs, which are the costs incurred by foregoing another opportunity in order to commit a crime. These opportunity costs may include the lost benefits of using time to spend with and enjoy friends, or to work and earn income at a job. Some of these costs may be tangible, like the loss of \$100 in income for four hours of work time as an alternative to the time spent committing a criminal act. These opportunity costs may also be intangible, like the opportunity cost valuation of \$100 for the pleasure of spending time enjoying the company of friends and family during an equivalent four-hour period of leisure.

The next category of private costs relates to being caught, and these costs are not certain since the individual does not know if he will be caught. If caught, the individual will experience costs associated with being in the justice system, both financial (lawyer fees) and time costs (opportunity costs of lost time while in the justice system), and will experience costs related to punishment, be they fines, or related to time served in the penal system. In addition, there may be intangible costs associated with being caught and serving time, like the social stigma attached to being known as a criminal offender.

In the above speeding example, the tangible costs to the offender were \$20 in operational costs, the intangible costs and the opportunity costs were both also assumed to be \$0 for simplicity, and the costs related to being caught were \$200, with a probability of 4%, and \$23,000 with a probability of 1%. Putting these together, the total of the expected costs to committing the act of speeding was \$278. With these assumptions and valuations, the rational individual will choose to commit the illegal act of speeding. It should be emphasized, however, that the decision made is indeed considered rational on an ex ante basis. If John Doe proceeds to speed and gets into an accident which was in the realm of possibility, many observers might consider the resulting damages of \$23,000 to be a steep price to pay for the possibility of receiving the \$1,000 of additional income, and deem his speeding as irrational, but this is an analysis on an ex post basis; the possibility of having an accident with considerable damages was taken into account before making the decision, on a rational basis.

This method of modeling can also be applied on similar grounds to the decision to commit other crimes, for example, an assault. However, the individual making the decision on whether or not to commit crime does not take into account the additional costs borne by other individuals and by society as a whole, which may only be partially compensated by fines and damages imposed on the offender. This is an example of what economists call a negative externality, where decisions made at the individual level have consequences for others that are not valued as part of the decision-making process. In the simple illustrative example, these additional costs borne by society may include uncompensated damages borne by the police force, justice system, government, and individuals affected by the speeding vehicle or the possible accident.

2.4 Illustrative Example Revisited

Now, let's enhance and vary some of the benefits and costs specified in the simple example above to get a better idea how they affect the individual's decision. As an adjustment to the first example, consider the case with additional intangible personal benefits and costs. Assume that John receives an increase in satisfaction if he successfully speeds to his target without being caught, a level of satisfaction deemed equivalent to that if he had found a \$20 bill in the park and being able to use that money. Assume that John would be very unhappy and angry for a considerable amount of time if he were to meet up in traffic and not make his appointment, a level of unhappiness equivalent to that if he were to lose his billfold containing money, all valued at \$200. Assume that if he were to be caught speeding, he would not only receive the ticket, but would also be upset, a level of angst for which he would be willing to pay \$100 to be rid. In addition, let's assume that if John were to cause an accident, he would experience more serious guilt and anxiety amounting to the equivalent of \$2,000 in personal distress. These additional intangibles are in boldface below:

$$E[NB] = \sum_{i=1}^{n_b} E[B_i] - \sum_{j=1}^{n_c} E[C_j], \text{ so that,}$$

$$\sum_{i=1}^{n_b} E[B_i] = 0.9 \times (\$1,000 + \mathbf{\$20}) = \$918, \text{ and}$$

$$\sum_{j=1}^{n_c} E[C_j] = \$20 + 0.05 \times \mathbf{\$200} + 0.04 \times (\$200 + \mathbf{\$100}) + 0.01 \times (\$23,000 + \mathbf{\$2,000}) = \$292, \text{ and thus,}$$

$$E[NB] = \$918 - \$292 = \$626 > 0. \quad (\text{EG2})$$

In total, the expected benefits amount to \$918, and the expected costs amount to \$292, and the expected net benefit amounts to \$626. John Doe would still be willing to speed with the hope of reaching his destination on time.

Working from example EG2, let's reduce the benefit of making the scheduled appointment so that the value of additional income is only \$300 (EG3). This would reduce the expected benefit from \$918 to \$288. This would mean that a rational John Doe would deem the expected benefits of speeding (\$288) to be less than the expected costs of speeding (\$292), and as such, he would choose not to speed, miss the appointment, and lose the sales income:

$$E[NB] = \sum_{i=1}^{n_b} E[B_i] - \sum_{j=1}^{n_c} E[C_j], \text{ so that,}$$

$$\sum_{i=1}^{n_b} E[B_i] = 0.9 \times (\$300 + \mathbf{\$20}) = \$288, \text{ and}$$

$$\sum_{j=1}^{n_c} E[C_j] = \$20 + 0.05 \times \mathbf{\$200} + 0.04 \times (\$200 + \mathbf{\$100}) + 0.01 \times (\$23,000 + \mathbf{\$2,000}) = \$292, \text{ and thus,}$$

$$E[NB] = \$288 - \$292 = (\$4) < 0. \quad (\text{EG3})$$

Additional scenarios can be explored in which fines for speeding may increase, the probability of detection may rise, or societal pressures may cause changes in intangible benefits and costs including the value of feelings of power and peer approval over committing crimes, or the value of feelings of guilt and social stigma associated with being caught. Such changes may affect the ultimate decision of the individual, either pushing the act towards higher expected net benefits, or towards lower net benefits. Only when the result is a change from a net cost to a net benefit, or when the result is a change from a net benefit to a net cost, will the decision to commit the illegal act be changed. Small changes in these factors may push only a few people under different daily speeding scenarios to make different decisions, leaving many other individuals' choices unchanged.

2.5 Time Preference

Up to this point in the discussion, we have not mentioned the value individuals place on returns or costs expected to be received in the future, rather than those solely in the present. Some people may place a higher value on a \$1,000 return today as opposed to the value of \$1,000 received in one year. If this is the case, we may introduce the concept of time discounting, or the equivalent concepts of time preference, the degree of impatience, or the tolerance for delayed gratification. An individual may be relatively impatient, and view the receipt of \$1,000 in one year as equivalent to the value of receiving \$900 today. In this case, the discount rate for this individual is 10%. Very impatient individuals will have a much higher discount rate, like 50%, which means that such an individual would be just as well off to receive \$500 today as he would by receiving \$1,000 in one year.

As an illustration of the effect of time preference, let's extend the previous example (EG3) to allow for time discounting effects on the decision. First, the monetary gain from the completed contract will immediately be \$150, and an additional \$150 in one year. Second, the \$23,000 in damages arising from a possible accident would be payable in one year's time. Third, the individual has a discount rate of 10% each year in valuing future returns and costs in present value terms. These changes affect the decision as follows, with changes identified in boldface:

$$E[NB] = \sum_{i=1}^{n_b} E[B_i] - \sum_{j=1}^{n_c} E[C_j], \text{ so that,}$$

$$\sum_{i=1}^{n_b} E[B_i] = 0.9 \times (\$150 + \$20 + \mathbf{0.9 \times \$150}) = \$274.50, \text{ and}$$

$$\sum_{j=1}^{n_c} E[C_j] = \$20 + 0.05 \times \$200 + 0.04 \times (\$200 + \$100) + 0.01 \times (\$2,000 + \mathbf{0.9 \times \$23,000}) = \$269, \text{ and thus,}$$

$$E[NB] = \$274.5 - \$269 = \$5.50 > \mathbf{0}. \quad \text{(EG4)}$$

The individual is prepared to engage in the act of speeding under these conditions, which is expected to generate a net benefit in present value terms. In this case, there is a reduction in expected costs of

\$23, due primarily to the discounting of the possible costs of an accident, and there is a reduction in the present value of expected returns by \$13.50.

The rate of time preference will affect individual choices. In general, a more impatient and impulsive individual wants satisfaction right away, and is more likely to engage in various types of criminal activity that involve immediate returns, be they tangible or intangible, than will those who can delay their satisfaction.

2.6 Attitudes to Risk

Individuals in society vary over the values they place on goods, the use and usefulness of their time, the intangible satisfaction they achieve over various feelings and behaviours, and over their rate of time preference. Individuals also vary over their attitudes to risk. The examples so far have assumed that the individual is risk neutral. Risk neutrality essentially means that an individual is indifferent to risk, and will value a prize (or loss) of \$1,000 with certainty, as being equal to the possibility of receiving (or losing) \$2,000 with a probability of 0.5, and \$0 with a probability of 0.5. An individual who is risk averse prefers certainty over uncertainty, and places a higher value on receiving \$1,000, than in receiving a ticket which has a probability of 0.5 of receiving a \$2,000 prize, and \$0 otherwise. A highly risk averse individual might be willing to receive as little as \$500, rather than the ticket with a 0.5 probability of a \$2,000 prize. A risk loving individual gains extra satisfaction out of an uncertain outcome, and would much rather prefer the ticket with a \$2,000 prize and a probability of 0.5 and with \$0 otherwise, over the \$1,000 gain with certainty. A highly risk-loving individual may need to receive as much as \$1,300 with certainty in order to forgo the ticket with a 0.5 probability of receiving the \$2,000 prize.

Faced with the situations under EG1 and EG2, with positive net expected benefits in excess of \$600, the risk neutral salesman will choose to speed; the risk loving individual would choose to speed as well. The uncertainty facing the individual in these situations, particularly with the possibility (albeit low) of fines and intangible costs, may lead a highly risk averse salesman to decide not to speed, and forgo the opportunity to close the sale.

The net expected benefit under scenario EG3 is actually a loss of \$4. This would lead the risk neutral salesman to decide not to speed and lose the sale. The risk averse individual would also choose not to speed. A risk loving salesman would, however, choose the more uncertain outcome and speed to his destination. Faced with the scenario described by EG4, both risk neutral and risk loving individuals would choose to speed, whereas the risk averse would not for such a low expected net return.

In summary, those with aversion to risk tend to be less likely to commit crimes with the uncertain outcomes of failure, detection, and punishment, while those who are lovers of risk are more likely to commit crimes with uncertain benefits and costs.

2.7 Model Predictions

The rational choice model used by economists to explain criminal behaviour has several predictions at the individual level:

- A. When the tangible return to crime increases (decreases), the probability of the crime occurring increases (decreases). All else equal, if the value of goods that can be stolen in one incidence of robbery increases, then the attraction of that crime, and its probability of occurring increase.
- B. When the intangible return to crime increases (decreases), the probability of the crime occurring increases (decreases).
- C. When the probability of successfully committing a crime increases (decreases), the probability of the crime occurring increases (decreases). It may become easier to successfully rob a home when there is no one there, and there are no security devices. In such a case, the expected return increases, as does the possibility of committing the crime.
- D. When the direct costs of committing a crime increase (decrease), the probability of the crime occurring decreases (increases).
- E. When the intangible costs of committing a crime increase (decrease), the probability of the crime occurring decreases (increases). If it becomes less acceptable among peer groups and society overall to be found guilty of, for example, home violence, people may be less likely to commit such crimes. An increase in social awareness about home violence and its prevalence may curb the probability of these crimes being committed.
- F. When the opportunity costs of committing crime increases (decreases), the probability of the crime occurring decreases (increases). If people have a better ability to find well-paying and interesting employment, people may be less likely to pursue criminal activities.
- G. When the probability of being caught increases (decreases), the probability of the crime occurring decreases (increases).
- H. When the probability of conviction increases (decreases), the probability of the crime occurring decreases (increases). If there is a higher probability of being caught and punished, the expected costs of crime increase, and lessen the attractiveness of the crime.

- I. When the punishment increases (decreases), the probability of the crime occurring decreases (increases). If the fines and/or time of incarceration increase, the expected costs of committing crime increase.
- J. When people place greater (less) emphasis on future outcomes, the probability of committing crimes which may reduce future opportunities decreases (increases). If people care more about their ability to pursue long-term legitimate goals, then the probability of sacrificing those goals for short-term illegal gains decreases.
- K. When people are more (less) averse to risk, the probability of committing crimes decreases (increases) since the uncertainty of the returns, as well as the uncertainty of getting caught and punished, lessens (heightens) the attraction to crime.

The factors affecting an individual's decision to commit a crime are as varied as the factors affecting an individual's decision to enroll in a trade school, or to take a job in another province. These decisions are complex, and because they are complex, people will differ in their choices. It is not always possible to discover how close each individual is from taking the option not chosen. We may only observe the choice made, and not the underlying factors and their contributions to influencing the decision. For example, how large of a scholarship would be required to cause Jane Smith to enroll in welding school rather than start a life of burglary? If Jane Smith enrolls in welding school, will we know how close Jane was to becoming a burglar? If Jane Smith becomes a burglar, will we know how close Jane was to a life of legitimate employment?

2.8 Aggregate Trends

The economic model used to describe behaviour at the individual (and microeconomic) level may also be used to help examine trends in criminal behaviour at the aggregate (and macroeconomic) level. Why have most crime rates generally fallen since 2003 in Canada? Why have most crime rates fallen since the mid-1990s in the US? How do improved economic conditions and increasing employment opportunities affect criminal activity? How do changes in the justice system affect criminal behaviour? Why has Saskatchewan recently experienced an increase in drug-related offenses?

We may use the general economic model and translate the model predictions at the individual level to make predictions at the macroeconomic level. This may help connect trends in macroeconomic variables to trends in crime rates. However, we must use caution, since many of the macroeconomic trends may have offsetting effects on criminal activity, and the distinction between correlation and causation may be blurred. In this section, economic, demographic and justice system factors will be briefly discussed, with the purpose of setting up some context for the review of empirical evidence in section 3.

2.8.1 Economic Factors

The first set of factors to be explored is the set of economic factors. Economists have sought to associate trends in crime to economic cycles, and to changes in income, unemployment, inflation, poverty and inequality.

2.8.1.1 Income and Business Cycles

An increase in general prosperity, indicated by stronger growth in production (GDP), is a macroeconomic variable often linked in theory to criminal activity. Stronger growth and prosperity is expected to increase the amount of employment opportunities in the legal economy, and thus increase the opportunity costs of criminal activity, which would lead to less crime (see prediction F above). However, improvements in GDP may also affect criminal activity in other offsetting ways. Improved prosperity would also increase the tangible returns to property crime, leading to more property crime (see prediction A). Economic growth may lead to greater emphasis on security, both at the individual level with increased personal security measures, and at the community level with improved resources for policing and justice (see predictions B, G, H). Improvements in the general economy may lead to improvements in technology used in the criminal sector, improving the probability of successful criminal activity and/or reducing direct costs (see predictions B, D). Economic growth may also lead to a greater demand for illicit goods, like prohibited drugs, and lead to an increase in drug trafficking and crime. The overall effect of improved (or depressed) prosperity on crime in general is uncertain due to these conflicting effects.

2.8.1.2 Unemployment

An increase in the unemployment rate is generally an indicator of poor economic conditions and of deteriorating employment opportunities in the legal sector. This would decrease the opportunity costs of criminal activity. This may also lead to societal changes that affect the intangible returns and costs of crime; during hard times, minor criminal activity (theft) may more easily be condoned and overlooked in society and certain peer groups (prediction E). However, an increase in unemployment may result in more people being home and circulating in their residential communities, thus increasing the amount of informal security and decreasing the probability of successful crimes. Although the various effects may be offsetting, unemployment rates are general expected to be positively linked with crime rates.

2.8.1.3 Inflation

Inflation has been linked to crime as inflation erodes the purchasing power of money income. An increase in inflation causes items to become more costly to purchase, and individuals with little income, or with fixed income, are less able to provide for their needs. When people are less able to provide for their own needs, they may consider resorting to criminal activity. High inflation may increase the social tolerance for crime as people find it more difficult to make ends meet (prediction E). High inflation may also increase the relative returns to crime (prediction A). Inflation may be positively related to crime rates.

2.8.1.4 Poverty and Income Inequality

People in poverty have difficulty providing for their needs legally. Their opportunity costs to crime are low and they may consider criminal activity (prediction F). They may also become less averse to risk and criminal behaviour, and more impatient as poverty persists (predictions J, and K). As such, an increase in poverty may increase the crime rate. Income inequality may also lead to increased crime as the poor believe that their relative standing against the rich has deteriorated, unfairly, and perhaps because of economic and/or political and/or social conditions that favour the wealthy (prediction E). Poverty rates and degrees of inequality may be positively linked to crime rates.

2.8.2 Demographic Factors

The second set of factors to be explored is the set of demographic factors. In particular, scholars have sought to associate trends in crime to educational attainment, age and youthfulness, to family structures, to immigration patterns, and to cultural and ethnic differences in a population.

2.8.2.1 Education

Low levels of education are generally associated with less skilled and low paying employment opportunities which lead to low opportunity costs of criminal activity, a poor understanding of future opportunities, and the effects criminal activity will have on these. In general, low levels of education at the aggregate level are expected to be linked with high crime rates.

2.8.2.2 Youthfulness

Adolescents and young adults are generally associated with a higher prevalence of crime, as they are believed to have lower employment rates and lower wages affecting their opportunity costs of crime, higher degrees of impatience affecting the way they value future outcomes, and greater tolerance for risk (predictions F, J, and K). In general, youthful societies are expected to be linked with relatively higher crime rates.

2.8.2.3 Family Structures

Youth from lone-parent families tend to have a higher probability of being involved in crime, perhaps because household incomes of lone-parent families tend to be lower than other household types, and perhaps because of loose attachments to greater society due to less supervision or lower participation in expensive after-school programming and activities. Youth of lone-parent families may be predisposed to immediate economic need, be less risk averse, and be predisposed to peer pressure and criminal activity (predictions E, J, K). The proportion of lone-parent families in society may be positively correlated with crime rates.

2.8.2.4 Immigration and Ethnic Differences

Different cultures may have different value systems and different perceptions on criminal activity. Incomplete integration with the majority may result in antisocial behaviour and attitudes across minority ethnic groups. These may lead to violent and property crime differences across ethnic groups. Immigrants and visible minorities may also have different demographic (e.g. age and education) and economic (e.g. poverty, unemployment, inequality) characteristics relative to the overall population that may lead to differences in criminal activity across groups. In general, recent immigrants and those in an ethnic minority may have a larger proportion of youth, greater unemployment and poverty rates, and less developed social support, and may be predisposed to criminal activity, relative to the greater population. As such, the proportion of immigrants and individuals from an ethnic minority may be positively correlated with crime rates.

2.8.3 Policing, Prevention and Punishment

The third set of factors to be explored is the set of policing and justice system factors. Changes in punishment, policing activity, and prevention strategies have been associated with changes in crime and criminal activity.

2.8.3.1 Punishment

Following prediction I, if the justice system imposes higher punishment for a particular crime, be it monetary and/or in incarceration time, it is expected that criminal activity would be deterred and crime would decrease.

2.8.3.2 Policing

An increase in the number of police officers and policing resources may result in an increase in the probability of detection and conviction of criminal activity. This is expected to decrease the incentives for criminal behaviour, and the actual amount of crime, as it would decrease the expected returns to crime (predictions C, G and H). However, an increase in policing resources may also lead to an increase in the number of police-reported crimes as the ability for the police to detect crime increases, and the public may choose to also report more crime with a greater police presence in the community.

2.8.3.3 Crime Prevention Strategies

Strategies to decrease crime may be implemented and affect criminal behaviour via different influences. Strategies may encourage better police-community interaction, better awareness of the costs of crime, better use of anti-theft measures, better community detection and reporting of criminal activity, and less social and peer acceptance of crime in the community. These strategies are, as the title suggests, implemented to prevent crime, and decrease crime rates.

2.9 Summary: Economic Modeling of Criminal Behaviour

In this section, a simple economic model of individual behaviour was presented to analyze how the opportunity of criminal behaviour enters into the rational decision-making process. The model was examined with a simple example, and adjustments to the example were used to illustrate how changes in certain factors may cause a change in a decision. The model has several implications at the microeconomic level. For example, an increase in the severity of punishment for a crime is expected to result in a decrease in the net benefits of that crime, and a decrease in the probability that an individual will commit that crime, all else equal. These implications were then translated to the macroeconomic level. For example, an increase in the severity of punishment for a crime is expected to result in a decrease in the rate of that crime occurring in society, all else equal. With this theoretical framework, the empirical evidence on the economic, demographic, policing, and justice system factors thought to be influences on criminal behaviour and crime rates, is surveyed in Section 3.

3 Empirical Evidence

Crime is a major activity in society, and with it are associated heavy costs, both direct and indirect. As such, researchers have long been interested in the influences and incentives for criminal activity, and to develop policies and measures to help reduce crime and its impact on society. In the previous section, we identified three major sets of factors that may be associated with crime: economic factors; demographic factors, and; policing and justice system factors. In this section, we will examine if and how these factors have empirically been found to influence crime. Each factor will be covered individually, with a summative overview at the end of this section. In many cases, individual studies focus on one of these factors, but also include controls for the other possible factors. Studies that focus on more than one factor may be cited in multiple subsections.

3.1 Economic Factors

The major economic factors that have been examined in the literature for their impact on crime are: income and business cycles; unemployment; inflation, and; poverty and inequality. Each will be discussed in turn.

3.1.1 Income and Business Cycles

Early researchers tended to agree that evidence supported a countercyclical relationship between economic conditions and robbery and burglary, while most found no evidence to support any relationship between homicide and the business cycle (Wolpin, 1978, Long & Witte 1981, Cook & Zarkin, 1985). The majority of these studies relied on parametric (regression) methods, and later studies attempted to further investigate the relationship with improved methods and larger and more recent data samples. A major innovation to the study of crime and business cycles was the introduction of non-parametric estimation methods by Cook & Zarkin (1985).

Cook & Zarkin (1985) investigated patterns in crimes committed during periods of economic growth and in crimes committed during downturns in the economy. They used annual US data from 1933 to 1981, and the timing of economic cycles as determined by the US National Bureau of Economic Research (NBER). They then calculated the growth rate of crimes immediately following the end of an economic growth cycle and compared the results to the growth rates of crime during the economic growth cycle (from trough to peak). Over the nine recessionary periods, eight exhibited stronger growth in robbery and burglary than over the previous growth periods, which indicated that these two categories of crime are counter-cyclical. In contrast, only four of nine recessionary periods exhibited stronger growth in homicides, suggesting no stable relationship between cycles and homicide. In

addition, the growth rate in auto thefts during seven of nine recessionary periods was less than that in the previous growth period, suggesting a pro-cyclical link between auto theft and economic cycles. Cook and Zarkin (1985) supported these results by running simple regressions of crime rates on labour market indicators, the unemployment rate and the employment rate. They found that robbery and burglary were strongly counter-cyclical, while auto thefts were weakly counter-cyclical and homicide was acyclical.

Rather than focusing explicitly on business cycles, Freeman (1996) traced the rising criminal activity of American males from the mid-1970s to the mid-1990s to changes in the labour market. Over this period, the number of men in the US prison system tripled, and surprisingly, criminal activity grew while convicted males were replaced by other offenders. By 1993, almost 1.4 million US males were incarcerated, and an additional 3.5 million were either on probation or on parole, so that almost 7% of adult US males were involved in the criminal justice system. Many of these men were young, and were high school dropouts (including two-thirds of those in state prisons). Freeman (1996) emphasized the role of changes in the labour market as contributing to the rise in criminal activity over this period. Real earnings for low skilled men fell by approximately one quarter and hours worked also fell amongst low earners. He argued that the demand for low skilled workers was depressed, causing the returns to legal activity to fall. Over this period, the attractiveness of illegal activities was enhanced. Based on data from the 1980 NBER Inner City Youth Survey, and the 1989 Boston Youth Survey, the proportion of youths who declared that they could earn more from illegal street activities than from legal employment doubled, to 63% in 1989, and real earnings from criminal activity rose by five percent.

These results were supported by those from Gould et al (2002), who focused on the US labour market experience of young males, and Hansen (2003) who looked at the effects of increasing female labour market participation on male crime in the UK. Low-skilled males suffered in both the US and the UK during the 1980s and 1990s; their real wages declined, and their crime rates increased.

A set of economic variables was used by Yearwood & Koinis (2011) to conduct an exploratory regression analysis of annual crime rates in North Carolina over the 1977-2007 period. Of the various income measures, few were statistically significant for the separate types of crime, and they varied across the crime types: supplemental security income recipients per capita was positively related to robbery; the average wage and salary was negatively related to fraud and larceny-theft; per capita income was positively related to embezzlement; and income benefits per capita was positively related to motor vehicle theft.

Andresen (2013) used a Canadian panel data set at the provincial level covering the 1981-2009 time period. A fixed effects model was used to investigate the short-term impact of economic conditions, demographic changes, and justice system variables, on property and violent crime, and decomposition methods were used to estimate long-term effects. Andresen (2013) pointed out that different model specifications can lead to differing results and inferences, with changes in effect magnitudes, statistical

significance, and even signs. For property crime, aggregate income measures had no statistically significant effect, but other economic variables did: increases in the unemployment rate coincided with declines in property crime, while increases in the proportion of low income families coincided with short-run increases in property crime. Violent crime rates were positively related to the aggregate income measure on a per capita basis, and simultaneously negatively related to aggregate income, although, on an ex ante basis, we would expect these results to be similar.

Overall, the evidence appears to be mixed. Labour market opportunities seem to be important for men who are young and are considered low-skilled to provide an alternative to illegal activities. However, “the relationship between the economy and crime is complex” (Andresen, 2013; p. 255), with some crimes in some regions appearing to be procyclical, while other are counter-cyclical, and even acyclical. The empirical findings appear to be highly sensitive to the sample data, the period of study, and the factors used in the analysis. This indicates that further study is needed, but also that the results may be showing which effects dominate, the opportunity effects or the motivational effects, for criminal activity in different contexts.

3.1.2 Unemployment and Crime

Early economic surveys on the relationship between unemployment and the level of crime in the aggregate, have found, for the most part, that a weak positive relationship existed, with higher rates of unemployment or lower rates of employment corresponding with higher rates of crime, and that the relationship became stronger in the 1970s (Freeman, 1983; Chiricos, 1987).

The empirical investigation of the relationship between unemployment and crime was extended to allow for time delays in the pattern of unemployment as it affects criminal behaviour by Cantor & Land (1985). They theorized that in the early stages of periods of higher unemployment, the opportunities to commit crime may be limited. This opportunity effect is the result of a slowdown in production and consumption by the employed and unemployed. This slowdown decreases the level of activity and circulation of people and property, and can also lead to a guardianship effect, whereby people are more inclined and able to protect their property by being home and careful to prevent criminal activity. In the early stage, criminal activity may be reduced. In the second stage, the motivation effect of unemployment may become dominant, since the longer the period of unemployment, the more likely it will be that unemployment benefits and/or savings will be reduced or exhausted, and the motivation to commit crimes to replace lost legal income increases.

The Cantor & Land (1985) study examined annual US data from 1946 to 1982, focused on non-negligible homicide, forcible rape, aggravated assault, robbery, motor vehicle theft, burglary, and larceny, and used a series of different specifications. The results indicated that there was a small overall negative effect of unemployment on homicide, robbery, burglary, larceny, and motor vehicle

theft: the opportunity effect dominated, with a reduction in crime during periods of higher unemployment. For some property crimes (robbery, burglary, and larceny), the results supported a motivational effect, with a delayed rise in these crimes following a rise in the unemployment rate. The unemployment rates had no identifiable impact on rape and aggravated assault.

Raphael & Winter-Ebmer (2001) examined the unemployment-crime link with state-level US panel data using an instrumental variables approach, which tied the closing of military bases and oil price shocks directly to unemployment but not to crime, and then examined direct changes in the unemployment rate as they affected crime rates. The estimates led to the inference that a one percentage point increase in unemployment led to almost a four percentage point increase in property crime, but no discernible impact on violent crime.

Chamlin & Cochrane (2000) believed that there was a different motivational impact of unemployment on crime between the short-term and long-term unemployed. They applied time-series techniques to aggregated monthly US data from 1982 to 1996 and focused on the effect of long-term unemployment on property crime. They found that while the unemployment rate had no impact on property crime, the number of individuals unemployed for fifteen weeks or longer had a positive effect on the level of property crime. They also found that when the demand for labour, proxied by capacity utilization rates, decreased, the number of property crimes increased.

In a similar vein, Chapman et al (2002) examined how the duration of unemployment affected the crime rate of breaking, entering and stealing from private households, in New South Wales from 1989 to 1999, using quarterly data, and simple regression models. The results indicated that while the unemployment rate for all males had no statistically significant effect on property crime, an enhanced model showed that long-term unemployment rates of males aged 15 to 24 had a positive and statistically significant impact on property crime rates.

Paternoster & Bushway (2001) disaggregated auto theft into joyriding and for-profit auto theft in an attempt to better identify the effect of unemployment. They claimed that joyriding, which has been found to account for a strong majority of auto thefts, should be more common during times of prosperity and low unemployment, and should highlight the opportunity effect. For-profit auto theft should be more common during times of high unemployment and depressed economic conditions. The authors contended that unemployment changes inversely with output, in tune with the business cycle, so that the business cycle served as a valid proxy for changes in unemployment. They then applied the nonparametric methods used by Cook & Zarkin (1985) to study business cycles and crime rates. Paternoster and Bushway (2001) used age at arrest to distinguish between joyriding and theft for profit over 11 business cycles between 1933 and 1991, under the assumption that juvenile offenders are joyriders, and adults are for-profit offenders. The results indicated that in 9 out of 11 business cycles, the growth rate in the juvenile crime rate was greater during economic expansion as opposed to contraction. In contrast, the adult crime rate grew more in the expansion phase than during

contraction in only 6 out of 11 business cycles, suggesting some ambiguity between opportunity and motivation effects for adults.

At the aggregate level, the evidence appears mixed, with motivational and opportunity effects often counteracting each other. Most studies that focus on the crime-unemployment relationship at the individual level find support for a positive link, with individuals more likely to engage in criminal activity during periods of unemployment. Thornberry & Christenson (1984) used data from Philadelphia police files and the FBI to construct arrest histories for a ten percent sample of those born in 1945. Interviews were conducted with the sample respondents at age 25, with a 62% response rate, for a sample of 567. Arrest histories were available to age 30. They found that the relationship between unemployment and arrests was substantially stronger for those who had a prior history of delinquent activity as well as those who worked in 'blue collar' occupations, and found a strong concurrent relationship between the amounts of time spent unemployed in a given year and the number of arrests that year. Most importantly, the authors concluded that the results indicate that there are strong reciprocal relationships between unemployment and crime that are reinforcing. "Unemployment has significant instantaneous effects on crime and crime has significant, primarily lagged effects on unemployment" (Thornberry & Christenson, 1984, p. 408).

A study by Hartnagel & Krahn (1989) examined the unemployment-crime relationship with a sample of 162 individuals from Edmonton who had dropped out of high school before completing grade 12, in the 1980s. There was a bivariate correlation between the number of months an individual spent unemployed after leaving school and self-reported involvement in property and violent crime. In a multivariate regression analysis, the number of months spent unemployed was not statistically significant; employment status was a statistically significant determinant for property crime, with the part-time employed more likely than the full-time employed to commit property crime, and the unemployed even more likely than the part-time employed to commit property crimes. In addition, those who held a greater number of jobs were more likely to commit property crimes. Both are signs that poor labour market attachment increases the probability of engaging in property crime.

Butcher & Piehl (1998) examined annual data for 43 US cities from 1981 to 1984, and from 1986 to 1990. The aggregate data provided no evidence of a link between employment rates and the violent crime rate or the overall crime rate. However, when they turned to data at the individual level, using the 1980 National Longitudinal Survey of Youth, some interesting links appeared. Respondents were aged between 15 and 23 years, and criminal activity was self-reported. The survey provided evidence that there was a statistically significant increase in the probability of a male respondent self-reporting criminal activity in the past year, with an increase in the local unemployment rate. However, there was no statistically significant impact of the local unemployment rate on the probability of young males self-reporting that they were involved in the criminal justice system (stopped, booked, charged, and/or convicted) over the past year. In contrast, there was no effect of the unemployment rate on the

probability of female respondents reporting criminal activity in the past year, but there was a statistically significant increase in the probability of a female respondent identifying an encounter with the criminal justice system in the past year (stopped, booked, charged and/or convicted), due to an increase in the local unemployment rate.

Albertson & Fox (2012) concluded their survey on the relationship between unemployment and crime by stating that there is no definite consensus in the literature, due to the problems of comparing across studies, and their different results. Methodologies, data, and variables used are not standardized and make it difficult to compare results across studies. Opposing motivational and opportunity effects may also arise. Further study is needed.

3.1.3 Inflation and Crime

The inflation-crime relationship has been studied extensively and inflation has generally been accepted as a macroeconomic variable of significant influence on crime rates. Inflation measures the increase in prices, and positive inflation means that there is an erosion of the purchasing power of currency in an economy and an increase in the cost of living. An increasing cost of living may eventually exceed what some individuals' incomes can comfortably absorb which may begin to affect the social fabric of a community by increasing tolerance of minor property crimes. Long & Witte (1981) proposed that crime rises when the inflation rate increases as hard times motivate criminal behaviour, and inflation inhibits the ability of communities to deter crime (see also Becker, 1968 and Devine, Sheley, & Smith, 1988). Lott (1990) made the argument that the poor are more likely to commit crime due to their relatively limited access to capital markets. Deutsch, Spiegel, & Templeman (1992) added that the poor are more likely to engage in property crime because the cost of engaging in crime is lower for low-income people than for high-income people that have more wealth to lose.

The early work by Ehrlich (1973) suggested that individuals are more likely to engage in burglary and other property related crimes as a result of increasing relative deprivation. As the real incomes of individuals are eroded by an increasing cost of living, they may engage in property-related crimes to compensate and improve their living standards. Devine et al. (1988) developed a model of economic distress, social control policy, and crime rates, which included both unemployment and inflation as economic distress variables. The authors used annual time-series data over the period of 1948 to 1985 in the United States to examine the influences of unemployment, inflation and the rate of incarceration, on rates of homicide, robbery and burglary. The results of the model indicated that the rate of inflation had a significant positive influence on changes in robbery. Allen (1996) also found that inflation had a significant effect on burglary and robbery rates, and he concluded that the shift of central banks to anti-inflation policies may contribute significantly to reducing property crime rates.

More recently, Bunge, Johnson, & Baldé (2005) studied Canadian crime patterns using data for 1962-2003. The results of their analysis showed that inflation, not unemployment, was a better predictor of breaking and entering and motor vehicle theft in Canada. The authors found that a 1% increase in the inflation rate contributed to an increase of 0.21% in the rate of motor vehicle theft and an increase of 0.19% in the rate of breaking and entering. Tang & Lean (2007) expanded on the body of literature by testing the causal link between macroeconomic variables and crime, using time-series techniques applied to US annual data over the period of 1960 to 2005. The results indicated that the crime rate varied with inflation and unemployment rates. The results further suggest that the crime rate and inflation rate have a positive relationship in both the short and long-run. Yearwood & Koinis (2011) conducted a similar study using data from North Carolina and found that reported robbery rates were best predicted by the Consumer Price Index and supplemental security income receipts per capita, and these two indicators explained 79% of the variance in robbery crime rates. However, these authors also found that unemployment was the only significant factor in determining motor vehicle theft.

Seals & Nunley (2007) assessed whether price stability led to a reduction in crime rates by conducting a structural time-series analysis with 47 years worth of criminal incidence data in the United States. The authors used data on the unemployment rate, the percentage of manufacturing employment relative to total employment, and the female labour force participation rate, and examined whether they served as predictors of different kinds of property crime. Information on property crime rates was collected from the FBI's Uniform Crime Reports (UCR) and included larceny, burglary and robbery. The authors argued that it may be more attractive for those in society with low level skills, who may be most likely to be laid off work in an economic downturn, to commit offences such as property crimes when inflation is high. During periods of high inflation, the returns to stealing also rise and increase the incentive to commit property crime. The authors found that price stability contributed considerably to a reduction in property crime over the study period, so that monetary policy aimed at ensuring price stability may yield positive externalities of reduced property crime. In a similar study, Nunley et al. (2011) assessed the impact of macroeconomic variables on four property crimes rates in the United States (larceny, burglary, robbery and auto theft). The study covered over half a century of data and allowed for an assessment of the effect of changing demography. They concluded that inflation had robust positive effects on all property crime rates on the national scale.

Research has also examined white collar crime, particularly tax evasion, and inflationary effects. Fishlow & Friedman (1994) assessed the extent to which the public in developing countries (including Brazil, Argentina and Chile) resort to tax evasion during an economic downturn. The results of the study show that negative shocks to real income in these countries raised tax evasion as a substitute for loans when credit may be tight. Bittencourt, Gupta, & Stander (2014) provided new research on tax evasion as it pertains to a country's financial development and inflation rate. The authors developed a theoretical model that indicates that both a lower level of financial development and higher inflation

rate results in the creation of a larger shadow economy. They then tested the model against data for 150 countries from 1980-2009 and the results are generally supportive of the theory.

Overall, the body of literature exploring the inflation-crime relationship supports the notion that rising inflation will result in higher property crime rates. Studies conducted on country, state and city levels have generally identified a positive relationship between inflation and property crime while providing no real support for inflationary effects on violent crimes. This is in contrast to the mixed evidence provided by studies on the unemployment-crime link.

3.1.4 Poverty and Inequality

Braithwaite (1979) provided a review of the literature on poverty and inequality on crime, and at that time, the body of evidence did not conclusively indicate a relationship between poverty and crime, but instead, there was support for a positive link between inequality and crime. Danziger & Wheeler (1975), who used US data over the 1949-1970 period, and while controlling for other factors, found that the absolute income gap (a measure of the difference between the average incomes of upper and lower halves of the sample), and relative income inequality (a measure of the ratio of incomes between the upper half and lower half of the income scale) were both positively associated with burglary, robbery and aggravated assault. Carroll & Jackson (1983) used a cross-sectional study of US cities with data from 1970, and found that increasing income inequality (measured using the Gini coefficient) coincided with increases in certain crimes, specifically burglary and crimes against the person (aggregated crimes of homicide, rape, and aggravated assault).

Stack (1984) attempted to expand the empirical research to the international context, with allowance for different cultural and social experiences. Nations may respond differently to inequality, some may have an egalitarian culture, have stronger labour union movements, and be active to promote income equality. His methodology allowed for an effect of income inequality, an effect through a cultural animosity towards inequality, and interactive effects between these cultural responses and inequality. Other control variables included an economic development indicator, the degree of urbanization, industrialization, and political indicators. Stack (1984) used Interpol data for property crime from 1965 for 62 countries. The results did not suggest a positive relationship between inequality and crime, and there was no evidence of interactive effects. In a few regressions, the results led to the inference that increasing income inequality coincided with less property crime. The results did indicate that increasing economic development, as measured by gross national product per capita, led to increases in property crime. Stack (1984) concluded that the positive relationship between inequality and property crime which appeared to exist in the US, did not exist across a large sample of developed nations. Perhaps inequality led to different responses and noncriminal deviance in other nations.

Allen (1996) examined economic, social, and criminal justice factors thought to affect rates of burglary, robbery and auto theft in the US over 1959 to 1992, including poverty rates, the Gini coefficient of income inequality, inflation rate, and the unemployment rate. He found that poverty reduction led to increases in property crime, and the measure of income inequality had no effect. He attributed this result to poverty reduction measures that improved the incomes of targeted groups: females with children, and the elderly. These groups experienced improvements in their well-being, and other poverty-stricken groups (young low-skilled males) experienced relative declines in their well-being. In such cases, the opportunities and motivation to commit property crimes for young low-skilled males were enhanced.

Among more recent studies, Corman & Mocan (2000) concluded that growth in poverty had a positive impact on homicide and assaults, while Andresen (2013) concluded that increases in the proportion of households in low income coincided with increases in property crime and with decreases in violent crime, while increasing inequality coincided with increases in both property and violent crimes.

The various studies provide results that make it hard to infer a well-defined and repeatedly supported relationship between poverty and crime. It appears that low-skilled males seek opportunities to commit property crimes, and that poverty and inequality may provide them with additional motivation to take advantage such opportunities. Identifying the relationship between crime and poverty and inequality is worthy of more research.

3.1.5 Summary: the Impact of Economic Factors on Crime

Of the economic factors examined herein, the evidence seems to support a well-defined positive relationship between inflation and property crime, and a negative relationship between employment opportunities of young low-skilled men and criminal behaviour. There is some support for a positive relationship between inequality and crime, and between poverty and crime. The evidence for an unemployment-crime link at the macroeconomic level is mixed.

The use of these economic factors in examining crime rates is highly recommended, but must be done with care and caution due to the offsetting motivation and opportunity effects of committing crimes in response to economic changes. When we translate these factors into underlying causes for criminal behaviour, we may hypothesize that poor employment prospects, poverty, and high inflation, lead individuals to be susceptible to engaging in criminal behaviour, following the theoretical framework. Other opposing forces may hinder criminal decisions.

3.2 Demographic Factors

The major demographic factors that have been examined in the literature for their impact on crime are: education levels and attainment; age and youthfulness; family structures, and; immigration and ethnic differences.

3.2.1. Education

There are several avenues whereby education can influence crime. First, those who are in school and study after school hours are occupied and cannot commit to other activities during these periods, including criminal activities. Second, the acquisition of knowledge may make criminal activity less acceptable to the decision-maker. Third, increases in educational attainment tend to be linked with increases in labour earnings and raise the opportunity costs of crime.

Engaging in school activities takes time away from other pursuits. Tauchen & Witte (1994) found that young people who are employed or attend school are less likely to engage in property and violent crimes. The knowledge gained while at school can also serve as a general deterrent to crime. Education provides a positive externality to society in the form of crime reduction; education teaches individuals to be law abiding and loyal to their country (Usher, 1997). With an understanding of history and other subjects and a greater understanding of the world, people are better-able to understand the implications of their decisions and veer away from criminal involvement (Groot & van den Brink, 2010). School may act not only as an intellectually stimulating environment, but also a means of escape for some youth. A number of researchers suggested that a positive school experience can act as a protective factor for youth who may have multiple risk factors for delinquent behaviour such as poor family life, and living in higher risk neighbourhoods (Bjerregaard & Smith, 1993; Fitzgerald, 2003; Sprott, Jenkins, & Doob, 2000). Results of this kind of research show that poor attachment to school and low academic achievement are associated with increased probability of delinquent behaviour.

Lochner (2004) developed a human capital model of crime, and upon empirically evaluating it, found strong negative effects of education on both property and violent crime rates. However, consistent with his predictions, he also found a positive relationship between education and white collar crimes including forgery, fraud and embezzlement. Lochner & Moretti (2004) calculated that in the United States, a secondary education reduces the probability of incarceration by 0.76% for Caucasians, and by 3.4% for African-Americans. Groot & van den Brink (2010) discovered that, in the Netherlands, the probability of committing crimes such as shop lifting, vandalism and threat, and assault decrease with years of education; their study also found that the probability of committing crimes like tax fraud increases with years of education, consistent with results from Lochner (2004).

Three recent studies, Chapman et al (2002), Hjalmarsson (2008), and Anderson (2010), have examined youth crime and high school completion. Chapman et al (2002) examined the interaction between

crime and unemployment duration and schooling using Australian data. A short summary of this study, focusing on the relationship between unemployment and crime, was included in section 3.2.2 above. Their linear regression model results suggested that breaking, entering, and stealing crime rates were positively related to school participation rates, and negatively related to high school completion rates, in New South Wales from 1989 to 1999. The authors used their results to run policy simulations, and they concluded that if a successful back to school enticement program could get high school dropouts, susceptible to long-term unemployment, to complete their schooling, the number of incidences of breaking, entering and stealing could drop by fifteen percent.

Hjalmarsson (2008) analyzed the relationships between juvenile justice system interactions and high school graduation. Using data from the US National Longitudinal Study of Youth, he estimated the effect of delinquent and risky behaviour, ability, and demographic characteristics, on high school graduation by the age of 19. Hjalmarsson (2008) employed a linear probability model in his estimation. To reduce the possibility of simultaneity bias (where dropping out of school causes an individual to interact with the justice system), only justice system interaction events that occurred before the eligible drop out age were utilized in the study. Hjalmarsson (2008) also employed a bivariate probit model to estimate the effect of arrests and incarceration on high school graduation. The results suggested that arrested and incarcerated individuals are approximately 11 and 16 per cent, respectively, less likely to graduate high school than non-arrested individuals. The effect of arrest was not robust due to the limited selection for unobservable characteristics. In contrast, results of the incarceration effect were more robust and less sensitive to unobservable characteristics. The methodology was not strong enough to determine causal relationships and future research with additional data would be necessary to make policy recommendations.

In the US, states have different minimum ages when students may choose to legally drop out of school. Anderson (2010) studied how variations in these minimum drop-out ages influenced criminal activity between 1980 and 2006. It is possible that students who are forced to stay in school will be less criminally active than those of the same age who may legally drop out. Anderson used control and treatment groups derived from the variation in compulsory schooling laws across the US. The control group consisted of individuals that were below the floor of state minimum dropout ages; all states have a minimum dropout age of at least 16 years old. Thus, the control group consisted of individuals aged 13-15 years old, and the treatment group consisted of youth aged 16-18 years old. Results indicated that minimum drop out age requirements had a significant and negative effect on property and violent crime arrest rates for individuals 16 to 18 years of age: a minimum dropout age of 18 decreased arrest rates among 16 and 17 year-olds by 9.7 per cent and 11.5 per cent, respectively. Results also supported an incapacitation effect of education on crime, where school attendance decreases the available time for criminal activity.

In conclusion, the literature supports a negative relationship between educational attainment and violent and property crime, but a positive relationship between educational attainment and white collar crimes including fraud. Youth in school are less likely to commit crimes than drop-outs as they have less time to be involved in crime, and education is counter-productive for criminal involvement as greater educational attainment translates into greater income and the higher opportunity cost of committing crime acts as a deterrent. Finally, the literature suggests that if youth do not complete high school, they are more likely to be involved in the criminal justice system, and similarly, if youth are arrested, they are less likely to complete high school.

3.2.2 Age

The relationship between age and crime has been examined fairly extensively in the criminology literature. Much of this literature revolves around the variation in criminal offences over age, better known as the age-crime curve. McVie (2005, p. 1) noted that the age-crime curve, which tends to peak in the mid to late teens, crosses both jurisdictional and temporal boundaries and is one of the least-contested issues in criminology (see also Hirschi & Gottfredson, 1983; Gottfredson & Hirschi, 1990; Farrington, 1986; Nagin & Land, 1993). Gannon et al. (2005, p. 121) indicated that age is one of the most cited correlates of criminal activity and delinquency, and that male teenagers and young adults tend to be the most criminally active groups of people in society. As a result, the overall crime rate is expected to be affected when the population size or crime rate of this high-risk group changes (Bunge et al., 2005, p.16).

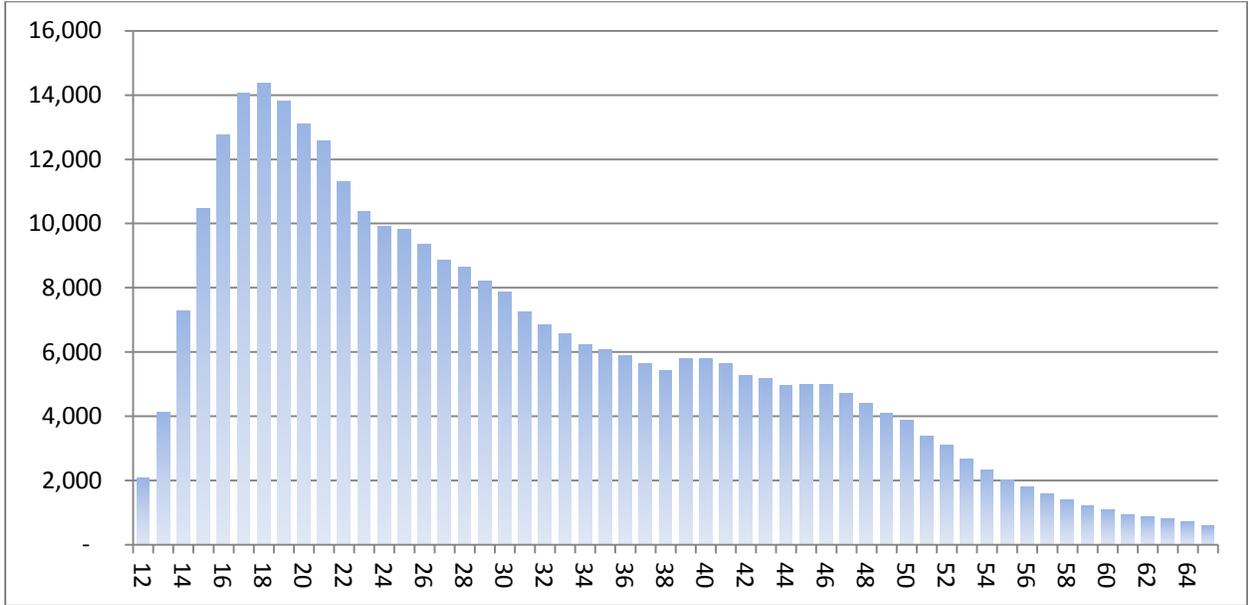
Statistics Canada annually publishes the age structure of persons accused of crime in Canada in the publication *Police-reported Crime Statistics in Canada*. The 2011 age-crime curve for Canada, depicting the structure of persons accused of crime by age, is reproduced in Figure 1 below. Age-specific crime rates tend to increase rapidly from 12 years of age to 17, reaching a peak at the age of 18, and then decreases slowly with increasing age (Brennan, 2012, p. 20). The Canadian distribution of crime across age is consistent with the age-crime curve in other jurisdictions.

Although the shape of the age-crime curve is widely accepted, several authors have highlighted shortfalls and important considerations in deriving inferences from it. The age-crime curve usually describes crime data on an aggregate basis and therefore it is necessary to interpret its results with this in mind. The age-crime curve tends to reflect variations in prevalence (the proportion of people who are offenders) rather than incidence (the rate of offending by offenders), and age-crime curves for individuals over the lifecycle do not resemble aggregate curves since incidence does not change consistently between the onset and termination of criminal careers. Age-crime curves for violent and non-violent crime among males and females differ drastically (see Figure 2). The shape of the age-crime curve also differs by the type of offence (see Figure 3); both property and violent crime curves

peak between the ages of 16 to 18, but the violent age-crime curve declines much more slowly with age than other age-crime curves.

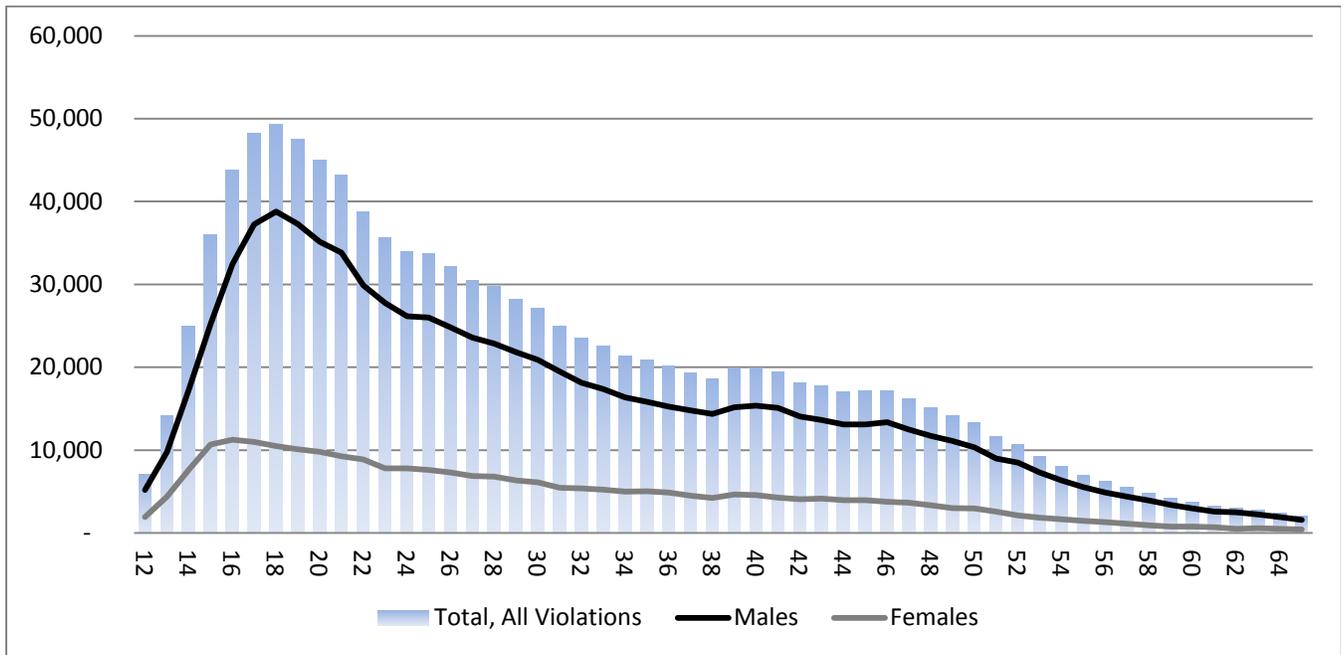
The idea that age itself does not directly impact crime is present in the literature. Farrington (1986, p. 236) indicated that age does not have a direct effect on crime due to a non-linear relationship and the impact of other possible variables. Farrington explains that the most plausible theory is that the age-crime curve reflects decreasing parental controls and increasing peer influence in the teenage years, and then increasing controls over adulthood due to family formation and involvement in the community. Blonigen (2010) also downplayed the age-crime relationship and cited Goring (1913) who described the age-crime distribution and suggested that some process or covariate of age, rather than age itself, better-represented this causal factor in the relationship between age and crime. Blonigen (2010) attributed other factors, such as developmental personality changes as youth transition into adulthood, as influencing the relationship between age and crime.

Figure 1: Rate of Criminal Code Violations by Age, Canada, 2011 (per 100,000 residents)



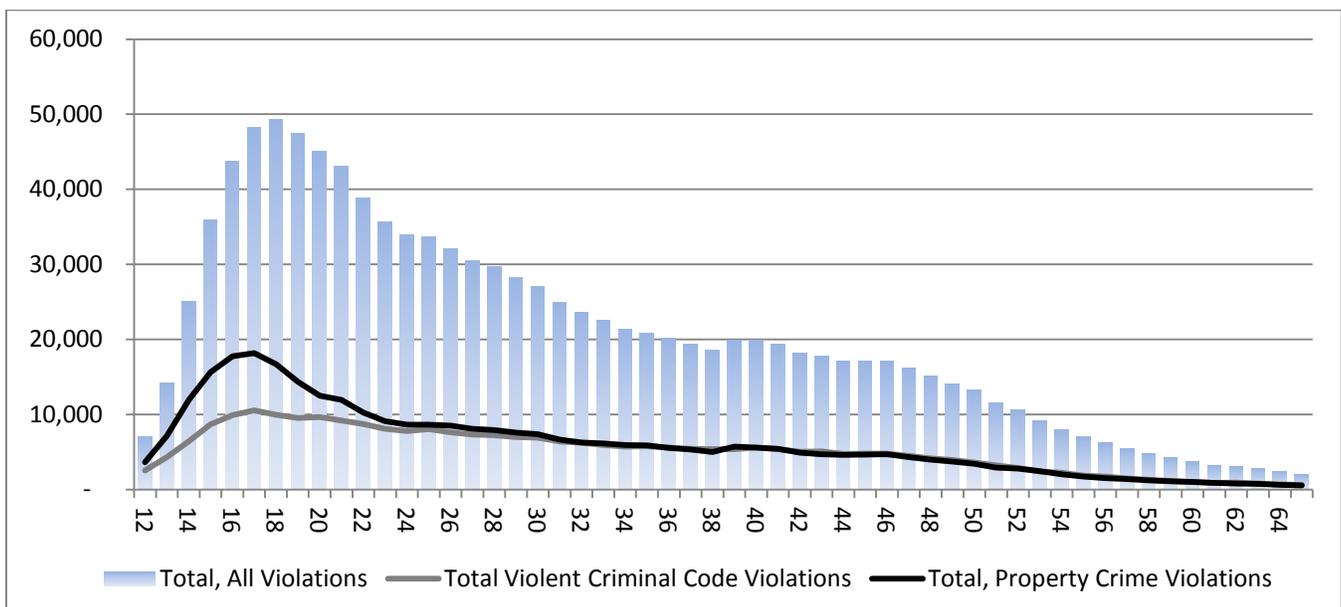
Source: Statistics Canada, Canadian Centre for Justice Statistics, Uniform Crime Reporting Survey

Figure 2: Criminal Code Violations by Age and Gender, Canada, 2011



Source: Statistics Canada, Canadian Centre for Justice Statistics, Uniform Crime Reporting Survey

Figure 3: Criminal Code Violations by Age and Type of Offense, Canada, 2011



Source: Statistics Canada, Canadian Centre for Justice Statistics, Uniform Crime Reporting Survey

Steffensmeier et al. (1989, p. 816) examined disaggregated arrest data in the United States between 1940 and 1980 and found that there were differing age-crime curve shapes for different offences, and also varying shapes for different time periods. McVie (2005, 12) examined simple patterns in longitudinal data on youth aged 12 to 16 years of age from the Edinburgh Study of Youth Transitions and Crime, and found a static prevalence in offending in aggregated data while disaggregated data indicated a divergence among prevalence and frequency of offending. Based on her findings, McVie (2005) reiterated Farrington's concerns by citing the complex nature of patterns in prevalence and frequency of offending for different offence types that cannot be captured by the age-crime curve itself. The age-crime curve is too simplistic. McVie (2005) concluded that data with respect to age should be analyzed on a disaggregated level to be most effective.

Brown & Males (2011) believed that the widely-observed adolescent peak in rates of offending is not a consequence of developmental factors, but rather a result of age differences in economic status— young people offend more than adults because they are poorer. These inferences were derived using aggregate arrest rates, poverty and age data. However, Shulman et al. (2013) found that criminal offending peaks in adolescence, even after controlling for variation in economic status. They were able to improve the methodology by using longitudinal data which included individual-level measures of offending, age and economic status.

Within the age-crime relationship literature there is a belief that certain adolescent behavioural traits lead to criminal behaviour. South & Messner (2000, p. 85) highlighted a well-established finding in the age-crime literature that childhood misbehaviour is one of the most powerful predictors of adult deviance and criminality, and cite antisocial behaviour as a common risk factor for juvenile and adult criminality. The Government of Canada also recognizes antisocial behaviour as a major risk factor among children and youth with regard to crime prevention (Public Safety Canada, 2014).

Neighborhood characteristics also appear to affect the age-crime relationship. Fabio et al. (2011, p. 325) found that the level of neighbourhood disadvantage affected the shape of the age-crime curve for certain individuals. The rates of violence among boys in disadvantaged neighbourhoods rose to higher levels and were sustained significantly longer when compared to those of boys residing in advantaged neighbourhoods. A neighbourhood disadvantage score developed by Wikstrom & Loeber (2000), based on demographic variables including the proportion of families on public assistance, families living below poverty level, non-married families, and those of African-American ethnicity, and economic variables including unemployment, and median income, was assigned to each of Pittsburgh's 90 distinct neighbourhoods. Their findings suggested that neighbourhood disadvantage in early adolescence may have an enduring effect on the shape of the age-crime curve throughout an individual's life. In support, Brisson & Roll (2012, p. 333) found that neighbourhood characteristics and processes are predictive of crime.

In summary, the concept of the age-crime curve is prominent within the criminology literature and also within Canadian crime reports. However, there are limitations in its interpretation that have been highlighted by several authors. These mainly relate to the inconsistency of the shape of the curve when using disaggregated data. Although the age-crime curve may be useful when speaking to the aggregate variation in offences across age in a society, it does not fully explain crime across age for individuals, for different offences, or for different genders. The age-crime curve does clearly indicate that youth have a high probability of being offenders, but does not indicate the frequency or severity of their criminal behaviour. Youth involvement in criminal activity is likely determined by the different options on how to use leisure time, their employment and income status, and neighborhood characteristics.

3.2.3 Family Structures

A number of empirical studies of at-risk sample groups show consistently that children from single-parent families or stepfamilies are more likely to engage in juvenile criminal activities than children with two-parent families (Coughlin & Vuchinich, 1996). Research on this topic has found that children from single-parent families or stepfamilies are more likely to be under-socialized and therefore may be more susceptible to factors like peer influence (Amato, 1993). However, other studies suggest that negative outcomes of children in such family structures may be largely due to factors that often accompany them as opposed to the family structure itself. Factors such as the low socio-economic status of single-parent families may exacerbate circumstances in terms of additional stresses associated with bearing the full burden of child rearing (Gannon et al., 2005).

Research has found that some children are more adversely affected by divorce and the effects can last well into adulthood. Parental conflict is cited as having the most significant impact on child outcomes above other reasons like financial hardship and strained relationships of parents (Bernardini & Jenkins, 2002). Regardless, with respect to lone-parent families resulting from separation or divorce, financial uncertainty, along with the stresses associated with being a single parent bearing the full burden of child rearing, are potential risk factors for youth delinquency (Coughlin & Vuchinich, 1996; Fitzgerald, 2003).

Common-law family structures appear to be at greater risk of separation and spousal violence versus married couples (Gannon et al., 2005). According to the 2009 General Social Survey on Criminal Victimization, this increased risk of violence prevalent in common-law unions could be due more to the ages of the couple, since common-law unions are predominantly of young adults, rather than older adults.

In general, the relationship between family structure and crime is not exactly clear, however it can be inferred that single parents are more likely than couple families to have greater levels of stress and

financial hardship which may increase the likelihood of children in these families engaging in particular crimes (Lipman et al., 2002).

3.2.4 Immigration and Ethnic Differences

As a major receiving country of immigrants, much work in the US has examined the impact of immigration on crime. Recent immigrants have different cultural and social values, and also typically are identified as ethnic and/or visible minorities upon arrival. In many cases, they have difficulty integrating into the labour market and into the greater society of the receiving country. These difficulties may lead to criminal activities. Similarly, there are ethnic peoples who are not immigrants, but may experience similar difficulties integrating into the labour market and into the greater society of their home country. Researchers have examined the impact of immigration and ethnic differences on crime, which will be discussed in this subsection.

3.2.4.1 Immigration

The nature of the immigration-crime relationship is one that has been debated quite heavily over the past century. Many early scholars, particularly in the United States, were concerned that increased levels of immigration would undoubtedly lead to higher levels of criminal activity over time. This logic was commonplace in late 19th and early 20th century America when there was a large influx of Eastern Europeans into American cities. Much of the early research examining the relationship echoed this position along with other concerns about immigrants displacing native workers, driving down wages, or increasing inequality (Hagan & Palloni, 1999). A recent examination by Moehling & Piehl (2009) on the nature of the immigration-crime relationship in early 20th century United States suggested that what was being reported by the major government commissions on immigration and crime suffered not only from aggregation bias but also from inaccurate population data. Thus, many commissions during the early 1900s presented misleading information of immigrant versus native criminality. However, by as early as 1930, the data showed that immigrants 20 years of age and older were less likely to be committed to prisons than non-immigrants. As a result, public expression of fears and concerns about immigrant criminality largely waned after World War II in the United States (Reid et al., 2005).

In recent years the fear of immigration increasing crime has reappeared. Two international opinion surveys comparing public views on immigration in seven developed countries found that between 1995 and 2003 the percentage of respondents who believed that immigration increases crime grew in Australia, Canada, West Germany, East Germany, Great Britain, Japan, but not in the United States (Simon & Lynch, 1999; Simon & Sikich, 2007). Even in Canada, where around 60% of individuals believed that immigration was good for the economy, 30% of the surveyed population believed immigration will increase crime. Though public concern about the immigration-crime relation has been increasing, evidence of any sort of significant relationship is sparse.

According to the standard rational choice theory of criminal activity, individuals are rational and weigh the costs and benefits between choosing legitimate versus illegitimate activities, and ultimately choose the one that makes them better off. Immigrants may engage in more crime simply because the legitimate labour market does not provide as many good opportunities for immigrants when compared to natives. A number of studies have found that new immigrant workers in Canada earn less than their native-born counterparts and that the earnings disadvantage of new migrants has been increasing since the 1990s (Aydemir & Skuterud, 2005; Frenette & Morissette, 2005; Green & Worswick, 2012). New immigrants also face an increased chance of unemployment upon first arrival to Canada which in theory could suggest a higher probability of engaging in criminal activities.

One theory of immigrant criminality is based on the logic that immigrants may increase inequality, displace native workers and reduce the wages of natives. Borjas, Grogger, & Hanson (2006) found a strong negative correlation in the United States between immigration and wages, unemployment rates and incarceration rates of native-born African Americans, from which one might infer that immigrants are displacing native African-Americans in the US. For Canada, there are only a few studies that look at the impact immigration has on labour market outcomes for native-born workers. Moore & Pacey (2003) concluded that immigration in Canada over the period of 1980 to 1995 contributed to increasing income inequality amongst different cohorts of the population. Borjas & Aydemir (2011) found that immigration in Canada had a negative impact on native-born wages using data from all available Census periods up to 2001. These studies, however, do not directly address the question of interest; whether immigration increases crime has still not been definitively answered. They also do not directly examine what motivation new immigrants may have to commit crimes in Canada.

Immigration policies in Canada need to be taken into consideration when considering the motivation for new immigrants to engage in criminal behaviour. Since the late 1980s, immigration policy selection criteria have placed significant emphasis on the education, work experience, and official language capabilities of potential immigrants. Targeted immigration policy was created with the hope that those who are chosen would have the highest probability of success in the country. Based on these immigration policies, Lochner (2004) argued that human capital investment would increase the opportunity cost of crime and incarceration for immigrants through earnings potential in the legal labour market, and also increase future losses due to incarceration. Better-educated immigrants should be less likely to engage in criminal activities.

There are a number of other factors that are designed to deter criminal activity among new immigrants. The Government of Canada requires a complete background check before admitting any new permanent residents. Immigrants can be deported immediately if they are convicted of a serious crime, and in the majority of cases, the deportation order cannot be appealed. Samuel & Faustino-Santos (1991) found that first-generation immigrants are indeed more law-abiding and less likely to engage in criminal activity than their native-born counterparts in Canada. This could lead one to infer

that a large influx of new immigrants into the country may put downward pressure on aggregate crime rates, rather than the reverse.

Overall, empirical evidence on the impact of immigration on crime is mixed. Some researchers have found that recent immigrants have no effect on crime rates in metropolitan areas (Butcher & Piehl, 1998; Reid et al., 2005), while others have determined that increased immigration increases property crime rates (Spenkuch, 2013). Bell, Machin, & Fasani (2013) found that a large influx of immigrants seeking asylum in the UK slightly increased the property crime rate, but also that a large influx of new migrants from countries in the European Union had no effect. Finally, very recent research by Zhang (2014) using Canadian data indicated that new immigrants do not have a significant impact on property crime rates initially, but over time the increase in recent immigrant share of the population decreases property crime rates; this suggests that immigration has a spillover effect in terms of changing neighbourhood composition which may reduce crime rates in the long-run.

The immigration-crime relationship may be different from country to country based on the immigration policies in effect, the methodology used, and the time period being assessed. It appears that in order to get a sensible answer to the immigration-crime relationship one must consider all of these factors in the analysis before making any conclusion for one specific country.

3.2.4.2 Ethnic Differences

In the US, African-Americans have a higher probability of being involved in crime when compared to the entire US population. Crime in the US has been found to be heavily concentrated in certain geographic regions, and that social interaction and the behaviour of peer groups, neighbors, and gangs, are a strong influence on criminal activity (Freeman, 1999, pp. 3549-3550). In Canada, the aboriginal population is overrepresented in the criminal justice system, and has characteristics relative to those of the whole Canadian population which are not dissimilar from those of the African-American population in the US.

There are certain economic, demographic and social factors that are associated with an elevated risk of offending. These include, but are not limited to, being young, living in lone-parent families, high levels of unemployment, and the consumption of alcohol or drugs (Gannon et al., 2005; Lochner, 2004; Pernanen et al., 2002; Raphael & Winter-Ebmer, 2001). All of these risk factors are very much apparent in the demographic and social conditions of many aboriginal communities and represent significant constraints on the prosperity of this particular demographic group. The most recent statistics on the aboriginal population show that children aged 14 and under in Canada represented approximately 28% of the total aboriginal population, and aboriginal youth aged 15 to 24 represented approximately 18.2% of the total Aboriginal population. In Saskatchewan, the number is even more staggering with just the aboriginal population aged 0 to 14 making up approximately 38.1% of the total Aboriginal population in 2011 (Statistics Canada, 2011).

Information on the living arrangements of aboriginal populations shows that 34.4% of aboriginal children lived in a lone-parent family compared to 17.4% of non-aboriginals. Among these aboriginal children living in a lone-parent family, the majority lived with a female lone-parent, exacerbating the chances of these children living in a household with low socio-economic status, and increasing the risk for juvenile delinquency.

3.2.5 Summary: the Impact of Demographic Factors on Crime

Individuals who have low levels of education, who are young, and/or who come from lone-parent families or families with broken spousal relationships have a higher probability of committing crime than individuals without these characteristics. Members of at-risk demographic groups, including the Canadian aboriginal population, which have higher proportions of their populations with these characteristics, also have higher probabilities of committing crime. These demographic indicators appear to be magnifying social and economic factors which have been associated with crime: low employment prospects, high unemployment, low absolute and relative household income, neighborhood disadvantages, financial instability, and social instability. As such, it becomes important to identify the causes of criminal behaviour underlying these demographic factors for at-risk individuals. Individuals cannot change (or cannot easily change) their age, gender, family structure, or their immigrant or ethnic status. They may be able, with appropriate support, to change their educational attainment, their ability to hold jobs, and their ability to deal with financial, family, and social stress.

3.3 Policing, Prevention, and Punishment

Policing activities, crime prevention efforts, and punishment measures are expected to serve as deterrents to crime and reduce crime rates. The empirical evidence on the role of police force size and expenditures, of crime prevention strategies, and on changes in the severity of punishment for crime, are examined in this subsection.

3.3.1 Punishment

An increase in the severity of punishment, either monetary or in the length of incarceration, is expected to cause a reduction in crime, as this will increase the deterrent effect of punishment and the expected costs of crime. Incarceration, one form of punishment which has been examined extensively, may have two separate and complimentary effects on crime. First, an increase in incarceration rates may be the result of an increase in punishment, but also of an increase in detection and conviction. These may serve as a deterrent. In the short term, however, there may be a positive correlation between crime rates and incarceration rates due to endogeneity and simultaneity problems. Second,

the extent of incarceration may also remove those individuals with higher probabilities of committing crimes from the population at large. Unless these criminals are replaced, less criminal activity is expected through the incapacitation effect.

In an early study, Ehrlich (1973) examined US state data from 1940, 1950 and 1960 for seven felony offenses (murder, rape, assault, robbery, burglary, larceny, and auto theft), using a simultaneous equations model to deal with simultaneity bias. The results suggested that rates for these index crimes were inversely related to the probability of apprehension and imprisonment, and to average time served. Subsequent research on the links between crime and punishment suffered from the key problems of data measurement error, and simultaneity and feedback effects; improvements in research methods were required (Cameron, 1988).

Research that followed in the 1990s incorporated better data and techniques to deal with the common problems of earlier studies. Marvell & Moody (1994) applied time-series techniques to data for US states over 1971 to 1991. This was a time when the prison population grew by 314%, while reported index crimes grew at a much slower rate of 73%, and when victimization survey estimates of crime fell slightly (by less than 3% over 1973 to 1991). They found that crime fell following increases in imprisonment. Their results led to the inference that for each new prisoner, 17 index crimes were prevented, mostly larcenies, suggesting a high incapacitation effect. In a similar vein, Levitt (1996) examined how the reductions in prison populations would affect crime. He used US state-level data and an instrumental variables technique which focused on the release of prisoners due to litigation against prison overcrowding. He concluded that for every prisoner released from custody, an additional 15 crimes would be committed each year. These results supported those of Dilulio & Piehl (1991) and others which used prisoner surveys; in Wisconsin, prisoner surveys from 1990 indicated that the median number of non-drug related crimes committed each year when not incarcerated was 12, although the mean was 141, indicating a skewed distribution of crimes being committed by a small proportion of the prison population (Dilulio & Piehl, 1991, p. 32).

Levitt (1998) studied the differences between penalties to juvenile and adult offenders and their impact on criminal behaviour, using US state data from 1978 to 1993. He found that harsher penalties corresponded to lower rates of offenses amongst youth. On average, violent crimes fell by 4%, and property crimes fell by 20%, when youth transitioned to adulthood in states where youth are treated relatively leniently compared to adults. Violent crimes increased by 23%, and property crimes decreased by 9%, in those states with the least discrepancy between youth and adult sentences. Correspondingly, criminal behaviour of youth reaching the age of majority, and the age-crime profile, are affected by the differences between penalties to youth and to adults.

Economists have also examined the impact of capital punishment on crime, with conflicting results. The early work of Ehrlich (1975) claimed that up to eight homicides may have been prevented for every one execution in the US over 1932 to 1970. Recent work by Mocan & Gittings (2003) claimed that each

execution (or commutation) would prevent (or lead to) five homicides. Others have made similar claims, but these works have been criticized as having many weaknesses. The death penalty is rarely used, is used only in some states, and the execution rate has fallen below 3% since 1999, so that many death row inmates will not see their sentences carried out. Katz, Levitt, & Shustorovich (2003) found no effect of capital punishment on crime rates, but found that death rates for prisoners was negatively correlated with crime rates, showing the possible deterrent effect on crime of the possibility of death while incarcerated.

The ability to separate the deterrent effect of punishment from the incapacitation effect is one of the many challenges facing researchers. Will an increase in the incarceration of criminals deter other individuals from conceiving and committing crimes, or does incarceration simply remove criminals from the public and reduce the number of individuals who engage in criminal behaviour? Ehrlich (1981) modeled these two effects of incarceration by using estimates of the maximum incapacitation effects of imprisonment and by comparing those estimates to the total effects of imprisonment. The estimates of deterrence effects were based on 1960 US data. Deterrence effects were estimated to be strongest for property crimes and assault. Using data for 59 large US cities, over the 1970 to 1992 period, Levitt (1995) estimated the deterrent and incapacitation effects of property and violent crimes, and concluded that the deterrent effects were strong for robbery, burglary, larceny, auto theft, and assault, but not for murder and rape. Incapacitation effects appeared strong for only rape and robbery.

One consequence of increasing penalties for a given crime is that criminals may substitute into other similar crimes with more lenient penalties. In a natural experiment, McPheters, Mann, & Schlagenhauf (1984) looked at the impact of mandatory prison sentences starting in 1974 in Arizona for robberies that were committed with a firearm. They found that mandatory sentences had the desired effect of decreasing the number of robberies with a firearm, but that criminals substituted to robberies without a firearm, so that robbery overall was not deterred.

The evidence on the early release of prisoners supports an incapacitation effect of prison and custody on crime. The evidence supports a deterrent effect of harsh penalties, and of the possibility of dying in custody, on criminal activity. The evidence also indicates that criminals will substitute between similar crimes if penalties for one crime become relatively more severe. However, researchers must be cautious in handling the simultaneity problem of crime rates and incarceration rates.

3.3.2 Policing

A common problem in investigating the links between police force size and crime rates is distinguishing between correlation and causality. High crime areas are typically served by large police forces, and low crime areas are served by small police forces. We do not want to infer from this that increasing the size of the police force will increase the amount of criminal activity. Police leaders may respond to higher crime rates by increasing the size of the police force, in which case the direction of causality is from crime rates to the size of the police force. It is also possible that increases in police size may lead to a greater incidence of detection and reporting of crime, rather than to an increase in criminal activities. Appropriate methods are required to remove simultaneity bias.

Ehrlich (1973) examined the impact of expenditures on law enforcement on crime, using a simultaneous equations model with state data from 1960. The results led to the inference that a 1% increase in public expenditures on law enforcement would lead to a 3% decrease in felony offenses. However, the error in the estimate was large enough to put into doubt the actual relationship between these variables (the probability that there was a negative relationship between the two was only 62%). Ehrlich (1973) indicated that there were many limitations in the data used and called for further work.

Cross-sectional studies that followed Ehrlich (1973) found some positive correlation between these two indicators, but such studies suffer from simultaneity, specification, and measurement problems. Marvell & Moody (1996) summarized thirty-six studies conducted between 1973 and 1995, and wrote that only ten found a negative impact of policing on crime, and fifteen found a positive impact on crime (see also the exhaustive survey by Cameron, 1988).

Economists have attempted to overcome data and methodological limitations with larger datasets and by using time-series and instrumental variable techniques that reduce or eliminate the effect of simultaneous changes in these indicators. Marvell & Moody (1996) applied time-series techniques to a panel dataset of annual observations for forty-nine US states and fifty-six cities over 20 years to 1992. With controls for demographic and economic influences on crime, they found that increases in the size of police forces at the state level were followed the next year by drops in crime rates for homicide, robbery, and burglary at the state level. Increases in the size of city police forces caused reductions in crime rates for homicide, robbery, burglary, larceny, and auto theft, as well as for total crime, in the following year. The authors stated that perhaps changes in police force size had little or no effect on assault or rape, because those crimes are less likely to be premeditated.

One of the limitations of empirical work using annual data and time-series techniques employed by Marvell and Moody (1996) is that the links between changes in factors within a year cannot be identified. Higher frequency data is needed. Corman & Mocan (2000) examined monthly data for the city of New York over the 1970 to 1996 period for the five crime types of murder, assault, robbery, burglary, and auto theft. During this period, the number of police officers fell from around 32,000 in 1970 to 22,000 in 1981, and then rose again, to 31,000 by 1996. The authors found that governments

responded quickly to rising crime rates by increasing the size of the police force. Their results support the deterrent effect of arrests for murders, robberies, burglaries and auto thefts, and the deterrent effect of increasing police force size for robberies and burglaries. The authors wrote that while the New York City police force was declining in size from 1970 to 1980, arrests for misdemeanors and minor crimes decreased by forty percent, due to a redeployment of resources towards more serious crimes including felonies.

Levitt (1997) examined data for fifty-nine US cities from 1970 to 1992 and eliminated the simultaneity problem by using an instrumental variables approach to estimation. Election cycle indicators were used as instruments that were correlated with the size of police force, but deemed uncorrelated with crime rates. During this period, police hiring was affected by the election cycle with substantial increases during election years. However, the point estimates for the effect of police size on crime was only statistically significant for violent crimes. In another study, using firefighters as an instrument to eliminate simultaneity bias, Levitt (2002) found that police force size had a statistically significant negative impact on murder and auto thefts, and negative, although statistically insignificant, impacts on robbery, assault, burglary and larceny. Levitt & Miles (2006) inferred from the results of these studies that a 10% increase in the size of the police force would lead to a decline in crime rates in the 3 to 10% range.

Studies which have recognized and have dealt the simultaneity problem between police force size or policing expenditures and crime rates have shown that both have a negative effect on crime rates, more specifically on homicide and property crimes.

3.3.3 Crime Prevention

Crime reduction and crime prevention initiatives can be grouped into three broad categories: (I) policing; (II) situational crime reduction; and, (III) developmental crime reduction (Albertson and Fox, 2012, p. 165). The first broad activity consists of strategies initiated by police forces, and is subdivided into four subcategories. The first is (i) standard policing, consisting of broad-based patrols, call responses, investigations and arrests. The second is (ii) hot-spot policing, which is location-specific, and designed to reduce crime in high-crime locations. The third subcategory is (iii) problem-oriented policing, for which police and community agencies identify problems and develop and implement solutions to reduce crime. The fourth subcategory is (iv) community policing and community-based crime prevention, where community partnerships are developed between police forces and community organizations and proactively work on crime and social problems. The second broad category is (II) situational crime reduction, which is very narrowly focused to limit criminal opportunity. Examples include baggage screening at airports to prevent plane hijacking, and improved street lighting and walk-home programs to prevent robberies and assaults. The third broad category is (III) developmental crime reduction, which focuses on the development of the individual, assessing risk

factors that have been thought to increase the probability of criminal activity, and designing intervention and support strategies, at the individual, family, school, and community levels.

Unfortunately, the evaluation and identification of effective crime reduction programs has been limited. For the most part, the problems in evaluating programs include the many different agencies involved in delivery programs, different criteria, and different expected outcomes. A few major review studies have been identified: Greenwood et al. (1996), Sherman et al. (1998), Freeman (1999), Welsh & Farrington (2001), Aos et al. (2001), Weisburd and Eck (2004), Weisburd et al. (2008), and Quinton & Morris (2008). These studies found that some programs were effective, some were not and some needed more time or evaluation.

It has been difficult to evaluate broad policing strategies (I.i) and their effectiveness, and the evidence has been mixed; however, recent empirical studies with more advanced regression techniques have provided support for crime reduction with larger police forces (see section 3.3.2 above). Freeman (1999) surveyed the literature and wrote that short-term programs, like random patrols, police visits to homes of domestic violence, and rapid response to emergency calls, were generally ineffective for the purpose of reducing crime. There was strong empirical support for the effectiveness of hot-spot or location-centred policing strategies (I.ii, Weisburd & Eck, 2004). Problem-oriented policing (POP, I.iii) has been implemented across the US and the UK, and the review by Weisburd et al (2008) has shown POP programs have held a statistically significant, although modest, impact in reducing crime. Weisburd & Eck (2004) reviewed community policing efforts, and were not able to reach any conclusion on the effectiveness of such programs in reducing crime, but the communities benefitted from greater awareness and involvement, and levels of fear decreased as a result. In the UK, Quinton & Morris (2008) reviewed the National Reassurance Policing Program, which was piloted in sixteen neighborhoods, and was found to improve community and police relations, engagement, confidence, and safety, and reduce victimization. However, in the US, programs like Neighborhood Watch and Midnight Basketball were found to be ineffective in reducing crime (Freeman, 1999, p. 3557).

Situational crime reduction (II) is based on the rational choice model, and attempts to reduce the opportunity and the expected net returns for individuals to commit crime. Welsh & Farrington (2001) reviewed thirteen studies of situational crime reduction initiatives and although the original program evaluations were poorly designed and lacking a long-term program perspective, programs generated some net benefits by reducing crime and criminal justice costs. Evaluations of six US developmental crime reduction strategies (III) were also covered by Welsh & Farrington (2001). Five of the six programs reviewed had positive net benefits to their investment, and these benefits included savings from reduced crime. The study by Greenwood et al. (1996) covered various developmental programs of intervention and assistance, and found that providing graduation incentives for disadvantaged youth, including cash rewards, was cost-effective in reducing crime.

As a general overview of crime reduction programs, Aos et al. (2001) concluded that research on the effectiveness of various programs is very limited. Programs which target juvenile offenders and those at risk produce the most consistent beneficial results and returns. Programs for children, youth, and adults have also been found to provide benefits in reducing crime and improving well-being. The authors recommended continuing and initiating a diversified set of programs, and to monitor and evaluate their progress.

3.3.4 Summary: the Impact of Policing and Justice System Factors on Crime

Research has clearly shown that increases in the size of police forces and in police spending lead to declines in crime rates when controlling for simultaneous effects. Crime has also been found to decrease following rises in the severity of punishment and imprisonment, with punishment and incarceration providing both deterrent and incapacitation effects on criminal behaviour. Assessments of crime prevention strategies are limited, but there is enough evidence to support the development, delivery, and refinement of such strategies to reduce crime rates.

3.4 Natural Resource Booms: Perfect Storms?

Saskatchewan has recently experienced an economic boom driven by high commodity prices. The boom has been characterized by increased natural resource exploration, development, construction, and increased migration inflows. Estevan, the “Energy City”, had the fastest rate of population growth from 2006 to 2011, and had the highest median income in 2010, of the ten largest cities of Saskatchewan. Workers flowed into the city to take part in the oil and investment boom. Estevan also experienced a substantial rise in minor assaults and drug-related offenses (Wilson & Sagynbekov, 2014).

Booming resource cities attract workers. These new workers are often young, work long hours, are housed in work camps, do not have established ties to the community, and may not properly integrate into their new community (see sections 3.2.2 and 3.2.4). These workers are well-paid, and may be attracted to the consumption of illicit drugs and alcohol (see section 2.8.1.1). The abuse of these goods may also lead to inappropriate behaviour, including fights and minor assaults. A perfect storm may result.

Two recent works have examined the impact of resource booms on crime. James & Smith (2014) examined changes in regional crime rates in the US between 2000 and 2011. The authors concluded that shale-rich regions experienced more rapid rises in both violent and property crime rates, especially assaults. Ruddell et al. (2014) focused their attention on the oil and gas producing regions of Montana and North Dakota (which shares the Bakken oil shale deposit with Estevan). Violent crime in booming regions increased by 19% from 2006 to 2012, while that of regions with no oil or gas

production decreased by 26%. Their results, however, are suggestive and must be taken with caution due to data limitations (in particular, incomplete crime data).

In Estevan, “oil companies have bought up entire blocks in hotels, and about 200 workers are housed in a ‘man camp’ – a cluster of well-furnished trailers in the city’s southeast end” (Mackrael, 2012); the city’s mayor identified an increase in the availability of drugs, including cocaine, and in the number of bar fights. Well-paid, young workers, housed on the outskirts of the community, are a strong source of demand for alcohol and illicit drugs, and a source of rising crime. The incidence of crime is influenced by economic opportunity, the demographic characteristics of the labour force, and the outlets for high income.

3.5 Summary: Empirical Evidence

A vast literature on the empirical determinants of crime exists. Several factors have repeatedly been identified as correlated with indicators of crime. These factors have been highlighted in this report: income and business cycles; unemployment; inflation; poverty and inequality; education; age; family structures; immigration and ethnic differences; punishment; policing, and; prevention.

The empirical evidence is strongly supportive of a positive relationship between inflation and property crime, and of a negative relationship between the labour market opportunities of young, low-skilled men and crime. There is some support for a positive relationship between inequality and crime, and between poverty and crime, but some studies find weak or nonexistent ties. The empirical evidence on the links between unemployment and crime is mixed, and appears to be the result of opposing motivational and opportunity effects on criminal behaviour. Overall, it appears that we may cautiously infer from the literature that poor employment prospects, poverty, and high inflation, cause individuals to be susceptible to engaging in criminal behaviour, as follows from the theoretical framework in Section 2, but other coincident and opposing forces may influence criminal decisions.

Public concern about the impact of immigration on crime has been recently increasing, however, evidence on the impact of changes in the proportion of immigrants on crime is generally inconclusive, and appears to be dependent on the policies and environment of the receiving country. Canadian immigration policy favours those with high levels of education and skill, and targets those who are believed to have the highest probability of success in the country. Although we know of only one study on the impact of immigration on crime in Canada, it provides evidence to support the inference that an increasing proportion of immigrants has no effect on crime, and may even cause decreases in property crime over time.

Individuals that are consistently linked to a higher probability of criminal behaviour are those who are young, those with low educational attainment, those from broken or lone-parent households, and those in visible minorities (for example aboriginal populations in Canada, and the African-American population in the US). However, all of these at-risk demographic groups also have socio-economic characteristics which are linked to a higher probability of criminal behaviour, namely low employment prospects, high unemployment, low absolute and relative household income, neighborhood disadvantages, financial instability, and social instability. This makes it important to further explore the socio-economic determinants of criminal behaviour which are masked by these demographic factors for at-risk individuals.

The impact of policing and punishment on crime appears to be quite clear. When studies effectively account for simultaneity between police force size or policing expenditure changes and crime rate changes, crime has been found to be adversely affected by increases in the number of police officers and resources used for policing. And when the justice system raises the severity of punishment for a specific crime, the rate of that specific crime falls; punishment serves as both a deterrent to criminal activity, and provides an incapacitation effect on crime with incarceration serving to restrict the ability of prisoners to engage in criminal activity. Research on the effectiveness of crime prevention strategies is in its infancy. Very few evaluations have been completed. However, from those which have been produced, there is enough evidence to support the continued development, delivery, and refinement of crime prevention strategies to reduce crime rates.

The literature on the determinants of crime, while vast, is still developing, with richer and longer datasets, and, most importantly, with the development, improvement, and use of appropriate methodologies. This has been motivated by criticisms of early studies that were unable to deal with simultaneity problems and bias in the resulting model estimates. Shortcomings of available data have also placed limitations on methodologies and their effective implementation, and on the ability to make conclusive inferences. Levitt (2001) recommended that researchers study cross-sectional, time-series, and panel data for small and large regions, for many cities, counties, states, countries, and to complement that research with longitudinal studies using individual-level data. There are also various methodologies to be used, depending on the data sets and issues, including specialized time-series and instrumental variables regression techniques, and natural experiments. The weaknesses, limitations, and omissions of each study have made it difficult to compare and contrast results in many cases. Even Levitt, who has surveyed, and whose numerous works are influential in, the literature on crime, is not immune from criticism. Donohue & Levitt (2001), a controversial and sensationalized study of the effect of abortion on the decline in crime since the 1990s has been found to be weak or problematic, for example, with results sensitive to time period selection, by Joyce (2003, 2009) and by Foote & Goetz (2008). Replies to these criticisms by Donohue & Levitt (2004, 2008) focus on differences in specification and samples that cause different results.

The work highlighted in this section is admittedly a small subset of the literature. The literature surveyed in this section and in section 2 is primarily grounded in economic theory and methodology. We do not wish to imply that other work and approaches are irrelevant, but want to acknowledge our strengths as economists and focus on economic approaches first. Section 4 presents our attempt to survey the non-economics literature.

4 Non-Economic Theories of Crime

Crime is a complex issue that encompasses interactions among biological, cultural, psychological, social, and economic factors. Therefore, it is not surprising that the economic theory of crime is just one of many theories of crime. In contrast to the economic theory, non-economic theories of crime provide greater depth and flexibility in understanding why an individual commits crime, how historical and socio-political contexts determine what constitutes a crime, and how biological specificities affect criminal behaviour. This multi-disciplinary nature of the study of crime led to the development of theories primarily in a parallel fashion, each addressing a specific aspect of crime. Although there is an attempt to unify non-economic theories of crime, the field remains fractured with limited empirical support (Agnew, 2012).

We have no expertise in non-economic theories of crime, and therefore our discussion of this topic does not extend beyond what we have learned from several academic articles and Ronald L. Akers's book *Criminological Theories: Introduction and Evaluation* (Akers, 1994) as well as Roger H. Burke's *An Introduction to Criminological Theory* (Burke, 2014).

One way to classify non-economic theories of crime is by the type of questions each attempts to address. From this perspective, there are two major questions: (1) What factors define a criminal act? And, (2) what drives an individual to commit a crime? Theories that address the first question claim that the justice system discriminates against weaker members of society based on race, gender, and class. The common theme for all of these theories is conflict between oppressive and victimized groups. Theories that address the second question focus on understanding factors that explain criminal behaviour at an individual and at a group level. Sociological theories of deviant behaviour explain differences in crime rates across communities as resulting from differences in social and cultural variables. In contrast to sociological theories, psychological, social-psychological, and biological theories of deviant behaviour emphasize the role of an individual's experience, particular life-altering situations, personality and other psychological traits, and physiological characteristics, as factors that predispose one to commit a crime.

In this section, we provide brief summaries of the major non-economic theories of crime. Then we review testable implications of each theory and how the resulting implications fare against empirical evidence. We conclude with a discussion of overlapping areas between these theories and the economic theory of crime.

4.1 Criminals as Victims of Oppression

Theories that position criminals as victims of oppression include conflict theory, labeling theory, Marxist theory, and feminist theory. Each is described individually in this subsection, with some concluding remarks on the empirical support for these oppression-based theories.

4.1.1 Conflict Theory

Conflict theory of crime suggests that laws reflect the interests and norms of an oppressive group, and crimes are simply attempts by the victimized group to maintain their own norms and resist the oppressor. This theory rests upon two fundamental premises. First, society consists of several groups that have opposing interests and cultural values. Second, laws exist to suppress dissent from the weaker groups. Those who subscribe to the “radical” version of this theory (for example, Quinney, 1970) believe that there is only one powerful group that perpetuates its position by use of the state’s coercive powers. Others who subscribe to the “pluralism” version of this theory contend that there are multiple powerful groups that share common goals and values and they actively engage in lobbying of government apparatus to institute favorable laws and rules.

4.1.2 Labeling Theory

Labeling theory is viewed as a variant of conflict theory. According to this theory, the oppressor group imposes rules according to which norms and values of the victimized group become “deviant”. As a result, a criminal act itself is less important in relation to the class affiliation of the person who committed the crime. In other words, criminality of an act is prescribed by the powerful group and is applied primarily to suppress the oppressed group. Labeling theory does not attempt to explain causes of crime. Instead, it focuses on the discriminatory application of criminal justice rules.

4.1.3 Marxist Theory

Marxist theory of crime asserts that laws and governments in capitalist societies exist solely to propagate the economic interests of capitalists. The product of a captured state by the powerful elite is a set of laws and rules, including a criminal justice system, designed to oppress the working class proletariat and extract maximum surplus from labour services. This theory rests on the following assumptions: (1) The proletariat (working class) owns its labour and nothing else; (2) the bourgeois (capitalists) owns all means of production; (3) the bourgeois cares only about wealth accumulation; and, (4) democratic processes by which the majority’s interests are reflected in laws and the actions of the state are simply illusions. Given these assumptions, Marxists conclude that the criminal justice system is not about what’s best for the society but about what’s best for the bourgeois. This line of reasoning is presented by the so-called “instrumental Marxists”. A milder version of this, which is

known as “structural Marxism”, relaxes the conclusion that the bourgeois fully controls the state. Instead, it argues that the state has “relative autonomy” in the short run as interests of some in the elite group may contradict the interests of others in the same group. But in the long run, both versions predict that the legal system will serve only the interests of the bourgeois. For example, both versions agree that the incarceration rate will go up during recessions as there are surplus labourers in the market and vice-versa during expansionary periods. In both versions, the bourgeois is afraid to have an unemployed proletariat as it may organize a revolutionary force to overthrow the capitalist regime.

4.1.4 Feminist Theory

Although there is no unified feminist theory of crime, there are several commonalities. All feminist theories of crime start with an assertion that knowledge is mediated by one’s gender. According to feminists, current crime theories draw knowledge from male experience, and therefore are biased against women. As a normative proposition, those who subscribe to feminist theories of crime suggest that we look at crime and the criminal justice system as being mediated by gender relations. Some feminists argue that the oppressive behaviour rooted in gender differences should have the same importance as race and class.

4.1.5 Empirical Support for Oppression-based Theories

Conflict theory and labeling theory generate similar testable implications. The strongest testable hypothesis from both is that the application of justice rules has little to do with the crime itself and more to do with one’s race, class, and gender. The empirical tests strongly reject the hypotheses advanced in conflict and labeling theories. Once characteristics pertaining to a specific crime are taken into account, the role of race, gender, and class become statistically and substantively insignificant (Akers, 1994). Also, this theory cannot reconcile the fact that the proportion of minorities in prisons has not been decreasing in Canada and in the US, yet the number of Bernie Madoffs and Martha Stewarts and their ilk, convicted for white collar crime, has been on the rise.

Although Marxist theory has little empirical validity in a historical context (the experiences of the Soviet Union, Cuba, and China), it does make one sharp testable prediction: the number of individuals behind bars rises during economic recessions and falls during economic booms. This prediction is easily falsified by the prison population trends in Canada as well as in the US. Despite the severity of the recent financial crisis in 2008, the growth in the prison population in both countries was not substantially affected, and continued during both good times and bad.

Feminist theory of crime provides several testable implications. For example, according to this theory women would face differential punishment than men for similar crimes. Steffensmeier et al. (1993) investigate sentencing practices of judges in Pennsylvania. They show that men faced a higher

probability of being sentenced to prison than women. But this difference disappears when they take into account the severity of crime, past offenses, and family responsibilities of offenders. Daly (1989) empirically tests the hypothesis of paternalism in judicial decisions to grant pre-trial releases to defendants by interviewing 11 judges from Springfield, Massachusetts and 12 judges from Suffolk County, New York. Her qualitative research findings suggest that judges exercised discretion and granted pre-trial releases to defendants who had stronger familial ties and parental obligations. But when she compared sentencing practices for women with no familial ties and parental obligations to men with similar characteristics, she found no reported differences in sentencing practices. Furthermore, she showed that the differences in pre-trial releases and sentence length were driven by the fact that twice as many women had familial ties and family obligations as men. Therefore, what appear to be paternalism-driven judicial decisions were instead decisions driven by the desire to protect the interests of families and children of offenders.

4.2 Biological Theories

In the late 19th century, an Italian physician and psychiatrist Cesare Lombroso argued that a criminal man is physically distinct from a normal man (Burke, 2014). According to early proponents of biological theory, criminals were born with physiological and genetic defects, and were destined to commit crimes. The modern biological theory of crime has distanced itself from the notion of a “predestined” criminal. Instead, it asserts that genetic and physiological traits play an important role as a determinant of criminal behaviour when they interact with environmental, psychological, and socio-economic factors. One of the main implications of the biological theory of crime is that, for offenders with strong physiological and genetic proclivities toward crime, there may be little or no deterrent effect from traditional penal methods.

The idea of inherited criminal traits was empirically investigated by Goring (1913). Although he was not the first one to do an empirical work, he was the first to use a large sample of prisoners (3,000 inmates) to explore the link between heredity and criminality. His research showed that inmates were on average less intelligent and physically smaller than a comparable non-institutionalized group of individuals. In addition, he reported that the correlation among individuals with familial ties, in terms of criminality, was stronger than among those with no familial ties. The strongest evidence for the role of heredity comes from the observation that children who were separated from their criminal parents were just as likely to grow up to be criminals as those children who were not separated from their parents.

A more recent study of 308 twins from Ohio (Rowe & Rogers, 1989) showed there were substantial similarities in behaviour. But both the Goring and Rowe and Rogers studies suffer from confounding effects, or factors other than inherited traits that also influence behaviour. Hutchings & Mednick (1977) attempted to overcome this by investigating male adoptees in Denmark from 1927 to 1941.

They found that 48% of adoptees with a criminal record had birth fathers with a criminal record, whereas only 31.1% of adoptees with no criminal record had birth fathers with a criminal record. But this study may also suffer from confounding effect as the adoption process may try to match adoptees with families that have a familiar environment to what the child had before adoption (Burke, 2014).

There have been many studies that empirically investigate the link between physiological traits and criminality. For example, Hirschi & Hindelang (1977) reviewed studies linking IQ to criminal propensity, Ellis (1990) linked some crimes to genetic predispositions, and Hartl et al. (1982) provided some evidence for body type and criminal propensity. Others have focused not on inherent physiological characteristics but on how biochemical changes in the body can influence one's criminal propensity. For example, sexual hormones, blood sugar level, adrenaline sensitivity, and substance abuse are shown to have some statistical association with criminal propensity. But in contrast to the earlier versions of biological theory, the latter versions all emphasize the importance of interactions between physiological and non-physiological factors as determinants of criminal propensity.

4.3 Psychological Theory

Similar to the biological theory of crime, the psychological theory of crime considers criminal behaviour as predetermined. In contrast to biological theory, in which physiological defects and abnormal physiological reactions to external stimuli are sources of criminal behaviour, psychological theory asserts that a person's underlying psychological problems are responsible for criminal behaviour. There are two distinct perspectives within psychological theory of crime: (1) psychoanalytic theory, and (2) personality theory. The proponents of psychoanalytic theory believe that criminal behaviour arises from mental abnormalities. From a Freudian psychoanalytic perspective, a person's mental development is shaped in early childhood. According to this view, a person's mind consists of the id, the irrational and impulsive component of the mind, and the ego and the superego, which are the conscious and reasoning parts of the mind. Over the normal course of development, a child undergoes emotional maturity and the role of the id diminishes as she comes of age. When there are abnormalities in the above-mentioned development stages, a person may develop antisocial behaviour and a propensity toward crime. Proponents of personality theory contend that criminal behaviour is a symptom of defective personality traits. Persons with abnormal personality traits do not feel empathy or guilt, and lack moral judgment. Some personality theorists assert that criminal behaviour is just a reflection of defective personality traits such as impulsiveness, aggressiveness, and hostility. In both versions of the psychological theory of crime, the emphasis is placed not on the nature of crime but on the personality defects of an offender. The theory contends that once personality defects are resolved, criminal behaviour is likely to subside.

Psychoanalytic theory rests on the assumption that a practitioner has the ability to correctly identify the underlying conflict inside the offender's mind. Therefore, the only observable evidence comes

from the practitioner's interpretation, which is subjective and cannot be replicated by another practitioner. As a result, psychoanalytic theory cannot be reliably verified by means of reproducible empirical research. On the other hand, the personality theory of crime produces a number of testable hypotheses, because there are ways to objectively ascertain personality traits. For example, the Minnesota Multiphasic Personality Inventory (MMPI) and the California Psychological Inventory (CPI) tests of personality traits are commonly used to compare group mean differences between a non-criminal control group and a group that consists of individuals with criminal histories. Despite its common acceptance as a reasonable theoretical construct, empirical evidence on the psychological theory of crime remains weak.

4.4 Social-Psychological Theories

The category of social-psychological theories is subdivided into social learning theory, which centres on learned behaviour, and social bonding theory, which centres on conformity to social norms.

4.4.1 Social Learning Theory

Social learning theory explains criminal behaviour as learned phenomenon. According to Akers (1994), one of the founders of this theory, a person's decision to engage in criminal activity is affected by the interaction of individual-specific rewards and punishments modified by external positive and negative reinforcements. The proponents of this theory emphasize the role of social learning in criminal behaviour, and the transmission of values and skills from one person to another. Furthermore, social learning theorists believe that criminal behaviour of one person reinforces and accelerates the rate of criminal behaviour of another person within the same group. One of the implications of this theory is that removing rewards associated with criminal behaviour or increasing punishment for bad behaviour will reduce the rate of criminal activity.

Akers (1994) reviewed several empirical articles that directly compare social learning theory variables with other theories such as anomie and social bonding in explaining total variation in some measure of delinquent behaviour. For example, in a study of adolescent substance abuse, 31% to 68% of total variation in the dependent variable was attributable to social learning variables, whereas social bonding theory and anomie theory variables accounted for 15% and 5% of the total variation respectively.

4.4.2 Social Bonding Theory

Social bonding theory, which is closely related to control theory, focuses on explaining why individuals conform to social norms instead of engaging in antisocial behaviour. There is one distinguishing feature of this theory in relation to other theories of crime. According to social bonding theorists, the natural state for humans is to engage in crime. The forces that stop people from committing criminal acts are social and personal controls. Hirschi (1969), the founder of the social bonding theory of crime, posited that criminal behaviour occurs when a person's bond to society is weakened. In turn, the bond between the person and the society depends on ties with other members of the society (attachment), on dependence on the community (commitment), on productive ways of spending time (involvement), and on shared norms and values with others in the society (beliefs). When any one or combination of these is weakened, the social bond is weakened, and therefore the likelihood of criminal behaviour is increased.

More recently, Gottfredson & Hirschi (1990) proposed an alternative to the initial version of social bonding theory. According to their theory, a person's propensity to commit crime depends on how much self-control one possesses: the stronger the self-control, the smaller is the likelihood of committing crime. These scholars argue that the formation of self-control primarily occurs during childhood years. Therefore, the role of parents in teaching self-control is far greater than similar teachings from peers or formal schooling. An immediate policy implication of this theory is that attempts to curtail criminality must focus on early childhood development.

Grasmick et al. (1993) constructed the attitudinal measure of self-control and used it as an explanatory variable to explain criminal behaviour using sample data from 395 adults in Oklahoma. Their analysis provided mixed results. Other empirical works also found a relatively weak statistical relationship between self-control and delinquent behaviour.

4.5 Sociological Theories

Sociological theories of crime attempt to explain systematic differences across groups. The unifying theme in all of these theories is that more crime occurs in places where social cohesion is broken down. Social disorganization theory primarily focuses on urban crime as resulting from abnormal and disruptive social conditions. Anomie theory of crime emphasizes the role of an integrated society in which socially desirable goals are balanced against socially desirable means of achieving them. In places where opportunities or means of achieving socially desirable goals are unequally distributed among subgroups of the society, individuals from groups with limited opportunities will seek out alternative (deviant) means of achieving socially desirable goals. Strain theory of crime takes a more general position. According to this theory crime, or delinquent behaviour in general, is a reaction to stress. Agnew (1985) identified three sources of stress: (1) failure to achieve one's goals; (2) removal of positive stimuli; and, (3) confrontation with negative stimuli. The first source of stress is identical to

what anomie theory of crime considers as the source of criminal behaviour. The second source of stress or strain refers to the loss of someone or something highly valued. And, the third source refers to reactions by an individual to situations such as domestic abuse or bullying at school.

Since Agnew's strain theory encompasses the other two theories, we will limit our discussion of empirical works pertaining to strain theory only. Agnew & White (1992) empirically tested the theory by looking at how sources of strain relate to delinquency. They found positive and statistically significant effects for the strain variable.

4.6 Common Themes in Non-economic Theories of Crime and the Economic Theory of Crime

What makes the economic theory of crime different from mainstream theories in criminology? Akers (1990) forcefully argued that the rational choice perspective imported from the economic science conceptually adds nothing new to criminology. According to Akers (1990: 660), "when the deterrence doctrine is expanded to encompass other variables beyond actual or perceived risk of legal sanction, such as formal and informal social sanctions and both rewards and punishment, it is no longer distinctively deterrence theory. It becomes something else; to some, it becomes rational choice theory; I would counter that it simply moves even closer to social learning theory." De Haan & Vos (2003: 32) go further, "sociologists critical of rational choice or rational action theory see it as a dubious form of 'economic imperialism', misunderstanding or disregarding the importance of the problems of meaning and morality with which the classical sociological theorists were concerned, and unwarranted in its claim to be a general theory of social action."

So, what does the economic theory bring to the table? As Akers (1990: 654) himself admitted, "Much of the rational choice literature takes a strong quantitative modeling approach derived from econometric modeling, which advances our ability to test complex models of criminal behaviour and the criminal justice system." We would argue that the appeal of the economic approach goes beyond the econometric tools. Theories of crime in criminology differ not only in explanations of criminal behaviour but also in terms of constructing their models of behaviour. In contrast, the economic theory of crime rests on the same modeling approach as the economic theory of health, the economic theory of law, and the economic theory of production. The binding forces behind these models are not some particular assumptions or specific variables, but the economic methodology employed to investigate behaviour. All economic models assert that behaviour is purposeful and goal oriented. Furthermore, behaviour in all economic models is explained as a rational reaction to constraints. What criminologists refer to as the economic theory of crime is just *an* economic model, not *the* economic model. Instead of looking at the economic approach as some specific explanation of criminal behaviour, as many in criminology appear to believe, one has to view the economic approach as a methodology. The economic methodology relies on mathematical modeling of theoretical constructs.

Such a formal approach to modeling, which is not the case in mainstream criminology, produces much sharper testable implications and provides greater tractability of theoretical arguments.

From this perspective, many of the aforementioned theories of crime can easily be integrated into economic models without ignoring important contextual factors. For example, peer effects in social learning theory can be modeled by making one person's utility function depend on another person's utility function. In fact, Becker (1974) provided a mathematical model of social interaction using the same economic methodology that economists have employed to understand consumer behaviour. Pollack (1976), a staunch critic of Gary Becker, provided a rigorous discussion of how to model interdependent preferences. Similarly, all informal rewards and punishments in social learning theory of crime can easily be integrated as part of the individual's constraints. Becker (1965) explicitly recognized the importance of non-market activities and formally integrates non-market constraints into his model.

According to Pollack (2002), there are two types of critics of economic explanations of social phenomena: those who disagree with the assumptions embedded in economic models, and those who reject the economic methodology. The latter add no value for advancement of knowledge as they propose no superior alternative. But the former can inform as well as improve empirical relevance of existing models. In recent years, that is precisely what has been driving scholarly work in the economics of crime.

In its simple form, deterrence theory asserts that individuals rationally consider costs and benefits of their actions. Psychological theories of crime, on the other hand, suggest criminals often behave impulsively and fail to recognize full costs of their actions. In economic terms, this translates into inconsistent discount rates; individuals with preferences that favor immediate consumption. Lee & McCrary (2005) empirically investigated the behaviour of young men one week before and one week after their 18th birthday. Since penalty jumps when one turns 18, the prediction from deterrence theory is criminal activities should show sharp drop. Yet, these authors find that the arrest rate data from Florida from 1989 to 2001 show no such drop. In other words, models of criminal behaviour should use preference functions that are subject to hyperbolic discount rates.

McAdams & Ulen (2008) provided an extensive review of theoretical and empirical economic studies that employ the approach called behavioural economics, a subfield in economics that addresses limitations of pure rational choice models. These limitations are derived from experimental works within economics as well as empirical works from other fields. The important point is, though these developments are critical of simple assumptions embedded in rational choice theory, new insights are used to improve internal validity and predictive power of existing models without rejecting the methodology.

Akers (1994: 12) was right in his remarks that, “A theory may be evaluated, either on its own or by comparison with other theories, on the criteria of clarity and consistency, scope and parsimony, testability, practical usefulness, and empirical validity. Of these the most important is empirical validity.” Despite many and often valid criticisms of the economic theory of crime, traditional theories of criminology have not been able to outperform it in terms of empirical evidence.

4.7 Summary: Non-economic Theories of Crime and Empirical Support

In this section, the major theories of crime from biology, psychology, sociology, and criminology were briefly reviewed. For theories capable of producing testable implications, results from empirical studies were discussed, and practical implications were highlighted. Conflict-based theories of crime such as Marxist theory and Feminist theory do not attempt to explain the causes of crime. Instead, they question the fairness of the justice system. Biological theories of crime make a strong case for a ‘predestined’ criminal and relative unimportance of deterrence as a means to reduce crime. Psychological theories of crime suggest that crime is a result of mental or personality defects, and argue that criminals need treatment not punishment. Sociological theories of crime attribute crime to a breakdown in social cohesion. In contrast to aforementioned theories, more recent theories such as social learning and social bonding consider criminals as capable of making choices. In that respect, these theories have much in common with the economic theory of crime. The advantage of focusing on economic theory is the ability to empirically test the validity of model predictions with existing data. Economic theory may also incorporate developments from other fields to improve the empirical relevance of economic models to describe criminal behaviour and crime.

5 Conclusion

This report is the second preliminary report of a larger research project focusing on the changing economy and demography of Saskatchewan and its impact on crime and policing. The first report provided an overview of economic, demographic, and policing and crime trends over the last two decades in Saskatchewan and its ten major cities. This report presented a review of the literature on the theoretical and empirical determinants of criminal behaviour and crime.

As economists, it was our natural tendency to first focus on economic theory as applied to the field of crime, using a simple model under the assumptions of rational decision-making given a set of opportunities and a set of constraints. The model was examined using examples and adjustments to illustrate how changes in certain economic, demographic, and policing and justice system factors may affect the decision-making process, and lead to criminal behaviour. The factors of interest were: income and business cycles; unemployment; inflation; poverty and inequality; education; age; differences in family structures; immigration and ethnic differences; punishment; policing, and; prevention. The empirical evidence concerning the influence of these factors on crime was then reviewed. The survey literature points out that early studies suffer from methodological and data limitations, and that it is particularly important to use methods that account for simultaneity in the data, and to corroborate results with those from a range of data sets in order to make valid inferences.

Empirical studies of the determinants of crime provide strong support for a reduction in crime with an increase in police size, policing resources, the severity of punishment, or in time of incarceration. The empirical evidence also points to a well-defined negative relationship between the employment opportunities of young men with low skill and education levels and crime, and a positive relationship between inflation and property crime. There is weak empirical support for a positive relationship between poverty and inequality on crime, and mixed results when trying to determine the impact of changes in unemployment on crime. At this point in time, little research exists on the effectiveness of crime prevention strategies, but the evidence is encouraging for the continued development, implementation, and assessment of such strategies to reduce crime.

The public concern on the impact of immigration on crime has increased in many nations including Canada. Internationally, the evidence on an immigration-crime is mixed. Although there is only one study that has examined this link for Canada, we may tentatively infer that there is no positive link between changes in the proportion of immigrants and crime, but instead, there appears to be a negative relationship between increased immigration and property crime in the long run. Current immigration policy favouring immigrants with high levels of education may have a strong influence on this result.

Other demographic factors that influence crime are somewhat difficult to contextualize. Individuals who are young, from broken or lone-parent households, or in some visible minority groups, are more likely to commit crimes than the greater population. However, these individuals also have a greater tendency to possess socio-economic characteristics that are linked to crime, such as poor employment prospects, high unemployment, financial instability, high absolute and relative poverty, neighborhood disadvantages, and social instability. This is important to keep in mind since demographic factors may be masking important socio-economic determinants of crime.

The major theories of crime from biology, psychology, sociology, and criminology were also briefly reviewed. Conflict-based theories of crime question the fairness of the justice system rather than explain the causes of crime. Biological theories of crime espouse the predestined criminal and that deterrence is unimportant in reducing crime. Psychological theories of crime suggest that crime is a result of mental or personality defects, and argue that criminals need treatment not punishment. Sociological theories of crime attribute crime to a breakdown in social cohesion. Social learning and social bonding theories treat criminals as capable decision makers, and as such, these theories have much in common with the economic theory of crime. While these alternative theories are important, the advantage of focusing on economic theory is the ability to empirically test the validity of model predictions. Economic theory may also incorporate developments from other fields to improve the empirical relevance of economic models to describe criminal behaviour and crime.

The findings contained in this second report will be used to inform subsequent phases of the larger research project on the changing economy and demography of Saskatchewan and its impact on crime and policing. This survey will assist in the development and use of an empirical model to examine the determinants of crime in Saskatchewan over time. The model will then be used to forecast the probable evolution of crime rates over time with continued resource development and the expansion of the Saskatchewan economy, to assist policy-makers and police forces plan for the future.

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