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**Exploring the Association Between Economic Conditions and Crime Trends in
Ontario, 1951-1999**

by

Andrew MacKenzie, B.A.

**A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of**

Master of Arts

Department of Sociology and Anthropology

**Carleton University
Ottawa, Ontario
May 10, 2001**

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acceptance of the thesis**

**Exploring the Association Between Economic Conditions
and Crime Trends in Ontario, 1951-1999**

submitted by Andrew Michael MacKenzie, B.A. Hons.

**in partial fulfilment of the requirements for
the degree of Master of Arts**

Department of Sociology and Anthropology

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May 2, 2001**

Abstract

The crime rates in Ontario fluctuated dramatically during the second half of the 20th century. Changing economic conditions are the most likely explanations for the continuously changing crime trends. But empirical findings from previous research are inconsistent. To control for changing demographic structure, Easterlin's age effects are incorporated into the statistical models. This allows the opportunity for a more thorough examination of the economic conditions-crime relationship. Several methodological concerns from previous research are also addressed. Time series analysis is used to analyze the data from the province of Ontario, 1951-1999. The results indicate strong associations between economic conditions and the crime trends, even when controlling for the age effects. Deteriorating economic conditions and a larger proportion in the youthful population tend to correlate with increased crime rates. More specifically, we find that the effects of changing economic conditions and demographic structure are relatively strong for property-related offences.

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<i>Acceptance Form</i>	ii
<i>Abstract</i>	iii
<i>Acknowledgements</i>	iv
<i>List of Tables</i>	vii
<i>List of Illustrations</i>	viii
Introduction	1
Chapter 1 Economic Conditions, Crime, and the Easterlin Hypothesis	5
Theories on Economic Conditions and Crime	6
<i>Motivation Theories</i>	8
1) Rational-Choice Theory	8
2) Strain Theory	11
3) Mainstream Motivation Theory	13
<i>Opportunity Theory</i>	15
Demographic Structure and the Easterlin Hypothesis	19
Summary and Conclusion	25
Chapter 2 Data, Measurements, and Methodological Concerns	30
The Sources of Data and Variables	30
<i>Crime Statistics</i>	31
<i>Indicators of Economic Conditions</i>	33
<i>Demographic Variables</i>	34
Reliability of the Data	35
Methodological Concerns in Previous Research	37
Methods	40
Chapter 3 Exploring the Correlates of Changing Crime Trends in Ontario, 1951-1999	43
Motivation Theory, Easterlin's Age Effects, and Crime Trends	44
Crime Trends	45
<i>Property Crimes</i>	48
<i>Violent Crimes</i>	49
Economic and Demographic Factors	52
<i>Unemployment Rates</i>	52
<i>Labour Force Participation Rates</i>	62
<i>Personal Disposable Income</i>	69
<i>Demographic Structure</i>	76
Discussion and Conclusions	80

Chapter 4	Multivariate Analysis of the Covariates of Crime Trends in Ontario	85
	Statistical Models for the Three competing Theories	85
	<i>Motivation Theory Model</i>	89
	<i>Opportunity Theory Model</i>	90
	<i>The Motivation Theory and Easterlin Hypothesis Model</i>	91
	Statistical Results	92
	<i>Statistical Results of the Motivation Theory Models</i>	93
	<i>Statistical Results of the Opportunity Theory Models</i>	97
	<i>Statistical Results of the Motivation Theory and Easterlin Hypothesis Model</i>	100
	Discussion and Conclusion	106
Chapter 5	Implications of Varying Economic Conditions and Demographic Structure for Changing Crime Trends	121
	Policy Implications	123
	Limitations of the Data	126
	Areas for Future Research	128
	<i>Gender Ratios</i>	128
	<i>The Relationship Between Opportunity Theory and Motivation Theory</i>	129
	<i>Empirical Studies of the Easterlin Hypothesis</i>	130
References		133
Appendix		138

List of Tables

Table 1	Motivation Theory Models for Property Crime	94
Table 2	Motivation Theory Models for Violent Crime	96
Table 3	Opportunity Theory Models for Property Crime	98
Table 4	Opportunity Theory Models for Violent Crime	99
Table 5	Motivation Theory & Age Effects Models for Property Crime	102
Table 6	Motivation Theory & Age Effects Models for Violent Crime	103

List of Illustrations

Figure 1	All Crimes in Ontario and Canada, 1951-1999	46
Figure 2	Property Crime Trends in Ontario and Canada, 1951-1999	48
Figure 3	Violent Crime Trends in Ontario and Canada, 1951-1999	50
Figure 4	Bivariate Relationship between Property Crime Rates, Unemployment Rates and the Percentage of the Population Age 15-19	55
Figure 5	Bivariate Relationship between Violent Crime Rates, Unemployment Rates and Percentage of the Population 15-19	59
Figure 6	Bivariate Relationship between Property Crime Rates and Labour Force Participation Rates	65
Figure 7	Bivariate Relationship between Violent Crime Rates and Labour Force Participation Rates	67
Figure 8	Bivariate Relationship between Property Crime Rates and Personal Disposable Income per Person	72
Figure 9	Bivariate Relationship between Violent Crime Rates and Personal Disposable Income per Person	75
Figure 10	Bivariate Relationship between Property Crime Rates and Proportion of the Population 15-19	78
Figure 11	Bivariate Relationship Between Violent Crime Rates and the Proportion of the Population 15-19 & 20-24	80
Appendix		
Figure A	Bivariate Relationship Between Break and Enter Rates and the Unemployment Rates	139
Figure B	Bivariate Relationship Between Theft Rates and the Unemployment Rates	139
Figure C	Bivariate Relationship Between Auto Theft Rates and the Unemployment Rates	140
Figure D	Bivariate Relationship Between Break and Enter Rates and the Unemployment Rates	140

Figure E	Bivariate Relationship Between Break and Enter Rates and the Labour Force Participation Rates	141
Figure F	Bivariate Relationship Between Theft Rates and the Labour Force Participation Rates	141
Figure G	Bivariate Relationship Between Robbery Rates and the Labour Force Participation Rates	142
Figure H	Bivariate Relationship Between Break and Enter Rates and Personal Disposable Income per Person	142
Figure I	Bivariate Relationship Between Theft Rates and Personal Disposable Income per Person	143
Figure J	Bivariate Relationship Between Robbery Rates and Personal Disposable Income per Person	143
Figure K	Bivariate Relationship Between Break and Enter Rates and the Proportion of the Population Age 15-19	144
Figure L	Bivariate Relationship Between Theft Rates and the Proportion of the Population Age 15-19	144
Figure M	Bivariate Relationship Between Robbery Rates and the Proportion of the Population Age 15-19	145

Introduction

The goal of this thesis is to improve upon existing research in the field of crime trend analysis. Historically, crime rates have been in a continuous state of change, rising and falling in a noticeable pattern. This pattern of change indicates that crime rates as a variable may vary with many factors including personal characteristics, environment, and social structure. If the crime rates can be influenced or maintained, all of society will benefit. An understanding of crime trends may lead to more effective targeting of social programs and the ability to forecast and address potential problems pre-emptively, before the crime rates can increase and detrimentally affect the lives of law-abiding citizens.

During the past fifty years, the rates of crime in the United States and Canada have fluctuated dramatically. With sufficient time, periods of high crime rates have given way to periods of low crime rates, followed again by high crime rates. During the 1950s and 1960s, the crime rates were at some of the lowest levels ever recorded. This period of low crime rates was followed by a period of noticeably higher crime rates during the 1970s and 1980s. The crime rates finally began a decreasing trend in the early 1990s and continued until the end of the decade. The exact causes remain unknown, but there are numerous theories concerning these changing crime trends.

Using data from Ontario between 1951-1999, this thesis examines the current criminological theories that provide explanations for this pattern of continuous change in the crime trends. One of the most likely explanations is changing economic conditions. Economic conditions are defined as the health of the prevailing national economy. Because one's economic situation affects one's living conditions and opportunity for success, these economic changes have been viewed as a possible explanation for

increased or decreased criminal activity. Currently, there are two competing criminological theories suggesting that changing economic conditions serve as the source of fluctuating crime trends. They are motivation theory and opportunity theory. The most important difference between the two theories concerns the direction of change in the crime rates when economic conditions deteriorate. Motivation theory suggests that criminal activity will increase during periods of low economic growth and development because of the increased stress and frustration associated with difficult economic conditions. In contrast, opportunity theory suggests that criminal activity will decrease because individuals have fewer opportunities to commit crimes. For example, proponents of opportunity theory will argue that juvenile offences will decrease in number because potential offenders are under increased supervision by parents and siblings who are now at home rather than in the paid labour force.

It is also possible that the two theories are related. Since the crime trends are not flat, it is obvious that the two theories do not have a cancellation effect on one another. However, it is possible that, in its own way, each of the effects described by these theories has an impact on crime rates. For example, during favourable economic conditions, the number of offenders with sufficient motivation for criminal activity may decrease but their opportunity for criminal activity may rise, thereby limiting the pattern of decrease noted in the crime rate. In a similar fashion, during difficult economic conditions when there are many motivated offenders, criminal opportunities are scarce, thereby limiting the increase in the crime rates. Overall, motivation theory presents a more convincing explanation of the crime trends, but previous research in this area has provided inconsistent results.

These inconsistent results suggest that economic conditions are not the only factors affecting the crime trends. A major problem with motivation theory is that it does not incorporate the effects of changing demographic structure. There is strong evidence to suggest that changing demographic structure and cohort size play an important role in the crime trends (Blumstein, Cohen & Farrington, 1988a; Blumstein, Cohen & Farrington, 1988b; Easterlin, 1980; Gottfredson & Hirschi, 1990; Gurr, 1981; Moffitt, 1993; Sampson & Laub, 1990; Tittle, 1988; Warr, 1993). For example, a theory proposed by Richard Easterlin suggests that youth age 15-19 are the most criminally active and that larger cohorts in this age group can significantly alter crime rates.

When motivation theory is combined with the age effects component described by the Easterlin hypothesis, a much more thorough explanation of the crime trends is provided. Richard Easterlin suggests that youth age 15-19 are the most criminally active. Since unemployment is most common in the early stages of an individual's career, a large cohort of youth age 15-19 experiencing difficult economic conditions will experience the highest levels of stress and frustration described by motivation theory and be the most criminally active. However, Easterlin's hypothesis is difficult to test because it operates in 40-year cycles and there has only been one revolution of the cycle captured by existing crime statistics in Canada. These data limitations have led researchers to ignore an empirical examination of Easterlin's theory in terms of motivation theory and its possible application for understanding fluctuating crime rates. Due to the complexity of Easterlin's hypothesis and the lack of necessary data, the age effects suggested by Easterlin cannot be tested directly, but can be controlled. Therefore, this thesis examines data from the province of Ontario for 1951-1999. Because this data covers a 49-year

time period, it allows us to test the ability of motivation theory, opportunity theory, and motivation theory combined with the age effect component of the Easterlin hypothesis as a way of explaining the fluctuations in the crime trends in Ontario, 1951-1999. From this perspective, we gain insight into the true association between changing economic conditions and crime because the effects of changing demographic structure on the crime trends are controlled.

This thesis consists of five chapters. The first chapter explores existing theories concerning economic conditions, crime, and the Easterlin hypothesis. In the second chapter, we will discuss the sources of the data used in this study, methodological issues observed in previous studies, and consequently the statistical methods used to analyze the data. The third chapter explores the crime trends in Ontario and their associations with the economic and demographic indicators, while suggesting possible explanations for the associations. The fourth chapter uses time series statistical methods to further examine the relationship between economic conditions and crime while controlling for some possible confounding factors such as the demographic structure of the population. The final chapter summarizes the results of this thesis and explains the theoretical and policy implications associated with the statistical analysis. This chapter also discusses the strengths and weaknesses of this thesis and describes how future research can continue to improve upon existing studies in crime trend analysis.

Chapter 1

Economic Conditions, Crime, and the Easterlin Hypothesis

A survey of prior studies reveals that criminologists and psychologists have studied crime and criminal behaviour from both structural (i.e. macro theories) and individual perspectives (i.e. micro theories). Structural level or macro theories examine the organization of society and its influence on the members of society. For instance, the macro level theories include ecological theories and anomie theory. Labelling theory, social learning theories, social control theory, and criminal propensity theory approach crime and criminal behaviour by focusing on micro level influences in the social environment. Traditionally, macro and micro level theories of crime have paid little attention to changing economic conditions and the association with criminal activity.

Travis Hirschi's 'social control theory' (1969) is one of the few theories to examine changing economic conditions, but this theory addresses economic conditions indirectly in combination with many other factors. Social control theory suggests that individuals will commit crimes unless they are constrained to do otherwise, and that their bond with society influences their conformity. Hirschi (1969) argues that these bonds are located in several areas. One of the strongest is the commitment of the individual to society. One of the main components of this bond includes commitment to society through employment. When economic conditions deteriorate and an individual is no longer committed to society through employment, his/her bond to society is weakened

and the likelihood of criminal activity is increased. Sampson and Laub (1990) found significant support for social control theory and the idea that commitment to society through work, education, and economic ambitions significantly reduces the likelihood of criminal activity. However, as significant as the support for social control theory is, this theory only partially examines one aspect of economic conditions, that is, commitment to society through employment. Social control theory does not examine many aspects of economic conditions, including the effects of change in the levels of unemployment, inflation, labour force participation, and disposable income on individuals.

There have been several studies attempting to illustrate that trends in crime rates can be explained by concentrating on economic conditions. A review of the existing literature that has examined the relationship between economic conditions and crime trends provides an opportunity to gain an understanding of the strengths and weaknesses of the theoretical explanations used. Therefore, this chapter provides an overview of existing theories and an examination of previous research supporting each theory.

This chapter is divided into two major sections, with each containing two different theories. The first section explores theories on economic conditions and crime, and includes motivation theory and opportunity theory. The second section explains demographic structure and the Easterlin hypothesis.

Theories on Economic Conditions and Crime

The economic conditions perspective examines the effects of changing economic conditions on crime rates. All of the economic conditions theories examine the effects of macro level economic changes linked with micro level interactions and individual behaviour in society. The most thoroughly researched indicator of economic conditions

has been the unemployment rate. Britt (1997) describes the unemployment rate as a primary indicator of economic conditions because of its ability to provide an overall indication of current economic conditions. Low unemployment rates signal prosperous economic conditions, while “a higher unemployment rate generally signals a general slowdown in production and consumption activities” (Cantor & Land, 1985: 320). The majority of existing theories on the relationship between economics and crime are organized around the effects of unemployment rates as an indicator of the impact that economic conditions have on criminal behaviour. The reason for this focus likely involves the fact that the unemployment rates are an easily obtainable, understandable, primary indicator of economic conditions. Nevertheless, the results of research attempting to determine the strength and direction of the relationship between unemployment and crime have provided mixed results. There is evidence of significant positive and significant negative relationships, as well as results finding little relation at all between unemployment and crime (Chiricos, 1987). For this reason, this thesis intends to expand upon existing knowledge explaining crime trends by examining several different economic and demographic indicators rather than the single factor of unemployment as a way of gaining a stronger understanding of the relationship between economic conditions and crime.

The theoretical explanations for crime trends that examine the relationship between changes in economic conditions and crime over time are separated into two streams based on the macro level affects of changing economic conditions and how they influence the likelihood of an individual committing an offence. These two competing streams are motivation theory and opportunity theory.

Motivation Theories

Motivation theory argues that there is a close association between employment, individual motivation, and the crime rates. According to this theory, frustration caused by unemployment can provide sufficient motivation for individuals to commit crimes because unemployment directly results in “an individual’s inability to maintain a particular standard of living” (Cantor & Land, 1985: 317). This frustration will motivate some individuals to “engage in instrumental crime to secure material wealth” (Chamblin & Cochran, 1998: 426). Following this basic tenet of the theory, the motivation to become involved in crime will increase as sources of financial support (unemployment insurance, social assistance etc.) are gradually exhausted and the individual faces the full economic hardship of being unemployed (Cantor & Land, 1985; Collins & Weatherburn, 1995). In addition, as unemployment rates increase, so does the supply of potential motivated offenders. Since individuals are not occupied at work, they have more free time to engage in criminal activity (Britt, 1997). This increases the crime rate because more people will be committing more crimes. There are two specific theories included under the umbrella of the motivation theory perspective, rational choice theory, and Robert Merton’s strain theory.

1) Rational-Choice Theory

Proponents of rational choice theory suggest that crime is the result of a rational and conscious decision-making process. “A source of motivation may be the outcome of a rational choice process, where individuals weigh the costs and benefits of criminal behaviour against legitimate behaviour” (Britt, 1994; 100). Individuals intentionally use criminal activity as a means of equalizing their income with people who are employed

(Pyle & Deadman, 1994). When a person becomes unemployed, the prospects of benefiting from legitimate behaviour slowly decrease. Since unemployed people can no longer benefit from legitimate behaviour through work, the benefits from criminal behaviour become more appealing. The longer the term of an individual's unemployment, the lower the costs of committing a criminal act appear to be. Since the person is already unemployed, and has likely been for some time, the perception that he/she has little to lose by engaging in criminal behaviour increases (Allen, 1996).

A second point to the rational choice perspective suggests that the severity of punishment for committing a crime is not the most important consideration for a potential offender when weighing the costs and benefits of criminal behaviour. Allen (1996: 298) suggests that "The probability of being caught and punished, rather than harshness of punishment, is the principal crime deterrent." For these types of offenders, the social stigma associated with being caught is the most important cost of their criminal activity. However, an additional, unconsidered cost occurs when the individual is convicted of a criminal offence and he/she receives a permanent criminal record that will detrimentally affect his/her future life chances. In particular, when unemployment rates are increasing and obtaining a job becomes more difficult, a criminal record will further decrease the likelihood that the individual will find work. Under such conditions, many individuals are led into the criminal lifestyle repeating future offences that also serve to increase the overall crime rate.

There are two common criticisms of rational choice theory. The first suggests that before committing a criminal act, criminals do not make conscious, rational decisions based on the costs and benefits of being caught. Akers (1997: 24) suggests that criminal

activity is rarely the product of a decision based on “full knowledge and free will, taking into account only a carefully reasoned, objectively or subjectively determined set of costs and benefits.” Criminals typically believe they will not be caught and refuse to consider the possible costs before engaging in criminal activity. The second criticism of rational choice theory argues that sufficient attention is not given to the possibility that individuals may differ in how they view, and subsequently ‘weigh’ the costs and benefits of engaging in criminal activity. For example, Nagin and Paternoster (1993: 469) suggest that individuals “may differ with respect to their initial propensity to offend.” This differing propensity to offend may lead certain individuals to offend when encountering/considering identical, potentially criminal situations. In contrast, potential offenders with a low tendency toward criminal behaviour may choose criminal activity during difficult economic conditions but will not offend during a favourable economy. In other words, some individuals differ in their tendency to commit crimes and are more likely to offend in similar circumstances compared to other members of society. Thus, crime may increase for a short term but will not retain the consistent pattern observed in the fluctuating crime rates that currently exist.

The empirical evidence to support or refute rational choice theory is also quite mixed. Although the work of Chiricos (1987) and Maxwell and Gray (2000) provide strong support, most other studies are not as favourable (Akers, 1997). Explanations provided for these mixed results focus mainly on the methods used for testing this theory. For example, Akers (1997) argues that previous research has not properly tested rational choice theory because these studies have included extra components from other criminological theories that tend to enhance the test results of rational choice theory.

Maxwell and Gray (2000) suggest that previous studies have not sufficiently operationalized rational choice theory because of the difficulty involved in trying to measure and compare the certainty of capture versus the severity of punishment, especially given the wide range of potentially criminal situations. Typically, the variable used to measure the certainty of capture has been the source of previous methodological errors, and has not been carefully specified in the operationalization to meet the basic tenets of rational choice theory (p. 117). For this reason, overall there is not sufficient empirical evidence to support or refute rational choice theory. However, following the proper specification of the 'certainty of capture' variable suggested by Maxwell and Gray (2000), future efforts may be more successful.

2) *Strain Theory*

The second theory included in the motivation theory category is Robert Merton's Strain theory. Strain theory is quite different from rational choice theory because it focuses on the frustration caused by differential access to socially defined success where rational choice theory focuses on the balance between the costs and benefits of engaging in legitimate or criminal behaviour. Robert Merton developed this theory partially from Emile Durkheim's work on anomie. There are two principal components to strain theory: "(1) culturally defined goals that are held up as legitimate for all members of society and (2) acceptable or legitimate *institutionalized means* of achieving these goals" (DeKeseredy & Schwartz, 1996: 204 emphasis in original). According to this theory, if access to the culturally defined goals matches the institutionalized means available, there will not be members of society experiencing 'strain' and crime is unlikely.

Merton suggests that strain occurs when individuals experience a gap between the culturally defined goals and the legitimate means available to achieve those goals. Because they are unable to meet the goals of their society, individuals may display one of several modes of adaptation, depending upon their socialization and the value that these goals hold for them (Menard, 1995). These modes of adaptation include: conformity, innovation, ritualism, retreatism, and rebellionism. However, the mode of adaptation that is most important to this discussion is 'innovation'. If an individual's goals are not obtainable through their institutionalized means, Merton suggests that 'innovation' in the form of criminal behaviour may be used as a way of obtaining those goals (Agnew 1992; Chamblin & Cochran, 1998; Gurr, 1981; Menard 1995). From this perspective, crime is used as a method of acquiring desired material possessions that would otherwise be unavailable through legitimate means.

Existing empirical tests of Merton's theory also provide inconsistent results. Bernard (1987 & 1984) and Hirschi (1986) approached strain theory strictly from a macro or structural level perspective that provides weak empirical support for strain theory. However, Menard (1995) provides strong empirical support and argues that previous inconsistent results may be due to methodological problems. This study suggests that based on Merton's individual modes of adaptation, strain theory is best examined at the individual or micro level combined with carefully specified measures for each of the modes of adaptation. Menard (1995: 167) suggests that previous studies had not "operationalized strain theory adequately" because of the complexities of operationalizing perceived inequality and the various modes of adaptation. Following Menard's suggested operationalization of these concepts, several studies have found

strong empirical support for Merton's strain theory (Defronzo 1996a, 1996b, 1997; Grant & Martinez 1997; Hannon 1997, Messner & Rosenfeld, 1997a, 1997b; Zhang 1997; cited from Hannon & Defronzo 1998).

There are some important criticisms of Merton's theory. Cohen (1955) and DeKeseredy and Schwartz (1996) point out that Merton's theory is useful for explaining property crimes, but cannot explain crimes that are not meant for gains in property such as: a) delinquent vandalism activities b) incest and sexual assault c) violent crimes like homicide and aggravated assault. For this reason, this theory offers only a partial explanation of criminal behaviour and the relationship between economic change and fluctuating crime trends.

3) Mainstream Motivation Theory

Mainstream motivation theory is different from the previous two theories in that it focuses strictly on stress and frustration from changing economic conditions, where rational choice theory and strain theory examine motivation in terms of rational decisions and inequality in access to socially defined success. For the duration of this thesis, mainstream motivation theory is referred to as motivation theory. When considering the empirical support for mainstream motivation theory, it is important to note that studies testing motivation theory examine whether the crime rates increase with the unemployment rates. As such, research based on this theory offers a way of testing the relationship between economic conditions and fluctuating crime rates. For example, if the unemployment-crime relationship is positive, the study will support motivation theory. There is considerable empirical evidence offering support for motivation theory (Britt, 1997 (14-17 year old youth only); Chiricos, 1987; Gurr, 1981; Kapuscinski, et al.,

1998). There is also literature that either supports or refutes motivation theory depending on the type of crime examined (Allen, 1996; Cantor & Land, 1987; Witt, et al., 1999). Several studies suggest, for instance, that the unemployment crime relationship is much more evident for property crimes than violent crimes (Allen 1996; Cantor & Land, 1985; Chamblin & Cochran, 1998; Chiricos, 1987; Witt, et al., 1999). These findings suggest that deteriorating economic conditions are much more likely to result in increases in the property crime rates than the violent crime rates.

There are also methodological concerns raised about the studies that test motivation theory. However, these concerns apply to those studies testing the relationship between economic conditions and crime, and are described in Chapter 2 of this thesis. Generally, empirical research provides mixed support for motivation theory, depending on the type of crime being tested. As previously mentioned, support for motivation theory appears to be much stronger when property offences are examined and weakest when considering violent offences.

There are also some criticisms of mainstream motivation theory. Critics argue that, for motivation theory to hold true, the crime rates should decrease as unemployment increases due to the increased effects of guardianship (Witt, et al., 1999). Guardianship involves the presence of unemployed people in their homes protecting their property (Birkbeck & Lafree, 1993; Cohen & Felson, 1979). When people are unemployed, they are more likely to be near their home for prolonged periods, thereby increasing their ability to guard their property (Cantor & Land, 1985: 320). It is also argued that the increased supervision of potential offenders by parents and siblings in the home, especially for youth at the age of maximum risk (age 17-18), does not allow the

opportunity to commit crimes (Britt, 1994; Cantor & Land, 1985; Gurr, 1981). Thus, despite the apparent motivation to commit crime due to unemployment, the opportunity to do so is also lessened. This criticism of motivation theory is addressed by opportunity theory.

In sum, motivation theory argues that as the unemployment rates increase, so do the crime rates. Motivation theory also suggests that depending on the individual, the motivation to commit crimes may not be immediate upon becoming unemployed. Time is required for frustration to accumulate to a sufficient level where the individual commits a criminal act. This frustration can be delayed by the numerous financial and psychological support systems available for those recently unemployed. Eventually, however, these support systems are exhausted and the person experiences frustration to consider, and commit, a criminal offence (Cantor & Land, 1985: 322; Collins & Weatherburn, 1995: 232). Due to this delay in the experience of frustration, we must also expect a delay or 'lag' in the appearance of the motivation effect in the crime rates when testing motivation theory.

One criticism of all theories in the motivation theory perspective involves the idea that these theories overlook the possible effects of changing opportunities to commit crimes. All of the motivation theories assume a constant supply of opportunities to commit crimes. This possible oversight is addressed by opportunity theory.

Opportunity Theory

As part of the economic conditions perspective, opportunity theory expands on motivation theory by incorporating a situational component into the explanation of changing patterns of crime rates. Advocates of opportunity theory suggest that a criminal

act requires three components: (1) the presence of motivated potential offenders, (2) the presence of suitable targets for victimization, and (3) the absence of capable guardians to prevent criminal activity (Britt, 1994; Cantor & Land, 1985; Gurr, 1981). Opportunity theory examines the interrelationship existing between these three components and their resulting impact on crime. For example, using the first component of opportunity theory, we could hypothesize that, as more people are working outside the home, the crime rates would increase because of the increased opportunities for motivated offenders to commit crimes. The increased opportunities to commit crimes results from the offenders being away from parental supervision more frequently, as well as home owners being away from home more often. The second component of opportunity theory suggests that as the unemployment rates decrease and increasing numbers of people are participating in the work force, people are more willing to spend money on commodities (i.e. televisions, stereos, automobiles etc.) that have the potential to be stolen (Britt, 1997). In contrast, when economic conditions are difficult, individuals are less likely to make large purchases to be sure they have sufficient money available in case they become unemployed. Once the economy recovers, large purchases are made and more leisure activities are enjoyed away from the home. Hence, increased spending also increases the number of suitable targets available for victimization. Finally, as more people are enjoying leisure events away from the home, they are not able to properly guard their 'suitable targets' from the increased number of motivated offenders (Britt, 1997; Cantor & Land, 1985). In other words, the effects of guardianship are reduced by increased absence from the home. This increase in the numbers of motivated offenders and decreased guardianship leads to an increase in the crime rates.

While the arguments of opportunity theory do not directly contradict motivation theory, the suggested effects of changing economic conditions certainly conflict. Opportunity theory suggests that improving economic conditions will increase the crime rates while motivation theory argues that improving conditions decrease the crime rates. However, it is possible that these theories are interrelated. This possibility is explored further toward the end of this chapter following the explanation of all the theories concerned with the changing trends in crime.

A criticism of opportunity theory involves the first component that is required for a crime to occur, that is, the availability of motivated offenders. Collins and Weatherburn (1995) question whether the opportunity to engage in criminal activity increases as the unemployment rates decrease. Employed individuals are away from their home for extended periods, decreasing the effects of guardianship, but they are also constrained to legitimate behaviour while at work. This criticism is similar to social control theory, which suggests that individuals are constrained to legitimate behaviour while at work because of their commitment to society through employment. Unemployed individuals have far more opportunity to engage in criminal activity because they are not constrained to legitimate behaviour at work, and have more free time and motivation for criminal activity. As the unemployment rates decrease, there are fewer people with an increased opportunity to commit crimes because they are constrained by work (Britt, 1997). Thus, although the opportunity for successful crimes may increase, the pool of potential offenders lessens and the crime rate is likely to decrease.

A second criticism concerning the presence of motivated offenders involves the motivation of offenders to commit crimes. Proponents of opportunity theory assume that

a potential offender's motivation to commit crimes is constant and that changing economic conditions only affect their opportunities to commit crimes, not their motivation. From this perspective, potential offenders are just as motivated to commit crimes during prosperous economic conditions as they are during a recession. Interestingly, this criticism is addressed by motivation theorists who believe that motivation to commit crimes increases as the economy decreases. Recall that motivation theory suggests that the motivation to commit crimes fluctuates with economic conditions. During a favourable economy, there is little motivation to commit crimes. During a difficult economy, criminal motivation increases.

Empirical evidence for opportunity theory is also inconsistent. The work of Cantor and Land (1985) supports opportunity theory for most crimes. At the same time, their research also supports motivation theory for burglary and larceny. Britt (1994) also found support for opportunity theory based on data concerning youth 18-24 years old, but the unemployment-crime relationship of youth 14-17 years old is more accurately explained by motivation theory. There are also some studies that support or refute opportunity theory depending on the type of crime being tested (Allen, 1996; Witt, et al., 1999). For example, Allen (1996) found that the results from robbery and burglary support opportunity theory while the results for minor thefts and auto theft support motivation theory. It is important to compare empirical evidence relating to motivation theory and opportunity theory because of the implications associated with the direction of the relationship existing between the economic conditions and the crime rate. As noted above, a study that finds a positive relationship between economic conditions and crime supports opportunity theory, as economic conditions increase, so does the crime rate. As

seen by the evidence from Allen (1996) and Cantor and Land (1985), one study can provide support for opportunity theory and motivation theory depending on the type of crime being tested. Opportunity theory suggests that as the unemployment rate is increasing, the circulation of people and property in society decreases. There is increased guardianship over a decreased number of suitable targets, decreasing the availability of suitable targets. As the unemployment rates decrease, the circulation of people and property in society increases, also increasing the crime rates. In general, the support for opportunity theory is quite mixed, depending on the type of crime examined.

Overall, it appears that motivation theory provides a better explanation of the association between economic conditions and crime. Opportunity theory makes several assumptions that do not seem realistic, especially the assumption of constant motivation to commit crimes among potential offenders. The motivation to commit crimes is strongest for people who are unemployed and their unemployment provides increased opportunities to commit crimes. However, the inconsistent empirical evidence for both theories suggests that changing economic conditions are not the only factor affecting crime trends. Changing demographic structure may also play an important role in explaining fluctuating crime rates. The following section therefore focuses on the influences of changing demographic structure and its effects on the crime trends.

Demographic Structure and the Easterlin Hypothesis

Numerous studies have found varying levels of criminal participation at different ages in the life course (Bartusch, Lynam, Moffitt, & Silva, 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993;). Youth between the ages of seventeen and eighteen typically display the highest

criminal participation rates¹. As age increases, the criminal participation rates typically decrease. The most important consideration when looking at trends in crime concerns the prevalence² of active offenders in the population. According to life course research noted previously, after age 17-18, the number of active offenders in a specific age cohort steadily declines. As the proportion of the population at the age of 17-18 (the active offenders) decreases, the crime rates also decrease. Brantingham and Brantingham (1984) and Gurr (1981) use the example of the baby boom after World War two, and the fact that there was an increase in the crime rates seventeen to eighteen years later as evidence for this concept. Gurr (1981) hypothesizes that since there is a larger population at the age of maximum risk (the active offenders), we will experience increased levels of crime. The explanations given for this occurrence range from maturation and increased responsibility to criminal propensity and low self-control (Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990).

While there is little agreement on the cause of this finding, there is strong support for the idea that youth age 17-18 are the most criminally active age group (Bartusch, Lynam, Moffitt, & Silva, 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993;). This finding suggests that fluctuations in the proportion of the population in this age group can have important effects on the crime trends.

A major weakness in taking a demographic perspective is that this perspective does not address the individual factors associated with growing up in a large or small

¹ Participation rate is defined as the number of offences committed by a specific age group divided by the population for that age group.

² Prevalence is defined as "the proportion of a population who are active at any given time" (Blumstein, et al., 1988a: 3).

cohort relative to the prevailing demographic structure. This weakness is addressed by a theory proposed by Richard Easterlin, known as the Easterlin hypothesis. Easterlin's hypothesis explains fluctuations in the proportion of youth through a description of how changing economic conditions affect individuals and their behaviour.

To fully understand Easterlin's argument, we should first examine his basic idea of how the size of a birth cohort affects its members' life achievements. The central point of his argument considers the role of age-specific effects and their influence on the economic experiences of young adults. This theory suggests that the size of a birth cohort or generation relative to those before and after it affects that cohort's experiences over their entire life cycle. An important concept to understand is the cohort or generation size. The terms 'cohort' and 'generation' are used interchangeably by Easterlin, and refer to a group of births in the same time-period that travel through their life course together. Easterlin's understanding of the size of a given generation is also important. Generation size is not the absolute number of births in a given period, "but the average birth rate, the number of births per thousand population" (Easterlin, 1980: 8). This distinction is important because of the number of years and population growth involved in his argument. This definition allows an understanding and comparison of differences in the birth rates relative to the total population between 1951-1999. The differences in size between larger and smaller generations influence "the economic fortunes of young workers- their earnings, unemployment experience, and rate of advancement up the career ladder" (Easterlin, 1980: 4). Members of larger cohorts experience "high job competition, low wages, slow promotion, and low income potential" (Pampel & Peters, 1995: 166). The opposite occurs for members of smaller birth cohorts.

They enjoy less job competition, higher wages, faster promotion, and higher income potential. The reason for the increased hardship of the larger cohort stems directly from its increased size. The larger cohort of young adults competing for jobs decreases their opportunity to achieve their financial goals, “Although both large and small generations have higher unemployment rates in early working life than later, the unemployment rate of a small generation is less at each stage of its working career than that for a large generation” (Easterlin 1980: 30). Young adults from large cohorts find it increasingly difficult to obtain suitable employment. When they do find employment, typically the young adults are overqualified for the positions, or they must work for less pay relative to what a member of a smaller cohort would receive for similar employment.

Easterlin suggests this economic cycle, or ‘law of large numbers’, operates in forty-year periods, twenty years of prosperous economic conditions are followed by twenty years of difficult economic conditions. The beginning of this cycle was principally the result of two factors, the end of World War II and the Employment Act of 1946. After World War II, most of the industrialized world was rebuilding, leaving the United States as one of the few industrialized nations to emerge from the war with its capacity for commercial manufacturing largely intact. Consequently, there was little competition for American products in world markets, causing a boom in the American economy. The thriving American economy combined with the 1946 Employment Act, to prevent the typical rush of immigrants for vacant jobs in the United States, and “for the first time, generation size could play a central role in one’s economic life chances” (Easterlin, 1980: 33). This combination of factors marked the beginning of the forty-year economic cycle proposed by Easterlin. Given that the United States is Canada’s closest

neighbour and largest trading partner, the effects proposed by Easterlin were also evident in Canada.

The implications of the decreased economic life chances experienced by large cohort members affected many aspects of their lives. The most important effect for a discussion of the relationship between economic conditions and crime rates is the role of social disorganization. The increased social disorganization resulting from increases in cohort size is one of the most frequently discussed themes associated with Easterlin's hypothesis. There are several aspects of social disorganization that need to be addressed, the first relates to stress. The method that an individual employs to deal with increased stress can significantly affect the level of social disorganization. "If a large generation experiences more psychological stress, it is likely to show behaviour symptomatic of such stress" (Easterlin, 1980: 101). Easterlin suggests that behaviour resulting from increased stress can be observed in two distinct forms. The first is suicide, if individuals from large cohorts experience persistent increased levels of stress due to their employment experience and overall frustration from difficult economic conditions, there will be an increase in the prevalence of suicide for that cohort. The second behaviour that is symptomatic of increased stress is antisocial behaviour, typically in the form of crime, "If feelings of bitterness and resentment occur more often, antisocial behaviour, such as crime, is likely to be more common" (Easterlin, 1980: 101). This behaviour is discussed in-depth by this thesis, as it represents the key linkage between an individual's economic experiences and his/her engagement in criminal activity.

Easterlin suggests that during difficult economic times, individuals display the frustration of their experiences in the form of criminal activity. It is important to note

that Easterlin acknowledges that higher crime rates should be expected from a larger cohort age 15-19. However, he also suggests that there are higher individual participation rates in crime because of the increased levels of stress and frustration experienced through adverse economic conditions (Easterlin, 1980: 102). Thus, according to Easterlin, property crime rates, as opposed to violent crime rates, should be more sensitive to changes in cohort size and economic conditions since property crimes are typically committed for material gain.

Easterlin also suggests that increased stress and frustration can stem from a number of sources. The most important source is the frustration of experiencing difficult economic conditions; specifically increased unemployment, decreased relative income, and opportunities for success. A recent study by Savolainen (2000) examining the association between arrest rates and the Easterlin hypothesis explains that "...exceptionally large birth cohorts grow up to have high economic aspirations, but face stiffer competition over opportunities of economic success. This discrepancy results in higher levels of economic strain, which is conducive to criminal behaviour" (p. 118). Savolainen's conclusion is very similar to the theoretical proposition suggested by Merton's 'Strain' theory in the economic conditions section of this chapter. If the goals of an individual do not match the legitimate means available to obtain them, then the likelihood of improvization through criminal behaviour increases.

Several studies have examined the relationship between the Easterlin hypothesis and crime rates with mixed results and opinions concerning the proper methodology. Typically, these studies have focused on testing the Easterlin hypothesis through an analysis of arrest rates or self-reported delinquency rates and cohort size. Savolainen

(2000: 133) concludes that “relative cohort size appears to have a relatively robust positive net effect on predatory property crime.” However, this study provides little support for the relationship between cohort size and violent crime rates as suggested by Easterlin. O’Brien (1989) also found support for the effect of cohort size on property crime, but not violent crime (also see Menard & Elliot, 1990). Nevertheless, other studies including Steffensmeier, Streifel, and Harer (1987) and Steffensmeier, Streifel, and Shihadeh (1992) found little support for the Easterlin hypothesis. The mixed results combined with the disagreement concerning the proper methods to explore the Easterlin hypothesis suggest that there is still much research to be done concerning the association between economic conditions and crime suggested by the Easterlin hypothesis.

Summary and Conclusion

We began this chapter by outlining several criminological theories that are used to explain the variability in the crime rates. Each of the theories has their strengths and limitations. The principal difference between motivation theory and opportunity theory involves the behaviour of individuals when their employment status changes. Motivation theory suggests that individuals are more likely to commit crimes when they become unemployed due to increased stress and frustration (Cantor & Land, 1985). Opportunity theory suggests the opposite. Criminal behaviour decreases because unemployed young people spend more time at home where they are constrained to adhere to legitimate behaviour by parents and siblings (Britt, 1994 & 1997; Cantor & Land, 1985). However, the two theories may also be related and operate simultaneously, although given the opposition of these theories concerning the change in economic conditions, the trend in the crime rates should be flat. While the crime trends are clearly not flat, it is possible

that the effects of each theory limit the amount of change seen in the crime trends. During prosperous economic conditions, the individuals who do have sufficient motivation to commit crimes have increased criminal opportunities, thereby limiting the decrease seen in the crime rates. The opposite is true for difficult economic conditions. When the effects of guardianship increase and suitable targets are scarce, the increase in the crime rates is limited.

Based on the unrealistic assumptions of opportunity theory noted in this chapter, motivation theory appears to be the best theory to explain the relationship between economic conditions and fluctuations in the crime trends. When individuals are employed, they are not motivated and do not have as much of an opportunity to commit crimes because of their employment. The financial compensation that individuals receive from employment allows them to afford reasonable material desires and their motivation for crime decreases. Moreover, their opportunities to commit crimes decrease because they are constrained to legitimate behaviour while at work.

However, the mixed results suggest that economic conditions are not the only factors affecting the trends in the crime rates. A major weakness in motivation theory is the lack of consideration given to the changing demographic structure and cohort size issues suggested by the Easterlin hypothesis. There are many different theoretical perspectives suggesting that age is an important factor in explaining changing crime rates. As noted previously, there is considerable empirical support for the notion that changing demographic structure and cohort size also play an important role in the crime trends. To address this shortcoming of motivation theory, this thesis combines

motivation theory with the age effects component of the Easterlin hypothesis to provide a more thorough explanation of the crime trends.

When motivation theory is combined with the age effects suggested by the Easterlin hypothesis, there are some interesting results. Recall that the Easterlin hypothesis, as well as most other literature examining demographic structure, suggests that the proportion of the population age 15-19 is the most criminally active. When there is a large cohort in the 15-19 age group trying to enter the workforce and experiencing the increased competition for jobs and decreased financial success, the members of this cohort also begin to realize the lifelong effects of belonging to a large cohort. Since unemployment and financial hardship are most common in the early stages of an individual's career, youth age 15-19 experience the highest levels of stress and frustration when economic conditions are bad. This increased level of frustration leads youth age 15-19 to be the most criminally active. Therefore, the effects of being a member of a large cohort are most visible for this age group. In other words, increases in the proportion of the population age 15-19 lead to increases in the crime rates. Unfortunately, there has only been one revolution of Easterlin's proposed forty-year cycle, which makes his hypothesis very difficult to test. For this reason, this thesis does not intend to test the Easterlin hypothesis directly, but instead tests motivation theory with the age effects. This combination of the two theories means controlling for the effects of changing demographic structure on the crime trends. The addition of age effects to motivation theory permits a more thorough examination of the relationship between economic conditions and crime trends because it offers a more complex analysis of the effects of the factors outlined by both theories.

To test motivation theory with age related variables in this thesis, I am using data from the province of Ontario. Ontario is the largest province of Canada with 38% of Canada's population and 9 of Canada's 20 largest cities³. During the twentieth century, Canada experienced both tremendous economic prosperity and incredible economic hardship. The periods of prosperity witnessed unprecedented growth and development while the periods consisting of high levels of unemployment and recession were associated with economic hardship. During this time, the Canadian economy became much more fluid between provinces; all of Canada's provinces have become increasingly dependent upon each other and experience similar economic conditions. During the past fifty years, Ontario's economy has also experienced tremendous growth and its development is very closely tied to the rest of Canada.

In sum, this chapter has reviewed the existing criminological theories and studies in the field of crime trend analysis. The economic conditions perspective suggests that changing economic conditions have a prominent influence on the crime rates, but the evidence for this perspective has been inconsistent. One possible reason for this inconsistency is the lack of consideration given to the influences of age effects from changing demographic structure identified by Richard Easterlin. Easterlin suggests that youth age 15-19 are the most criminally active age cohort and that having large numbers in this age group will increase the crime rates. To address this possible oversight in current approaches to the study of fluctuating crime rates, this thesis tests an existing theory from the economic conditions perspective, that is, motivation theory, combined with the age effects component suggested by the Easterlin hypothesis using data from the province of Ontario between 1951-1999.

³ Canada Yearbook 2000, Statistics Canada.

The next chapter discusses the sources of the data used in this study, methodological issues observed in previous studies, and consequently the statistical methods used to analyze the data.

Chapter 2

Data, Measurements, and Methodological Concerns

Unlike a conventional secondary data analysis using existing survey data, the variables used in this thesis come from various sources. In fact, data collection and compilation of the variables is an important component of this study. This secondary data analysis process provided me with the opportunity to understand how various government agencies collect and present data in a number of government publications. In order to address the issue of validity and reliability of the numerous variables used in this study, in the first part of this chapter, I describe the various sources of the variables and how each variable is constructed. One of the most important sources of disagreement in findings concerning the relationship between crime and economic conditions is related to the statistical methods and measures used in different studies. For this reason, I decided to use the Maximum Likelihood grid search method of time series analysis. As a result, in the second part of this chapter, I outline the methodological concerns involved in the statistical analysis of data appearing in existing studies on the relationship between economic conditions and crime rates, and explain the reasons why I decided to use the Maximum Likelihood grid search method of time series analysis in this study.

The Sources of Data and Variables

The variables used in this study can be classified into three categories: crime statistics, indicators of economic conditions, and demographic variables.

Crime Statistics

There are two sources for the crime statistics data used in this study. Data for the years 1950 to 1961 were obtained from the publication 'Police Statistics.' Police Statistics was published annually by the Dominion Bureau of Statistics and provides data on crimes known to police and arrest data reported by police forces from across Canada. Data for the years 1962 to 1999 were obtained from the Uniform Crime Report (UCR), which appeared originally as a yearly publication of the Dominion Bureau of Statistics of Canada and became Statistics Canada in 1972. The Uniform Crime Report publishes crimes known to police and arrest statistics reported by all police forces in Canada. The consistency of the crime statistics being published by two different statistical sources is debated later in the chapter when the reliability for all data used in this study is discussed.

The six offences examined in this study include: manslaughter, murder, robbery, auto theft, break and enter, and theft. Auto theft is the only offence with data available back to 1950. The data for all other offences begins in 1951. There are two reasons for selecting these offences. First, the legal definitions of these crimes have remained unchanged during the 49-year span of time examined by this study (The Criminal Code of Canada, 1951; Martin's Annual Criminal Code, 1999). This consistency of definitions provides confidence that the variations in the crime trends are not because of changes in the legislation during this period. The second reason for including these offences is that aside from murder and manslaughter, these offences typically account for a very large percentage of all criminal offences committed each year in Canada (DeKeseredy and Schwartz, 1996). It should be noted that in all cases the variable 'theft' is a combination of minor thefts and major thefts. This combination is necessary to ensure comparability

of the theft variable over the 49-year period due to changes in the dollar value that determines the difference between a major or minor theft.

The yearly measurement for each offence is expressed as a rate. Using a 'rate' allows us to control for the effects of change in population size. To calculate the crime rate for each offence in each year, the number of offences for a given year are divided by the midyear population and multiplied by 100,000 to obtain the offence rate, indicating the number of offences per 100,000 population. In this study, each offence rate is analyzed individually. The offence rates are also analyzed as groups of categories that include violent offences, property offences, and all offences. These offences are grouped into categories to examine the effects of changing economic conditions on property and violent offences separately, as well as an overall indication of economic conditions on all crimes.

This categorization technique produced the following variables. The variable 'All Crime Rate' includes data for all six criminal offences with data available from 1951, murder, manslaughter, robbery, auto theft, break and enter and theft. The variable 'Violent Crime Rate' includes murder, manslaughter, and robbery between 1951-1999. 'Property Crime Rate' includes break & enter, theft, and auto theft from 1951-1999. The offences in each category for each year are added and then divided by the mid-year population for that year, then multiplied by 100,000 to obtain an offence category rate. The violent and property offences are examined separately to determine if there is a difference in the effects of changing economic conditions on the offences in the two categories of crime. It should be noted that murder and manslaughter are included in the violent crime category to provide an overall indication of the trends in the violent crimes

but are not analyzed separately because of the extremely complex nature of murder and the accidental nature of manslaughter. As such, we should be aware of the possibility that the violent crime rate may not reflect changing economic conditions.

Indicators of Economic Conditions

The economic indicators are important independent variables in this study. The indicators used to assess the effects of changing economic conditions are the labour force participation rate, personal disposable income per person, personal income per person, and the unemployment rate. While it is preferable to include more measures of economic conditions, it is difficult to find indicators that have been measured in the same manner and by the same agency throughout the 49-year series. All of the economic indicators included were collected by the Dominion Bureau of Statistics and later by Statistics Canada. It should be noted that the variables measured in dollars were originally measured in the currency value for each individual year. To convert these values to a standard monetary measure or 'constant dollars', the Statistics Canada consumer price index (CPI) is used to convert all monetary values to constant 1976 dollars. The consumer price index is an index of the cost of living in Canada and provides an indication of the buying power of a dollar in different years. The dollar values are standardized to 1976 values because this is the mid-year of the data series. Adjusting the data to the mid-year causes the least amount of alteration to each of the data values, ensuring the highest reliability.

Dividing the CPI value for 1976 by the CPI value for a different year provides a factor that is used to multiply the dollar values for that year, and adjusts them to constant 1976 dollars. An example will help to clarify this procedure. To determine what \$100 in

the year 2001 was worth in 1981, you would divide the CPI value for 1981 (50.3) by the CPI value for 2001 (115.2) and multiply this value (0.4366) by \$100 to get \$43.66. In other words, \$100 dollars in 2001 offers the same purchasing power as \$43.66 in 1981. This procedure is performed individually for the dollar values of each year in the series. Therefore, all dollar values are expressed in a dollar value equivalent to that for the year 1976. This standardization of dollar values permits a comparison across years and avoids the complexity and confusion of trying to compare income levels throughout the 49-year series.

Demographic Variables

The demographic data for this study were also collected by the Dominion Bureau of Statistics and Statistics Canada. The data are based on the Canadian census conducted every five years, with population estimates between these years based on many factors including immigration, emigration, births, and mortality. Demographic data were obtained for several age groups for each year between 1950 and 1999, as well as the total population for each year of the series. The demographic data for Ontario consists of five-year age groups for ages near the age of maximum risk (17-18) to examine whether changes in the proportion of the population at this age have an effect on crime rates. The selected age groups are 15-19, 20-24, and 25-29. To obtain the proportion of the population in a specific age group for each year, the midyear population of each age group is divided by the mid year population for that year. These demographic variables are used in this study primarily as control variables.

Reliability of the Data

The reliability of historical statistics has always been a concern in historical studies. Frequently, historical data were collected by different agencies, with different methods, and based on different criteria. Overall, the reliability of the data used in this particular study is very good. All of the demographic and economic indicators were collected by the same agency (Dominion Bureau of Statistics/Statistics Canada) using the same methods during the entire 49-year series. In addition, the method used in this study to convert the yearly currency values to a standardized value is the exact method used by Statistics Canada. For these reasons, the demographic and economic indicator data for this study are assessed as very good.

The reliability of the data for criminal offences is, however, not as good as the economic and demographic data and requires some discussion. There are several issues associated with crime statistics that cannot be avoided, but must be acknowledged. Crime statistics can never reflect the actual number of occurrences for a specific offence in society. Not all crimes are reported to the police, not all reported crimes are recorded, and therefore, not all crimes are included in official crime statistics. There are also different levels of reporting for different types of crime. Gurr (1981) suggests that the more serious the crime is, the more likely the crime is to be reported. DeKeseredy and Schwartz (1996) argue that the two most reliable crime statistics in terms of reporting are homicide and auto theft due to the seriousness of homicide and the insurance claims associated with auto theft. In contrast, crimes that involve a more personal component, like sexual assault, tend to have very low reporting rates. While this information suggests that the crime statistics data are not very reliable, Gurr (1981: 299) notes that, "Slippage

in one area can be assumed to be relatively constant.” The difference between the actual number of offences and the recorded number of offences or ‘slippage’ can be assumed to be relatively constant because the processes that lead to underreporting in official crime statistics are the same each year and can therefore be assumed to be constant. As a result, the interpretations drawn from this study should be made with caution as they are based strictly on crimes that have been reported to police, and are not reflective of all crimes committed.

Another factor related to the reliability of the crime statistics is the fact that crime data are not available from Uniform Crime Reports (UCR) before 1962. According to Turner⁴ (2000), the data available from Police Statistics between the years 1950 to 1961 may not fully reflect the actual number of crimes committed because the provision of data on criminal offences by police forces was optional until 1962. After 1962, participation was mandatory, and the Uniform Crime Report (UCR) produces data as reliable as the demographic and economic indicator data mentioned previously. The lack of mandatory provision of criminal activity data between 1950 and 1961 detracts somewhat from the reliability of the data. However, it should be noted that both sources were collected by the same agency, both examine crimes known to police, and both of the trends and rates of crime near the years where the data merge are very similar, suggesting that the two sources are comparable.

A final consideration in the use of the crime statistics appearing in this study concerns changes in legislation that would cause change in the policing practice. As noted earlier, the offences selected for this study have not been affected by changes in

⁴ John Turner is the UCR project manager at Statistics Canada.

their legal definitions that would artificially change the prevalence of these crimes. Therefore, the offences selected for this study are not subject to this source of bias. Given that the amount of slippage between the number of reported crimes and the actual number of crimes can be considered constant, and the offences have not been subject to legislative change, the quality of the crime statistics data should be assessed as quite good, but not to the same degree as the demographic and economic data. Therefore, the theoretical and policy implications drawn from the crime statistics should be interpreted with caution, as they cannot fully represent all crimes committed during the 49-year series.

Methodological Concerns in Previous Research

The first criticism or methodological concern emerging from this study involves the understanding of the effects of economic conditions. As noted above, existing research has looked primarily at the unemployment rate as an indicator of economic conditions, ignoring and therefore not controlling for several other important indicators of economic conditions. Without attempting to control for changing economic conditions, an examination of the relationship between the economic conditions and crime is not possible because other economic variables may generate confounding effects upon the association between the unemployment rates and the crime trends. This study attempts to incorporate several indicators of economic conditions into our analysis, including the labour force participation rate, personal income per person, personal disposable income per person and the unemployment rate. Including these variables in the analysis will allow us to control for the confounding effects of changing economic conditions over

time and provides the opportunity to examine the relationship between crime and economic conditions in a more effective manner.

The second criticism of previous studies concerns the geographic regions being examined. If the data are from a national sample, there is a decreased likelihood that a relationship between economic conditions and crime will be found. The larger the scope of the empirical analysis (geographic region), the more variation of the regions from which the data originate is included in the sample. When considering the data used at a national level, the mean of the indicators of economic conditions for the entire country are used as the measure of national economic conditions. The same criticism applies to crime rates; it becomes the mean crime rate for the entire country, averaged across all regions. Economic conditions and crime rates can vary considerably between cities, counties, and provinces (Chiricos, 1987: 196). Using such geographically diverse data ultimately smoothes out important variations in the crime rates and economic conditions. Smoothing is explained as the process where the important variations in the economic or crime trends are lost as the data are averaged across each of the different provinces to become the national economic and crime trends. There are several studies that have used national level data to examine the relationship between crime and economic conditions, including Kapuscinski et al. (1998), Britt (1997 & 1994), and Allen (1996). These studies show that the significant positive relationship found at the individual level “gets weaker as the geographic aggregation level increases” (Kapuscinski, et al., 1998: 215). To perform an accurate analysis of the relationship between economic conditions and crime, the lowest possible level of geographic aggregation should be used to avoid the potential problems associated with losing variations through smoothing. To address this

issue, this study employs data from the province of Ontario, rather than all of Canada. While it would be preferable to use regional data from within a province for the analysis, this data is not currently available. The provincial level is the lowest aggregate level for which all data required by this thesis are available.

In addition, previous research has typically addressed lagged effects. As mentioned in the previous chapter, the economic conditions-crime relationship may not be instantaneous. As economic conditions deteriorate, the individual may not immediately experience sufficient frustration to engage in criminal behaviour. Time may be required for sufficient motivation to accumulate to the point where an individual displays his/her frustration in the form of criminal behaviour. Theoretically speaking, the detection of lagged effects is only necessary for motivation theory. Opportunity theory suggests that the changes in the unemployment rate should affect the crime rates immediately. The analysis in this study includes lagged effects when modelling the association between economic conditions and crime. As such, it provides a different view of this relationship than has been offered previously by other studies.

The final methodological consideration that should also be addressed is related to the issue of how age effects should be incorporated into the analysis. The association between age and crime is well documented. The maximum risk age category (17-18) accounts for the largest proportion of criminal behaviour when examining the entire life cycle (Gurr, 1981: 345). Given the profound effect of age on the crime rates, the age effect should be considered by any research study examining crime trends. There are several examples of current research that did not test for age effects, including Kapuscinski et al., (1998), and Cantor and Land (1985). While these studies do provide

statistically significant results, the results may have been more indicative of the actual unemployment-crime relationship if they had also examined the age effect. To address the age effect criticism of previous research, this study examines the demographic structure of the population in addition to the economic indicators mentioned previously. The combination of economic and demographic indicators allows this study to improve upon existing knowledge concerning economic conditions, demographic structure, and crime.

Methods

Since the data for this study were collected at yearly intervals over a 49-year period, time series analysis is the primary method used in this study. Conventionally, the Ordinary Least Squares (OLS) technique is used with cross-sectional data. In OLS regression analysis, Kennedy (1998: 43), summarizes five basic assumptions that cannot be violated if one wants to produce unbiased results.

1. The dependent variable can be calculated as a linear function of a set of independent variables, plus a disturbance term.
2. The expected value of the disturbance term is zero.
3. All disturbance terms have the same variance and are not correlated with one another.
4. The observations on the independent variable can be considered fixed in repeated samples.
5. The number of observations is greater than the number of independent variables and there are no exact linear relationships between the independent variables.

Data collected at fixed time intervals are called 'time series data', and typically lead to the violation of assumption number three, non-autocorrelation of the disturbance (error) terms. Autocorrelations lead to seriously underestimated variance, although this problem becomes less serious with larger samples (Ostrom Jr., 1990). Underestimated variances can lead to misleading statistical inferences (Brannigan & Lin, 1999). A preliminary

analysis of our data indicates the existence of autocorrelation. Therefore, our data require techniques to address the problems associated with autocorrelation.

Before beginning an analysis of time series data, the amount and direction of autocorrelation must be determined. The most common method of testing for autocorrelation is the Durbin-Watson d-statistic. Preliminary analyses indicate the existence of first order autocorrelation in the data between the crime rate variables and the demographic and economic indicators. Kennedy (1998:122) explains that "first order autocorrelation occurs when the disturbance in one time period is a proportion of the disturbance in the previous time period, plus a spherical disturbance." When autocorrelation is detected, Estimated Generalized Least Squares (EGLS) regression is required to correct for the autocorrelation. There are several different methods for performing EGLS. Each has their advantages and disadvantages. The method used for this procedure is the Maximum-Likelihood Grid Search method available in the Time-Series Processor (TSP) programme. The Maximum-Likelihood (ML) grid search is identical to the Hildreth-Lu grid search method, except the ML grid search does not drop the first observation during the calculations. The difference between the Maximum-Likelihood grid search and many other EGLS methods is that the ML grid search method estimates all parameters for the model in one step, searching for the lowest sum of squared residuals (Gillis, 1989; Kennedy, 1998; Ostrom Jr., 1990). The ML technique is selected because it is considered the best of the autoregression time series procedures (Ostrom Jr., 1990). After using this method to address the first-order autocorrelation in the data for this study, the Durbin-Watson d-statistic indicates that autocorrelation is no longer a problem.

The data described in this chapter are examined in the following two chapters. The next chapter looks at the bivariate analysis to provide an intuitive understanding of the crime trends in Ontario over the last 49-years and how the various dependent variables are associated with the independent variables.

Chapter 3

Exploring the Correlates of Changing Crime Trends in Ontario, 1951-1999

The purpose of this chapter is to provide a descriptive analysis of the crime trends and their associations with the economic and demographic variables over the 49-year period in Ontario between 1951 and 1999. The intuitive knowledge from such an analysis is necessary for us to have a better understanding of the variables used in this study and to build multivariate time series statistical models in the next chapter to further examine the association between economic conditions and crime. This thesis suggests that motivation theory combined with the age effects component from the Easterlin hypothesis provides a better explanation of these crime trends in Ontario, 1951-1999. The graphic analyses of the bivariate associations are used to examine motivation theory, opportunity theory, and the age effects component suggested by Easterlin. The exploration of the crime trends begins by describing the expected associations between the crime trends and the economic and demographic variables. To understand the crime trends in Ontario, it is also necessary to compare them with those in the rest of Canada. Such a comparison helps to understand the issues of whether the crime rates in Ontario are consistent with the rest of Canada. Once a sufficient understanding of the crime trends in Ontario is complete, possible economic and demographic correlates of the changes in the crime trends are examined and compared graphically with the crime trends for Ontario. The graphical presentations convey a visual understanding of how the

various economic and demographic indicators may have influenced the crime trends. The bivariate results are then discussed and used to evaluate motivation theory, opportunity theory, and Easterlin's age effects.

Motivation Theory, Easterlin's Age Effects, and Crime Trends

Motivation theory suggests that deteriorating economic conditions lead to increased criminal activity, while opportunity theory suggests that deteriorating economic conditions lead to decreases in the crime rates. Easterlin's age effects suggest that increases in the proportion of the population age 15-19 increase the crime rates. This thesis tests whether motivation theory and the age effects component provide the most thorough explanation of the crime trends. To support this position, there are several expected associations that should be discussed before examining the crime trends.

The unemployment rates are considered a primary indicator of economic conditions and is the most thoroughly researched of all the economic indicators. Motivation theory suggests that this variable should be positively associated with the crime trends. In other words, increased unemployment rates, signalling deteriorating economic conditions, lead to increased crime rates.

The labour force participation rates have not been used in previous research examining crime trends. Thus, unlike other studies on this topic, this thesis contains a previously unexamined variable of interest in the exploration of the relationship between economic conditions and crime rates. Taking a motivation theory perspective, we would expect a negative association between the labour force participation rates and the crime trends. Decreased labour force participation rates, signal a decreased perception of opportunities for employment, leading to increases in the crime rates.

Personal disposable income per person has also not been explored in previous research. Motivation theory suggests that there will be a negative association between personal disposable income per person and the crime trends. Thus, in testing the data, we would also expect that decreased personal disposable income will lead to increases in the crime rates.

Richard Easterlin also suggests that the proportion of the population between the ages of 15-19 will have a strong influence on the crime trends, although the age effect is expected to be strongest for the property-related offences. Increases in the proportion of the population age 15-19 will lead to increases in the crime rates because this age group is the most criminally active. As a result, in testing this factor, we should also find a greater number of crimes occurring for this age cohort during times of high unemployment, in particular, in the category of property-related offences.

Crime Trends

As there is an ongoing interest in understanding the crime trends among the general public, we begin our analysis by examining the fluctuations in the crime trends of Ontario between 1951-1999, with a comparison to the national trends. During the examination, we use Ontario's crime rates for all offences⁵ to provide an overall picture of changes in the crime trends during the past 50 years. Secondly, in order to have a better understanding of Ontario's crime trends, we look further into the crime trends by examining violent and property-related offences separately. These examinations of the data provide us with a better understanding of the association between changing economic conditions and the two categories of crime.

⁵ All offences for Ontario and Canada include auto theft, break and enter, manslaughter, murder, robbery and theft.

Figure 1 presents a comparative picture of the crime trends between Ontario and Canada⁶. It seems that in the beginning of the 1950s, crime rates for Ontario and Canada were decreasing. However, in 1954, crime trends began to increase, and this upward trend continued into the early 1970s. During the 1970s, the upward trend continued, but there was more fluctuation than previous decades. In the early 1980s, both Ontario and Canada as a whole experienced downward trends.

Interestingly, in Ontario, the declining trends went much deeper than the national trend and the crime rates for Ontario remained lower from this point onward. The 1990s began with a sharp increase in the crime rates for both Ontario and Canada followed by decreasing trends for the rest of the decade. By 1999, the crime rates in Ontario and Canada had fallen to levels not seen since 1970 and 1974 respectively. The interesting question is what caused such a diversion between the two trends when they were virtually

² It should be noted that the crime trend for Canada includes Ontario.

identical during the first 30 years. Based on a perspective derived from studies in the association between crime and economic conditions, a possible explanation is that the increasing concentration of industry in Ontario helped the province overcome the difficult economic conditions in the early 1980s. This increasing concentration of economic strength in Ontario compared to the rest of Canada likely allowed the divergence in the crime trends existing between Ontario and Canada to continue, and will likely continue until Ontario's concentration of industry decreases relative to the rest of the country.

Upon further examination of the data, a strong relationship between fluctuations in economic conditions and fluctuations in crime rates emerges. The three major economic recessions between 1951-1999, occurring in the late 1950s-early 1960s, late 1970s-early 1980s, and the early 1990s, all coincide with increased crime rates. The prosperous economic conditions of the middle and late 1980s and 1990s also correspond with decreased crime rates in Ontario and Canada. This pattern indicates a strong association between economic conditions and crime in Ontario and Canada between 1951 and 1999.

Overall, the crime trends for Ontario and Canada are virtually identical from 1951 to 1980. After that time, the crime rates for Ontario continue to follow very similar trends to the rest of Canada, but at slightly lower levels. The question is whether such a close association in the crime trends between Ontario and Canada is also true when we conduct our analysis with violent and property-related offences separately.

Property Crimes

Figure 2 presents the property crime trends for Ontario and Canada between 1951-1999. Examination of both the Ontario and Canadian data show that, the low crime rates of the early 1950s gave way to a steady increasing trend that lasted until the early 1970s when there was some deviation from the steady increase, peaking in 1981, followed by a steady decline for the duration of the 1980s. The peak in 1981 also signalled the beginning of a pronounced diversion between the property crime rates for Ontario and Canada, similar to that seen in Figure 1 for all offences. The 1990s began with another peak in the property crime rates for both areas, although slightly less than in 1981. This increase was followed by a general decreasing trend with some deviation for the remainder of the decade, ending with crime rates not seen since 1970 and 1974 for Ontario and Canada.

The divergence in the property crime rates beginning in 1980 again suggests that Ontario's superior economy promoted more resistance and faster recovery from recessions. This relationship in property-related trends between Ontario and Canada suggests that the convergence and divergence in the overall crime trends between Ontario and Canada are, as a whole, very much determined by the property crime trends.

Violent Crimes

The separate examination of the violent crime rates⁷ for Ontario and Canada provides an opportunity to further understand the similarities and differences between the two trends. If crime rates are related to economic conditions, then, the violent crime trends for Ontario and Canada should be much different during the latter part of the cycle because, as previously discussed, their economic circumstances have differed over the forty-nine year time span used in this study. Since violent offences comprise only 2% of all crimes, when this category is examined separately, far more of the individual variations in the violent crime trends for each region are present.

Figure 3 illustrates the violent crime trends for Ontario and Canada. Interestingly, the trends for Ontario and Canada display considerably more divergence than the property crimes or all crimes.

⁷ The violent crime category includes manslaughter, murder, and robbery.

The violent crime rates for Ontario and Canada decrease in the early 1950s. However, in 1957 the violent crime rates began an upward trend with some divergence between the national and Ontario trends. Interestingly, the increasing trend continued until 1973 when the difference between the trends increased dramatically as the violent crime rates for Canada increase much more quickly than that for Ontario. Both trends continued increasing until the early 1980s, with Canada's violent crime rates at much higher levels than Ontario.

In the early 1980s, both Ontario and Canada experienced downward trends in the violent crime rate. However, by the late 1980s both violent crime rates had resumed increasing trends, with Ontario's increasing faster than Canada's until they peak at similar levels in 1991. Following this peak, both violent crime rates follow similar decreasing trends for the duration of the decade, although they do not return to very low

levels seen in the property crime rates, but remain at similar levels to the violent crime rates seen in 1990 and 1987 for Ontario and Canada respectively.

The most interesting question raised by this data focuses, again, on the divergence between the violent crime rates for Ontario and Canada between 1973 and 1991. While the divergence between the Ontario and Canada's violent crime trends lasts considerably longer, a similar explanation based on economic conditions is plausible. Note that the divergence begins in 1973, which also represents the time-period when economic conditions in Canada and Ontario began to deteriorate as a result of increasing inflation and unemployment (Palmer, 1992). Again, Ontario's superior economy likely reduced the deterioration of economic conditions and delayed the increasing violent crime rates for other parts of Canada, until the recession of the late 1980s and early 1990s when the violent crime rates for Ontario and Canada return to similar levels. These changes in the crime rates for both regions indicate support for motivation theory and the Easterlin hypothesis and the idea that economic conditions and crime are strongly associated.

In sum, the crime rates in Canada and Ontario follow similar trends between 1951-1999. The most notable difference occurs during the 1980s when the economy of Ontario and Canada as a whole was recovering from an economic recession. There is considerable divergence evident in all three categories of crime, with Ontario enjoying consistently lower crime rates compared to the national levels of crime. This divergence may be the result of Ontario's superior economy and, hence, its ability to resist, and recover quickly from a recession. If so, the data examined in this study demonstrate considerable support for combining motivation theory with Easterlin's hypothesis. The

following bivariate analysis of the association between crime trends and economic conditions allows us to explore these proposed explanations further.

Economic and Demographic Factors

This study focuses on the effect of changing economic conditions on crime trends. The previous illustrations of the crime rates in Ontario compared to other areas of Canada appear to suggest that changing economic conditions play a role in the fluctuating crime rates. To further examine this possibility, I analyze the relationship of the crime trends of the two categories of crime (property, & violent) as well as specific offences, with the economic and demographic indicators to determine if these variables can help explain the changing trends in crime, beginning with the unemployment rates.

Unemployment Rates

The unemployment rate consists of the percentage of people who are actively looking for employment compared to those who are currently employed. As noted previously, Britt (1997) describes the unemployment rate as a primary indicator of economic conditions. Therefore, a comparison of the crime trends with the unemployment rates advances our examination of the association between economic conditions and crime.

There are some important variations in the trend of the unemployment rates during the past 49 years that are symptomatic of the overall Ontario economy. An understanding of the reasons for the change in the unemployment rates provides a greater understanding of the effects of change in this economic indicator and its possible effects on the crime trends. The most prominent cause of change in the unemployment rates was the impact of economic recessions in Ontario (Heron, 1996; Palmer, 1992; White, 1985).

There were three economic recessions between 1951-1999. The first occurred during the late 1950s and early 1960s, followed by economic recessions during the late 1970s and early 1980s, and another during the early 1990s (Heron, 1996; Palmer, 1992; White, 1985).

During the 1950s and 1960s, economic conditions were quite stable. With the exception of the late 1950s and the early 1960s, economic conditions were amongst the most favourable of the entire 49-year series. However, the unemployment rate increased steadily during this time period as a result of male workers returning from the Second World War and the beginning of women's increased participation in the labour force. Increasing numbers of women began entering the workforce in the mid 1960s. Moreover, the highest entrance rates of women in the paid labour force was observed from 1976 to 1989 (Ip, 1998). During the late 1970s and early 1980s, the recession led to numerous factory closures in the heart of Ontario's manufacturing region. For example, Palmer (1992: 347) notes that "thousands of jobs disappeared in the Niagara-Oshawa manufacturing belt, with factory shutdowns continuing into the fall of 1981." These economic recessions in Ontario were consistently accompanied by increased unemployment due to the decrease in the consumption of manufactured and other goods. In addition, a large number of jobs disappeared during the latter half of the 20th century through other causes aside from recession. For instance, one of the most problematic situations for the Ontario working population has been the evolution of technology. A large number of jobs in the manufacturing and transport industries have been lost due to technological improvements. Some of the most significantly affected industries include mining, railway, assembly lines, and dock workers (Heron, 1996; Palmer, 1992). The

combination of all three factors increased the unemployment rates through increased competition for a declining number of jobs in Ontario during this time period.

There were also some very prosperous economic conditions between 1951 and 1999. The most notable of these times occurred during the early and mid 1950s, the middle and late 1980s, and the middle and late 1990s (Heron, 1996; Palmer, 1992; White, 1985). These favourable economic conditions led to decreases in the unemployment rates as the economy helped to decrease the competition for jobs. The effects of the economic recessions and economic boom periods, as well as the fluctuations in the number of available employment positions, are clearly visible in the trend of the unemployment rates from 1951 to 1999 (seen in Figure 4).

Based on the bivariate relationships calculated in this study, the unemployment rate appears to be most strongly associated with the crime trends, although the direction of the association is not consistent. In existing studies, some researchers have found the presence of a positive association between the two variables, while others provide evidence supporting a negative association, consistent with the work of Britt (1997), Chiricos (1987), Gurr (1981), and Kapuscinski, Braithewaite, and Chapman (1998). The data presented in Figure 4 indicate, however, that there is a positive association between the unemployment rates and the property crime trends existing for Ontario during the 49-year time span between 1951 and 1999. Increases in the unemployment rates lead to increases in the crime rates. There are several reasons for this suggestion, which are discussed below.

As previous research suggests, the unemployment-crime relationship appears to be strongest for the property crime category (Allen 1996; Cantor & Land, 1985; Chamblin & Cochran, 1998; Chiricos, 1987; Witt, Clarke, & Fielding, 1999). Figure 4 indicates that there is little difference between the trends for the property crime rates and the unemployment rates. Both rates reflect the three economic recessions experienced by Ontario, as well as the prosperous economic conditions, but there is some divergence between the two trends. The sharp increase in the unemployment rates during the recession of the late 1950s and early 1960s, followed by a decrease until 1966, was not reflected in the steady increase of the property crime rates between 1954 and 1970. The unemployment rates did not begin a similar increasing trend until 1967, when the property crime and unemployment rates follow similar trends with a roughly equivalent difference until the late 1970s. At this time, the unemployment rates increased sharply during the recession and then decreased just as sharply during the prosperous economic

conditions of the mid 1980s. While the property crime rates increase with the recession and decrease during the boom period, there is considerable difference between the two trends during this period. During the recession of the early 1990s, both trends increase, but the unemployment rates increase substantially more than the property crime rates. Following the recession, both rates follow similar patterns for the final five years of the series.

Overall, the positive association between the unemployment rates and the property crime rates is consistent with motivation theory, suggesting that frustration from difficult economic conditions leads to increased crime rates. The association appears to be instantaneous and there are not any lagged effects. The most interesting question focuses, again, on the deviation existing between the property crime and unemployment rates. The two most obvious deviations occur during the economic recession of the late 1950s-early 1960s, and the prosperous economic conditions of the mid 1980s. While the property crime rates trend was moving in the same direction as the unemployment rates in both instances, the dramatic changes in the unemployment rates were not reflected as prominently in the property crime rates. A possible explanation for the stability of the property crime trend involves the connection between motivation theory and opportunity theory. During the periods of high unemployment when there are many motivated offenders, suitable targets may be scarce, preventing the property crime rates from soaring. Conversely, during periods of low unemployment, there may be fewer motivated offenders, but they may be more active because of the increased availability of suitable targets, preventing a decrease in the property crime rates.

The most puzzling aspect of the trends occurs when they seem to be moving in opposite directions between 1961 and 1965, and briefly during the late 1970s. The few instances where the trends oppose one another suggest that while the unemployment rates display a strong positive association with the property crime rates, it is not the only variable influencing the property crime rates. When Easterlin's age effects⁸ are added to the bivariate comparison of the unemployment rates and property crime rates, there is a clear explanation for both instances. For example, in 1961-65, decreasing unemployment rates were coupled with increasing property crime rates. Nevertheless, the increasing proportion of the population age 15-19 seemed to be co-moving with the property crime rates during this time. This implies that the large proportion of the population age 15-19 pulled the property crime rates away from the decreasing unemployment rates. This combination of the unemployment rates and the proportion of the population age 15-19 appears to provide a more understandable explanation of these property crime rates. This association is examined further in the next chapter using time series analysis.

There are also some specific offences in the property crime category that display strong associations with the unemployment rates. The trends in the break and enter rates and theft rates also illustrate the fluctuations in the unemployment rates related to the recession and boom periods and are nearly identical to the trends between the property crime and unemployment rates. The trends are very similar to the property crime rates because theft and break and enter typically account for a large percentage of the property crime rate. The percentage of the property crime rate accounted for by the break and enter rates ranges from 16% in 1952 to 25% in 1999. Moreover, 73% of the property

⁸ The proportion of the population age 15-19 is expressed as a percentage in Figure 4 to enable all three variables to be graphed together.

crime rate was accounted for by the theft rate in 1952, compared to 61% in 1999 (See Figures A & B in Appendix).

Auto theft is the only offence in the property crime category that does not display a bivariate association with the economic or demographic indicators. A possible explanation for this distinction involves the continuously evolving balance in the technology used for both the protection and theft of automobiles and the ongoing adaptation of both sides. When new technology is introduced to prevent vehicle thefts, it may slow the theft rates until a method for dealing with this technology is devised, which then increases the auto theft rates. Likewise, if a more efficient method of stealing vehicles is devised, the vehicle theft rates are likely to increase until new preventative measures can be adopted (See Figure C in Appendix).

Overall, the property crime category, and the specific offences within this category appear to be positively associated with the unemployment rates. While there is some divergence suggesting that the unemployment rates are not a perfect predictor of property-related offences, there is strong evidence to suggest that the unemployment rates are an important explanatory factor that should be included in an explanation of these offences.

While the association is strongest between the unemployment rates and the property crime rates, many similarities are also apparent when the violent crime rates are compared with the unemployment rates. Upon examination of the data, the violent crime rates and the unemployment rates appear to display a positive association. Although there is more divergence between their trends, Figure 5 indicates that unlike the property-related offences, the effects of the economic recessions were only evident for the two

most recent recessions. The increased unemployment rates during the recession of the late 1950s -early 1960s were not evident in the trend of the violent crime rates for that time-period. The violent crime rates decreased in the first two years of the series before they began a slow increasing trend that continued until 1966. In 1966, the unemployment rates and the violent crime rates both began to increase, although the violent crime rates were steadier than the unemployment rates. Furthermore, there were sharp increases in the unemployment rates in the early and late 1970s, which were also not reflected in the violent crime rates. Interestingly, the unemployment rates peak in 1983 during the recession and, then, begin a sharp decline, while the violent crime rates peak in 1984, suggesting that lagged effects may be present.

In addition, the unemployment rates increased much more dramatically than the violent offence rates during this time. The brief declining trend in both rates was followed by sharp increases coinciding with the recession of the early 1990s, although

again, the unemployment rates increased more than the violent offences. Interestingly, both rates meet in 1991. However, following that convergence, the violent crime rates began a decreasing trend while the unemployment rates peaked in 1992 before beginning a decreasing trend. A second interesting point is that the unemployment rates appear to be decreasing faster than the violent crime rates for the duration of the series.

These patterns of relationship indicate that, generally, a positive association exists between the violent crime rates and the unemployment rates that is consistent with motivation theory, suggesting that deteriorating economic conditions lead to increased violent crime rates. However, there is also considerable deviation between the two trends. Interestingly, the most obvious deviations occur during the changing economic conditions of the late 1950s-early 1960s, late 1970s-early 1980s, and the early 1990s. At this time, the unemployment rates were increasing sharply while the violent crime rates displayed similar increasing trends, although less dramatic and much more stable than the changes in the unemployment rates, except for the recession of the early 1990s when the violent crime rates also increased sharply. An integration of motivation theory and opportunity theory provides a possible explanation for the stability observed in these violent crime rates. Thus, for example, we could hypothesize that, during difficult economic conditions, there is a decreased circulation of people as well as property, limiting the availability of suitable targets. Because the number of motivated offenders are limited to the number of crimes they can commit the number of violent crimes also become limited. Thus, similar to the property crime rates, there are also some instances when the violent crime and unemployment rates are travelling in opposite directions.

This hypothesis is supported by two obvious examples existing in the data. The

first is apparent during the early 1960s when unemployment rates are decreasing following the recession and the violent crime rates are increasing slowly. The second example occurs following the meeting of the two rates in 1991, when the unemployment rates continue to increase and peak in 1992 while the violent crime rates begin a decreasing trend. The presence of these puzzling situations in combination with the numerous deviations between the two rates suggests that the unemployment rate is not the only indicator affecting the violent crime rates.

When Easterlin's age effects⁹ are added to the graph of the unemployment rates and the violent crime rates, this variable does not appear to explain away the puzzling situations immediately. However, the fact that the violent crime rates increase approximately five years after the increase in the proportion of the population age 15-19. This finding suggests that older youth cohorts (25-29 years old) may be responsible for the increase in the violent crime rates. This explanation seems to be more plausible and evident when we investigate the relationship between crime trends and population age structure in the demographic structure section of this chapter.

Within the violent crime category, robbery also displays a strong positive association with the unemployment rates. The trend of the robbery rates is nearly identical to that of the violent offences because robberies account for a large percentage of all violent crimes per year, ranging from 95% in 1962 to 98% in 1998. Consistent with motivation theory, there is a positive association between the robbery rates and the unemployment rates between 1951-1999 (See Figure D in Appendix). However, there are also similar deviations to those observed between the violent crime rates and

⁹ The proportion of the population age 15-19 is expressed as a percentage in Figure 4 to enable all three variables to be graphed together.

unemployment rates, suggesting that the robbery rates are stabilized by the effects of motivation, supply, and demand.

Similar to the work of Britt (1997), Chiricos (1987), Gurr (1981) Kapuscinski, Braithewaite, and Chapman (1998), this study has found strong positive associations between the crime rates and unemployment rates. These positive associations suggest that time series analysis may provide additional empirical support for motivation theory. However, given the deviations and instances where the trends oppose one another, it is clear that other factors than the unemployment rate may be at work. Further, it is possible that the effects of motivation and opportunity theory together stabilize to some degree these fluctuations in the crime trends. To fully understand these fluctuations in the crime rates, however, additional economic and demographic variables must be examined.

Labour Force Participation Rates

The comparison of the labour force participation rates with the crime rates provides us with an opportunity to examine the effects of changing perceptions of employment opportunities on the crime rates between 1951-1999. The labour force participation rate represents the number of people in the workforce or actively looking for work as a percentage of all people of working age. Exploring the labour force participation rates allows us to further investigate the relationship between economic conditions and crime.

Similar to the unemployment rates, the labour force participation rates also reflect changes in economic conditions and women's increased participation in the workforce. However, the effects of these factors on the crime rates are slightly different from the

effects of the unemployment rates. The sharp increase in women's participation in the workforce beginning in the mid 1960s, and peaking during the years 1976 to 1989, led to dramatic increases in the labour force participation rates, which peaked in 1989. Conversely, the increase in women's labour force participation appears to have had a much smaller effect on the unemployment rates. While economic conditions also played a role in affecting the trend of the labour force participation rates, they were much less influential compared to their effects on the unemployment rates. In consequence, the effects of recession or prosperous economic conditions are not nearly as obvious in the labour force participation rates as they are in the unemployment rates.

The most notable contribution of the economic conditions to the labour force participation rates occurs during the boom in the economy that followed the recession of the early 1980s. Ip (1998: 31) suggests that an "important factor contributing to the high participation rate was the excess demand for workers in the economy in the late 1980s." Interestingly, the only economic recession to have an effect on the labour force participation rates was that of the early 1990s, which apparently calmed the demand for excess workers and decreased the perception of employment opportunities.

The relationship between the labour force participation rates and the unemployment rates is also important. If the labour force participation rates are considered as an indicator of the perceived job opportunities, increases in the labour force participation rates should also be associated with decreases in the unemployment rates. The decreases in the unemployment rates signal improving economic conditions, which increases the perception that there are employment opportunities available. However, since the labour force participation rates appear to be susceptible to changes beyond

economic conditions, (e.g. increasing women's participation), change in the labour force participation rates through artificial means should not be reflected by the unemployment rates. In contrast, changes influenced by economic conditions should be visible in the unemployment rates.

Due to the lack of prior research on economic indicators other than the unemployment rate, this study cannot draw from prior research for suggestions about the existence of possible relationships between the labour force participation rates and the crime trends. However, based on the increased perception of employment opportunities associated with increases in the labour force participation rates, it could be hypothesized that there is a negative association between the labour force participation rates and the crime trends. This thesis would be consistent with motivation theory which would consider that increases in the labour force participation rates, signalling increased perception of employment opportunities, lead to decreases in the crime rates. Overall, the labour force participation rates do not display the associations suggested by motivation theory and opportunity theory.

Data analysis on the bivariate relationship existing between the property crime rates and the labour force participation rates reveal a very interesting relationship. Figure 6 indicates that the two trends display a positive association for most of the series, with some deviations. In the beginning of the series, both trends decline briefly before increasing in 1954. The labour force participation rates increase slightly then remain steady until 1965 when they began to increase steadily until becoming steep during the 1970s. The surge in this rate during the 1970s appears to be due to the sharp increase in women's labour force participation rates which finally peak in 1989 during the booming

economy. Meanwhile, the property crime rates increased steadily from 1954 and then increase sharply during the difficult economic conditions of the 1970s, peaking in 1981 during the recession.

There are some interesting convergences and divergences between the two trends. The most notable deviation occurs during the early 1970s when the property crime rates were increasing at a much faster pace than the labour force participation rates. However, this gap is narrowed with the sharp increase in the labour force participation rates of the mid 1970s and the accompanying dramatic increases in women's labour force participation. The reason for the sharp increase in the property crime rates does not appear, however, to be directly related to the labour force participation rates because there is little movement in the trend during this time which would influence this sharp increase. In contrast, the surge in the property crime rates is apparently related to economic conditions and demographic structure because this increase is clearly visible in

the unemployment rates and the proportion of the population age 15-19. In addition, the second divergence between the labour force participation rates and the property crime rates occurs in 1981 during the recession. During this time period, the property crime rates peaked sharply, while the labour force participation rates follow a slow increasing trend. Thus, the unemployment rates and Easterlin's age effects also explain the peak in the property crime rates during the recession.

The only evidence of the expected negative association between the two trends occurs during the prosperous economy of the late 1980s. As noted by Ip (1998), the labour force participation rates peak during the late 1980s because of an excess demand for workers, while the property crime rates decline with the prosperous economic conditions. Theoretically, this positive association between the property crime rates and the labour force participation rates suggests support for opportunity theory because of the increased opportunity to commit crimes when away from the home. However, given the lack of variation in the labour force participation rates during changing economic conditions and its susceptibility to such influences as increased women's labour force participation, it appears that this variable is not as indicative of economic conditions as the unemployment rates.

When we look into the property crime category, the break and enter rates and the theft rates also display associations with the labour force participation rates and are nearly identical to the property crime rates (See Figures E & F in Appendix). Overall, the property-related crimes appear to display a positive association with the labour force participation rates. However, there is considerable divergence between the two trends, suggesting that the perception of employment opportunities is not as important for

explaining the property crimes as unemployment. The inconsistent positive association between the property-related crime rates and the labour force participation rates is a further indication that there are other factors affecting the property crime rates.

An examination of the violent crime rates also shows inconsistency in their associations with the labour force participation rates. Although, the violent crime rates also appear to be associated with the labour force participation rates, there are also some interesting patterns of divergence. Figure 7 shows that during the first fifteen years of the series, the two variables displayed a positive association, but there was considerable deviation and neither variable reflects the recession of the late 1950s-early 1960s.

Beginning in 1966, the violent crime rates increased and displayed a very similar association with the labour force participation rates until 1976 when the labour force participation rates increased sharply because of increased women's labour force participation (Ip, 1998). Following this sharp increase, the labour force participation

rates show a steady increasing trend, peaking in 1989, while the violent crime rates fluctuated somewhat before increasing sharply during the late 1980s. Interestingly, the labour force participation rates peak one time-period before the violent crime rates; suggesting that lagged effects may be present. Following these peaks, both rates resume similar decreasing slopes for the duration of the series, except for a brief increase in the violent crime rates in 1995-96.

Overall, the positive association between the labour force participation rates and the violent crime rates is consistent with opportunity theory, suggesting that increased opportunities to commit crimes lead to increased violent crime rates. However, the large deviation between the two trends following the increase in women's labour force participation occurring in the middle of the 1970s indicates that the labour force participation rates are not just indicative of economic conditions, but changing social conditions as well. The most interesting deviation that is not explained by the increase in women's participation during the 1970s occurs during the first fifteen years of the series, when the violent crime rates drop sharply and then increase slowly with the labour force participation rates. These violent crime rates appear to increase with the recession during this time but the labour force participation rates continue a level trend that appears to be unaffected by the recession. The inconsistent evidence presented during these times of changing economic conditions in the labour force participation rates further suggests that this variable is not as reliable as the unemployment rates for indicating economic conditions.

The robbery rates also display a virtually identical association compared to the violent crime rates and the labour force participation rates (See Figure G in Appendix).

Overall, the theoretical implications of the positive associations with the labour force participation rates suggest that the statistical analysis of these associations may support opportunity theory. In other words, the increased employment opportunities provide increased criminal opportunities, which increase the crime rates. However, given the lack of fluctuation in the labour force participation rates associated with changing economic conditions, it appears that the labour force participation rates are not very indicative of economic conditions and theoretical interpretations based on this variable should be made with caution.

Personal Disposable Income

Personal disposable income per person is the final economic indicator explored in this study. An analysis of personal disposable income per person gives us an opportunity to examine how individuals are affected through changing economic conditions. This variable provides a different perspective from the unemployment rates. It is the average income per person of all people in Ontario after income taxes have been deducted.

The trend that appears for personal disposable income per person in Ontario suggests that this variable may also be affected by fluctuations in economic conditions, although it is less obvious than the unemployment rates. However, personal disposable income per person should be associated with the unemployment rate because income is generally affected by a person's ability to earn wages. For example, increases in personal disposable income should be associated with decreases in the unemployment rates because the increasing profits accompanying a prosperous economy will encourage growth and development in the paid labour force. In contrast, an examination of decreased unemployment rates should indicate that the more people who are employed

and generating an income, the more the average disposable income per person increases. Conversely, increasing unemployment rates should decrease personal disposable income per person because there is an increasing number of people without an income. In a similar vein, the labour force participation rates should also be positively associated with personal disposable income. Increasing labour force participation should be associated with increased disposable income because more people are generating incomes in the workforce.

Overall, the data indicate an increasing trend in the level of personal disposable income per person during the time-period of this study, but there are some changes associated with fluctuating economic conditions. However, the trend of personal disposable income is quite different from the unemployment or labour force participation rates. For example, the first two economic recessions do not have a decreasing effect on personal disposable income, but they do cause the trend to plateau. Once the recessions are over, the increasing trend resumes. The only decrease in the trend occurs during the economic recession of the early 1990s.

Similar to the labour force participation rate, there is not prior research on the relationship between personal disposable income and crime trends to suggest the reasons for these possible associations. However, based on motivation theory, which suggests that increases in personal disposable income indicate improving economic conditions and less frustration, we would expect a negative association between the level of personal disposable income per person and the various crime rates. In contrast, increases in the level of personal disposable income, suggesting improved economic conditions, would

lead to decreases in the crime rates. Overall, there is mixed support in the data for this expectation.

An examination of the property crimes helps further our understanding of the patterns of association found in this data. The property crime rates display an inconsistent association with personal disposable income per person. Figure 8 indicates that overall, there is a positive association between the two variables, but there is also considerable divergence. As noted previously, following a short decrease in 1951-1953, the property crime rates began an increasing trend that peaks in 1981 during the recession. Conversely, personal disposable income began with a steady increasing trend that converges with the property crime rates in 1971 and begins a sharper increasing trend that also lasts until 1981. However, following the recession, both variables display negative associations for the duration of the series. Personal disposable income increases while the property crime rates decrease with the prosperous economic conditions of the late 1980s. Interestingly, both variables converge during the recession of the early 1990s before resuming negative associations for the remainder of the series.

This overall positive association between the property crime rates and personal disposable income is consistent with opportunity theory and its suggestion that improving economic conditions lead to increased crime rates. However, the theoretical implications associated with the deviations that follow the recession of the early 1980s should also be discussed. The most likely explanation involves the idea that personal disposable income does not decrease with deteriorating economic conditions, but instead levels off until economic conditions improve before resuming an increasing trend. Beginning in 1981, a clear negative association exists between the labour force participation rates and the property crime rates. This pattern of association is consistent with motivation theory.

One possible explanation for this pattern involves the concept of relative deprivation. For the purposes of this thesis, relative deprivation is described as the situation where someone is deprived of income relative to another person or time-period, which can increase stress and frustration. Recall that the unemployment rates vary far

more between 1981-1999 than at any other time during the 49-year series. The peaks and valleys seen in the unemployment rates are also consistent with the fluctuations in personal disposable income, suggesting that these variables are related. Before 1981, when economic conditions were relatively stable, the gap in income between the wealthy and the poor remained relatively constant, thereby supporting opportunity theory as the best explanation of criminal behaviour. However, during the turbulent economic conditions that followed 1981, the gap between the wealthy and the poor widened because of unemployment, some people had income while others did not. Consistent with motivation theory, the frustration that resulted from the increasing relative deprivation was displayed through criminal behaviour.

Again, the trends for the break and enter rates and theft rates are nearly identical to those between the property crime rates and personal disposable income per person (See Figures H & I in Appendix). This pattern suggests that the specific crimes contained in the property crimes category react very similarly to changing economic conditions.

Similar to the comparisons made between some of the other economic indicators and the violent crime rates, the positive association between the violent crime rates and personal disposable income is weaker than that with the property crime rates. Figure 9 shows that during the first thirty years of the series, the violent crime rates and personal disposable income display a strong positive association. Following the decline of the violent crime rates in 1951-1953, both trends increase steadily with a similar gap until the early 1970s when the trends increase more quickly until the recession of the early 1980s. Interestingly and similar to the property crime rates, the positive association ends in 1981. After 1981, there appears to be a negative association between the violent crime

rates and personal disposable income, although it is far weaker than for the property crime rates. Personal disposable income increases steadily to a peak in 1989 before it began a declining trend that continues until after the recession. Meanwhile, the violent crime rates dip slightly with the favourable economic conditions of the mid 1980s before increasing sharply to a peak in 1991, meeting personal disposable income. Following this meeting, both variables decrease as the economy improves before resuming a negative association in 1997.

The positive association between the violent crime rates and personal disposable income before 1981 again suggests support for opportunity theory, while the weak negative association after 1981 supports motivation theory. The explanation for this occurrence is similar to that suggested for the property crime rates with one additional component. When the violent crime rates increase sharply in 1990-1991, it appears to coincide with the decrease in personal disposable income. Recall that personal disposable income has never decreased before this time. Relative deprivation can also help to explain this situation. When individuals' incomes decreased relative to previous years, this may have caused considerable stress and frustration, which was displayed through the sharp increase in the violent crime rates. Therefore, when relative deprivation in 1990-1991 is combined with the relative deprivation explanation for the property crime rates discussed previously, we can see that before 1981, increasing personal disposable income increased the availability of suitable targets, which increased the crime rate. When economic conditions became more turbulent in 1981, the motivation to commit criminal behaviour came from experiencing difficult economic conditions and relative deprivation, especially in 1990-1991.

As expected, the robbery rates display an identical association with personal disposable income as the violent crime rates because robbery typically accounts for 95-98% of all violent crimes (See Figure J in Appendix).

The mostly positive associations found between the crime rates and personal disposable income provide support for opportunity theory. However, the pronounced divergences that begin in 1981 for all of the crime rates may weaken the positive associations discovered using time series analysis. In addition, the lack of fluctuation with economic conditions in the trend of personal disposable income per person suggests that this variable is not as efficient an indicator of economic conditions as the unemployment rates. Thus, theoretical assumptions based on this variable should be made with caution.

Demographic Structure

A comparison of the demographic structure with the crime trends in Ontario provides us with the opportunity to examine the influence of changing demographic structure on Ontario's crime rates. This study focuses on the proportion of the population age 15-19 as they are suggested to be the most criminally active of all the age groups (Bartusch, Lynam, Moffitt, & Silva, 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993;). By examining the relationship between age and crime, we are able to control Easterlin's age effects and conduct a proper examination of the association between economic conditions and crime.

The most prominent effect on the demographic structure of Ontario has been the baby boom that followed World War II and lasted until the early 1960s. During the baby boom, there were record levels of birth rates, peaking in 1957 (White, 1985). The baby boom has had pronounced effects on many aspects of Canadian society. These effects have ranged from school shortages and increased competition for jobs in their early years, to pension and healthcare concerns as the baby boomer cohort nears retirement age (Easterlin, 1980). The cause of the baby boom is suggested to be the result of the extremely prosperous economic conditions that followed World War II (Easterlin, 1980; Heron, 1996; Palmer, 1992; White, 1985). In a similar vein, the baby bust that followed the baby boom is suggested to be the result of two factors, increasing women's participation in the workforce and an end to the prosperous economy that followed World War II.

As suggested by previous research, the proportion of the population age 15-19 is strongly associated with several of the crime trends. Increased proportions of youth at the age of maximum risk lead to increased crime rates. As this body of literature suggests, the age-crime relationship also appears to be strongest for property crimes (Brantingham & Brantingham, 1983; Gottfredson & Hirschi, 1990; Easterlin, 1980; Moffitt, 1993).

Upon examination of the data used in this study, there are some interesting similarities and differences in the trends for the property crime rates and the proportion of the population age 15-19. Figure 10 shows that both trends start with a slight decrease before they began steady increasing trends in which the property crime rates increase at a slightly faster pace with more fluctuation until both variables meet in the early 1980s. Following this convergence, the proportion of the population age 15-19 decreases steadily until 1993 when it remains steady for the remainder of the series. Meanwhile, the property crime rates increase sharply during the recession of the early 1990s before decreasing sharply to meet the proportion of the population age 15-19 in 1999.

The strong positive association between the proportion of the population and the property crime rates that lasts until 1989 indicates strong support for the argument that youth age 15-19 are the most criminally active (Bartusch, Lynam, Moffitt, & Silva, 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993;). However, the sharp increase in the property crime rates during the early 1990s that is not reflected by this proportion of the population suggests that this increase was not due to changes in the demographic structure of the population. Based on the evidence from the previous comparisons with the unemployment rates, labour force participation rates and personal disposable income per person found in this study, it appears that the increase in the property crime rates in the early 1990s was due to the deterioration of economic conditions from the recession. In addition, the delay in the decline of the property crime rates compared to the decline in the proportion of the population age 15-19 in 1981-1982, suggests that lagged effects may also be present.

Lagged effects suggest that increases in the population slightly older than 15-19 (age 20-21) may also be responsible for the increased property crime rates during this time.

The break and enter rates and theft rates also display virtually identical associations with the proportion of the population age 15-19. Similarly, the only exception to this strong association involves the declining proportion of the population age 15-19 and the sharp increase in theft rates and break and enter rates during the early 1990s. This decline again suggests that changing demographic structure is not the only variable affecting the crime trends (See Figures K & L in Appendix).

The violent crime rates and robbery rates also display positive associations with the proportion of the population age 15-19, although the association is not as strong as with the property crimes. Figure 11 indicates that the proportion of the population age 15-19 may not have as prominent an effect on the violent crime rates as the proportion in the 20-24 age group. The trend in the violent crime rates was far more similar to the proportion of the population age 20-24. This association suggests that older youth are more likely to engage in violent criminal behaviour as this is the age category that increases with the violent crime rates. Similar to the property crimes, the decline in the proportion of the population age 20-24 also coincides with a sharp increase in the violent crime rates in the early 1990s as the economy slipped into a recession. As noted for the property crime rates, this sharp increase in the violent crime rates was likely the result of the declining economic conditions illustrated previously by the unemployment rates.

The robbery rates again display a nearly identical association to that between the violent crime rates and the demographic indicators (See Figure M in Appendix).

The strong positive associations that exist between the crime trends and the proportion of the population age 15-19 indicate that the statistical analyses will provide substantial empirical support for Easterlin's suggestion that youth age 15-19 are the most criminally active. The baby boom generation appears to have dramatically increased the crime rates as they progressed through the maximum risk age category (age 15-19), and experienced the increased levels of stress and frustration associated with being members of a large cohort. As such, this finding also supports the basic tenets of motivation theory. The final section of this chapter provides a brief summary of the bivariate associations observed in this chapter and a discussion of the theoretical implications.

Discussion and Conclusion

The results of the bivariate analysis of the crime trends with the economic and demographic indicators provide varying support for the different criminological theories described in Chapter one of this study. In consequence, this section evaluates how the data provides support for each of the theories. It also briefly reviews and compares the associations with previous research. Finally, the discussion in this section examines which of the theories is best supported by the bivariate associations described in this chapter.

The bivariate associations between the unemployment rates and the crime rates indicate a strong positive association between the two trends that is consistent with previous research on motivation theory (Britt, 1997; Chiricos, 1987; Gurr, 1981; Kapuscinski, et al., 1998). The crime rates do deviate slightly from the unemployment rates, but Easterlin's age effects explain these deviations. Therefore, the associations between the crime trends and the unemployment rates clearly support motivation theory, when controlling for age effects. As suggested by previous research, the association between economic conditions and crime appears to be strongest for property-related offences (Allen 1996; Cantor & Land, 1985; Chamblin & Cochran, 1998; Chiricos, 1987; Witt, et al., 1999).

The labour force participation rates have never been used as an economic indicator for crime trend analysis and provide some inconsistent results. Overall, there is a positive association between the crime trends and the labour force participation rates that are consistent with opportunity theory (Britt, 1994; Cantor & Land, 1985), although

there is a brief period between 1984-1991 where the association supports motivation theory.

Personal disposable income per person is also a new economic indicator for crime trend analysis that for the most part does not display the expected associations. This variable also demonstrates a positive association with the crime trends for the first 30 years that is consistent with research on opportunity theory (Britt, 1994; Cantor & Land, 1985) and a negative association for the final 20 years that supports the arguments of motivation theory (Britt, 1997; Chiricos, 1987; Gurr, 1981; Kapuscinski, et al., 1998). Consideration of the relative deprivation concept provides a possible explanation for the change in the direction of the association, suggesting that the gap between the wealthy and the poor is consistent during stable economic conditions, but increases during turbulent economic conditions.

The bivariate associations that exist between the crime trends and the demographic variables indicate that there is strong evidence for Easterlin's age effects and previous research suggesting that youth age 15-19 are the most criminally active (Bartusch, et al., 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993;). There are not any bivariate associations in this study that contradict the age effects concept. Interestingly, the property crimes appear to be best explained by fluctuations in the proportion of the population age 15-19, while the violent crime trends appear to be affected by fluctuations in the proportion of the population age 20-24. This result is not surprising considering that the age effect is expected to be strongest for property-related crimes. Also, some criminologists suggest that there is an escalation in the seriousness of crimes committed

throughout a criminal career, beginning with minor property offences and becoming increasingly violent in subsequent offending (Britt, 1998; Elliott, Huizinga, & Morse, 1998). The increasing violence process suggests that youth age 15-19 are just beginning their criminal careers and do not escalate to violent offences until they have progressed beyond the 15-19 age group.

Overall, there is strong support for motivation theory in this data when controlling for Easterlin's age effects. There are strong positive associations between the crime trends, unemployment rates, and proportion of the population age 15-19. While there is also bivariate evidence to suggest support for opportunity theory, the evidence for opportunity theory is provided by variables whose results should be interpreted with caution because they appear to be affected by more than just economic conditions. Since the unemployment rate is considered to be a primary economic indicator, the results of the bivariate associations with this variable should be considered by far to be the most reliable of the three economic indicators. The demographic indicators should also be considered extremely reliable, as they are not subject to any potential bias and reflect only the demographic structure of the specific age group. Taken from this perspective, there is strong bivariate evidence to support motivation theory and Easterlin's age effects.

The problem with this type of analysis is that the associations in the data may be spurious or suppressed. The true associations between these variables may be inflated or masked by the presence of other variables that are not included, and therefore not controlled for in the bivariate analysis. These types of issues are addressed in the next chapter. The following chapter therefore begins by describing the models that are used to test the competing theories for the fluctuating crime rates and reviews the statistical

results from the multivariate time series analysis. The theory best suited to explain the crime trends is then identified and the theoretical implications associated with this theory are explained. Finally, the statistical results and corresponding theoretical implications are compared with previous research to determine if they are consistent with and have improved upon existing studies in the field of crime trend analysis.

Chapter 4

Multivariate Analysis of the Covariates of Crime Trends in Ontario

The purpose of this chapter is to use the regression methods of time series to test motivation theory and opportunity theory, as well as motivation theory combined with the age effects component of the Easterlin hypothesis. The statistical methods available in this type of analysis provide the opportunity to examine the association between economic conditions and crime with control variables. This chapter begins by describing the models for testing each theory and how the partial regression coefficients are expected to behave. The time series results are then used to evaluate each of the models. Finally, the discussion section of this chapter focuses on the theoretical implications of the findings concerning the three models, including an explanation of which model offers a stronger understanding of the crime trend fluctuations.

Statistical Models for the Three Competing Theories

Consistent with the theories examined in this study, three statistical models are tested to evaluate the data. The first one is designed to test motivation theory; the second tests opportunity theory; and the third examines how an integration of motivation theory and Easterlin's age effects component might appear.

There are a few points concerning all three models that should be mentioned before describing the specific details of each model. Several variables were excluded from these models because of multicollinearity problems. Multicollinearity occurs when

two or more independent variables are highly related linearly, which may indicate these variables are measuring similar events or concepts. Therefore, personal income per person is not included in the models because it is highly correlated with personal disposable income per person. The proportion of the population age 20-24 is highly correlated with the proportion of the population age 15-19 and 25-29. Thus, when the age structure is analyzed, the 15-19 and 25-29 age groups are examined together. It should also be noted that all models in this thesis include a trend variable. Trend variables are used frequently in time series analysis to control for time-related factors that cannot be measured directly. Trend variables are used in all of these models with the intention to control for technological improvements that may increase the likelihood of criminal activity. For example, improvements in technology have led to the increased availability of items that are lightweight, portable, and of considerable value, including personal computers (especially laptop computers), televisions, VCR's, and stereos. Given the current social context, these factors need more consideration than has been given to them in prior studies using motivation theory, opportunity theory, or the Easterlin effect.

Lagged dependent variables are also included in all of the models as a way of controlling for the impact of inertia. Inertia involves the carryover effects of the criminal justice system. The capacity of the criminal justice system to maintain crime statistics can have a strong effect on crime trends. From one year to the next, the capacity of the criminal justice system to charge and convict offenders remains relatively stable. However, long-term change in the crime trends can affect the criminal justice system through increases or decreases in budgets and their personnel, whereas few short-term

fluctuations are likely to occur. The long-term changes occur when there is a lengthy change in the crime trends because it takes time for the criminal justice system to adjust to current levels of crime. Therefore, the ongoing impact of the criminal justice system and its capacity to capture and convict criminals should be controlled in examining the association between economic conditions and crime by incorporating a lagged dependent variable.

The approach used for developing and testing the models also requires discussion. This study examines 5 sub-models for each of the competing theories to explore the lagged effects of the independent variables on the crime rates. The criminological theories are not specific on the structure of lagged effects, but we know that some theories may have cumulative effects that develop into criminal activity with time. This study uses hierarchical model testing to determine the best model while exploring the lagged effects. The first model examines the immediate effects of the unemployment rate by itself. The second model tests the instantaneous effects of the major components of the theories. The third model is saturated with all the economic and demographic variables lagged by one and two years. The model selection process begins by removing the least significant variables one at a time until all of the variables are significant in the final model. It should be noted that there are some theoretical models where only the unemployment rate is significant in the final model. When this situation occurs, the first model begins with all of the major components. The second model is saturated and the third and fourth models report the relationships as the model is reduced to the unemployment rate for the final model.

The model selection process is conducted based on the diagnostic statistics. There are five different diagnostic statistics used to evaluate each of the models. The R^2 statistic describes the amount of variation in the dependent variables explained jointly by the independent variables and ranges from 0 to plus or minus 1, with the closest value to 1 being the best model. It should also be noted that Ostrom Jr. (1990) suggests that R^2 estimates based on results from EGLS time series are highly inflated. Therefore, all of the R^2 statistics reported in this thesis are used for comparing the goodness of fit between models, but should not be interpreted as an indicator of the percentage of explained variation in the violent and property crime trends. The Durbin-Watson d-statistic was mentioned briefly in Chapter 2 and indicates the amount of first-order autocorrelation present in a given model. As noted in Chapter 2, autocorrelation involves the correlation of the residuals from a time series analysis. The Durbin-Watson d-statistic ranges from 0 to 4, where a value of 0 indicates positive autocorrelation, 4 indicates negative autocorrelation, and 2 indicates the absence of autocorrelation and consequently, the best model. The standard error indicates how well the independent variables predict the dependent variables, the smaller the standard error, the better the model. The Rho statistic or autocorrelation coefficient also indicates the presence of autocorrelation by examining the correlation between the error terms. The Rho ranges from 0 to 1, where 1 indicates a perfect correlation and 0 indicates no correlation in the error terms. The final statistic is the Schwarz Criteria, which indicates the goodness of fit of a model in comparison to other models using the same dependent variable. The values of the Schwarz Criteria vary depending on the units of the dependent variable. However, when

comparing models with the same dependent variable, the smallest Schwarz criteria indicates the best model.

Motivation Theory Model

The model used to test motivation theory focuses exclusively on the economic indicators described in earlier chapters. Previous studies testing motivation theory have focused primarily on the unemployment rates. As noted previously, motivation theory is strongly supported by beliefs about the effects that employment and unemployment have on criminal activity. In this study, this model intends to improve upon previous studies by including more economic indicators. The economic indicators include: the current unemployment rate, the current labour force participation rate, and the current personal disposable income per person. This model also includes one and two year lags on each of the economic indicators to explore the lagged effects of these variables. Based on the idea proposed by motivation theory, increases in the unemployment rates will lead to increases in the crime rates. Thus, we expect that regression coefficients associated with the unemployment rates in our data analysis will be positive.

The second component tested in this model is the labour force participation rates. The motivation theory model suggests that in a multivariate analysis, the regression coefficients associated with this variable will be negative. Negative coefficients are expected because decreasing labour force participation rates can be interpreted as an indication that there are decreased employment opportunities available. This perception will, in turn, lead to increased stress and frustration displayed through criminal activity. The regression coefficient for personal disposable income per person in this model should also be negative. Decreasing personal disposable income suggests that individuals are

less able to achieve their financial goals. This lack of achievement increases their stress and frustration and their likelihood of engaging in criminal activity. The bivariate analyses in the previous chapter indicate some inconsistent associations between the crimes rates and personal disposable income. These deviations might be explained by referring to the existence of lagged effects. In this model, we will examine such a possibility by incorporating lagged economic indicators.

Because motivation theory suggests that time may be required for sufficient frustration to accumulate before criminal behaviour will occur, the motivation theory model is tested with and without lagged effects. The lagged motivation theory model includes one and two-year lags on each of the economic indicators. While many models were tested, only the best models according to statistical criteria are reported here. It should also be noted that since the data for this study were collected in yearly intervals, all lags must be expressed in years. While smaller lags are preferable, they are not possible with the current yearly data. The results of this testing will be discussed in later sections of the chapter.

Opportunity Theory Model

Similar to the motivation theory model, the opportunity theory model focuses exclusively on economic indicators including the unemployment rate, the labour force participation rate, and personal disposable income, as well as one and two year lags on each of these variables. Nevertheless, this model expects very different associations for these indicators with the crime trends. We expect that the regression coefficients for the unemployment rates will be negative. This negative correlation occurs because decreases

in the unemployment rates are expected to correlate with increases in the crime rates due to the increased opportunities made available for motivated offenders to commit crimes.

If the opportunity theory argument is valid, regression coefficients related with the labour force participation rates should also be positive. This positive correlation should occur because, as opportunity theorists suggest, increases in the labour force participation rates present increased employment opportunities. This increase in employment would result in an increase in the number of people away from home and more opportunity to commit crime. This opportunity occurs due to the decreased supervision of parents and siblings who are now in the paid labour force. However, partial regression coefficients for personal disposable income per person should be positive as increasing personal disposable income often leads to increasing spending, and consequently increase the availability of suitable targets.

A final point concerning the opportunity theory model involves the possibility of lagged effects. However, opportunity theory suggests that the effects of changing economic conditions on criminal activity are immediate rather than long-term. For this reason, minimal lengths of lagged effects are tested for this model. Thus, we test the opportunity theory model with one-year lags only.

The Motivation Theory and Easterlin Hypothesis Model

The motivation theory and Easterlin hypothesis model (motivation/Easterlin model) is very similar to the motivation theory model except that it includes the age effects suggested by Richard Easterlin. Thus, this model includes the same economic variables as the motivation theory model and adds the current proportion of the population 15-19 and 25-29 and the proportion of the population 15-19 and 25-29 lagged

by one and two years. Because we are only adding the factor of age cohort to this model, our expectations concerning the behaviour of the economic indicators are identical to those of the motivation theory model described above. Therefore, only the expected behaviour of the age effects component and the possibility of their lagged effects are specified in this section.

The motivation/Easterlin model suggests that there is a positive association between the proportion of the population age 15-19 and the crime rates. Accordingly, increases in the proportion of the population age 15-19 will increase the crime rates because this age group is consistently the most criminally active. The bivariate associations of the previous chapter contend that a positive association exists between the proportion of the population 25-29 and the violent crime rates. Similar to the motivation theory model, the motivation/Easterlin model tests for lagged effects of each of the three economic indicator variables and age effect components separately. While many models were tested, only the best are reported based on statistical criteria.

Statistical Results

Empirical analyses of the three competing theories are conducted with both the property and violent crime trends as dependent variables respectively. The models from each of the theories for both crime categories are compared to determine which model is better for explaining the crime trends in Ontario, 1951-1999. The results are also compared with the findings of previous research. This explanation of the data results begins with the motivation theory models for property and violent crime trends, followed by an examination of the opportunity theory models, and finally the motivation/Easterlin models.

Statistical Results for the Motivation Theory Models

Overall, the bivariate associations of the previous chapter concerning the property crime rates do not appear to be spurious for this model. All of the associations in the bivariate analyses are consistent with the results of the time series analysis. Table 1 presents five of the motivation theory models estimated for the property crime rates that we hypothesized for the data. The first model includes the three economic indicators without any lags. Examination of this model indicates that only the unemployment rate, and the lagged property crime rate are significant. In contrast, the second model includes two lags on each of the three economic indicators. This methodological decision was made in an attempt to examine the cumulative effects of stress and frustration on the crime rates. As can be seen in the table, there are several significant variables in this model, including the unemployment rate, the lagged property crime rate, and the trend variable. The remaining variables are not significant. Moreover, the lagged variables indicate moderate lagged effects, but do not appear to be meaningful because only two of the six lagged variables are significant.

Table 1 Motivation Theory Models for Property Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	67.7064***	105.636***	94.3441***	74.2423***	65.3827***
Unemployment rate (-1)		-66.5164	-40.3658		
Unemployment rate (-2)		19.2588			
Labour Force Participation Rate	9.98885	151.171***	145.109***	67.4773	
Labour Force Participation Rate (-1)		-137.2**	-108.416***	-63.2150	
Labour Force Participation Rate (-2)		20.4302			
Personal Disposable Income per Person	0.058536	0.531063**	0.427824		
Personal Disposable Income per Person (-1)		-1.35168***	-1.18199***		
Personal Disposable Income per Person (-2)		0.462325	0.368056		
Lagged Property Crime Rate (-1)	0.770217***	0.927311***	0.925983***	0.799017***	0.81312***
Trend Variable	5.78931	31.3718***	34.1982***	11.3916**	11.6495**
Constant	-754.911	-1248.43	-1290.72	-382.532	-98.4333
Model Diagnostics					
R ²	0.987666	0.991044	0.990942	0.988109	0.987398
Durbin-Watson d-Statistic	1.86795	2.01737	1.99627	1.86269	1.86369
Standard Error	168.909	151.081	147.5	163.46	166.731
Rho	0.296082	-0.217347	-0.134251	0.181354	0.277133
Schwarz Criteria	324.016	313.347	309.762	315.843	320.647

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

The third and fourth models begin removing the least significant variables from the saturated second model. An examination of models three and four reveals that there are still some non-significant variables remaining from the saturated second model that need to be removed.

The fifth model is the final motivation theory model to examine property crime rates. This model includes only three significant variables, the unemployment rate, the lagged property crime rate, and the trend variable. The labour force participation rates and personal disposable income per person are not significant explanatory variables for the property crime rates.

Overall, the positive association between the unemployment rate and the property crime rate suggests strong support for motivation theory. The diagnostic statistics for the

final motivation theory model (i.e. model five) are acceptable, although they are not as good as some of the models containing non-significant variables. Usually, when non-significant variables are removed, the standard error decreases. In this case, the standard error increases slightly. However, the Durbin-Watson d-statistic improves slightly when the non-significant variables are removed, indicating that they should not be included. This finding suggests that some of the non-significant economic indicators may play a small role in explaining the property crime trends.

When the violent crime rates are tested as the dependent variable for the motivation theory models, the results are not consistent with those found in the previous chapter. The positive associations between the labour force participation rates, personal disposable income and the violent crime rates from the previous chapter are in fact negative in the time series results, suggesting that some of the bivariate associations were spurious. The most likely explanation for these findings is that the bivariate associations of the previous chapter could not examine the effects of all of the economic indicators simultaneously to control for changing economic conditions.

Table 2 Motivation Theory Models for Violent Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	20.3327***	2.12047***	1.16549	1.3167**	1.57206***
Unemployment rate (-1)			-1.60672**	-1.76248***	-1.64218***
Unemployment rate (-2)			0.034604		
Labour Force Participation Rate		0.151203	-0.637552		-0.790284**
Labour Force Participation Rate (-1)			-1.63945	-2.14658***	
Labour Force Participation Rate (-2)			1.09766	1.08832	
Personal Disposable Income per Person		0.00301859	-0.00826771	-0.648289**	-0.011568***
Personal Disposable Income per Person (-1)			0.00581493		0.019321***
Personal Disposable Income per Person (-2)			0.014711**	0.018016***	
Lagged Violent Crime Rate (-1)	0.061342	0.057157	0.432621***	0.418177***	0.51347***
Trend Variable	1.51105***	1.17015***	0.265317	0.332084	0.418421**
Constant	-6.54948	-23.4952	34.2382**	29.6622**	22.9375
Model Diagnostics					
R ²	0.979851	0.980542	0.989466	0.989199	0.987982
Durbin-Watson d-Statistic	1.60338	1.6323	2.00693	2.00644	2.06066
Standard Error	3.98532	4.0124	3.16484	3.06829	3.23422
Rho	0.614852	0.570348	-0.035479	-0.047751	-0.107181
Schwarz Criteria	138.655	141.677	135.515	130.348	134.189

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

In Table 2, we report the results of testing the motivation theory models with violent crime rates as a dependent variable. The first model includes the unemployment rate, the lagged violent crime rate, and the trend variable. Nevertheless, the lagged dependent variable is not significant. In contrast, the second model includes all of the economic indicators without lags. Again, only the unemployment rate and trend variable are significant.

The third model introduces two-year lags on each of the economic indicators to examine the accumulation of frustration. Interestingly, in model three, the current unemployment rate is not significant, while the unemployment rate with one lag is significant along with personal disposable income with two lags and the lagged violent crime rate. The fact that the unemployment rate is not significant implies that the

combination of some of the non-significant variables may be interfering with the unemployment rate.

The fourth model begins removing the non-significant variables. There are several significant variables including the current unemployment rate and the one-year lagged unemployment rate, the current labour force participation rate and the labour force participation rate lagged by one year, current personal disposable income and personal disposable income with a one year lag, and the lagged violent crime rate. The number of significant lagged variables imply that lagged effects may be present.

The final model removes all of the non-significant variables. Here, all of the economic indicators are significant without any lags and the unemployment rate and personal disposable income per person are significant with one-year lags. The lagged violent crime rate and trend variable are significant in the final motivation theory model. This positive association between the unemployment rate and the negative association for the labour force participation rate and personal disposable income per person suggest support for motivation theory. Interestingly, however, when the unemployment rate and personal disposable income are lagged one year, their associations with the violent crime rates seem to be consistent with opportunity theory. We will address this outcome in the latter section of this chapter. Overall, the regression coefficients for the motivation theory models are consistent with the expectations of motivation theory.

Statistical Results for the Opportunity Theory Models

Table 3 shows that the opportunity theory models for property crimes are very similar to motivation theory except that fewer lags have been incorporated. As previously mentioned, this methodological decision was made because the effects of

opportunity theory are expected to be immediate. Examination of Table 3 indicates that the first model includes the instantaneous economic indicators. Consequently, only the unemployment rate and lagged dependent variable are significant. In contrast, the second model for opportunity theory includes a one-year lag for each of the economic indicators. Interestingly, the labour force participation rates are significant in this second opportunity theory model. Nevertheless, this significance disappears when the non-significant variables are removed in the third and fourth models.

Table 3 Opportunity Theory Models for Property Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	67.7064***	99.9668***	75.0269***	74.2423***	65.3827***
Unemployment rate (-1)		-34.9687			
Labour Force Participation Rate	9.98885	97.9884**	65.4828	67.4773	
Labour Force Participation Rate (-1)		-638.469	-62.5206	-63.215	
Personal Disposable Income per Person	0.058536	0.320261	0.014402		
Personal Disposable Income per Person (-1)		-0.600727			
Lagged Property Crime Rate (-1)	0.770217***	0.860537***	0.794513***	0.799017***	0.81312***
Trend Variable	5.78931	27.0199**	10.6589	11.3916**	11.6495**
Constant	-754.911	-1350.22	-349.103	-382.532	-98.4333
Model Diagnostics					
R ²	0.987666	0.988778	0.98811	0.988109	0.987398
Durbin-Watson d-Statistic	1.86795	1.83411	1.86335	1.86269	1.86369
Standard Error	168.909	165.015	165.538	163.46	166.731
Rho	0.296082	0.049357	0.184922	0.181354	0.277133
Schwarz Criteria	324.016	320.295	317.765	315.843	320.647

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

The final model for opportunity theory is also identical to that used to test the property crimes with motivation theory, again suggesting that the labour force participation rates and personal disposable income per person are not good predictors of the property crime rates. The positive association between the unemployment rate and the property crime rate shows little support for opportunity theory. This association is more consistent with the expectations of motivation theory.

The opportunity theory models testing violent crimes as a dependent variable use the same variables as the models testing property crimes as the dependent variable. Unlike the motivation theory model, this model includes fewer lagged variables. Table 4 presents the results of testing the opportunity theory models with the violent crime rates. The fact that the data finding for the final models are identical between motivation theory and opportunity theory suggests that lagged effects are only present for one year. Here, it is important to note that most of the associations in Table 4 are consistent with those suggested by motivation theory, thereby showing little evidence to support opportunity theory. Only when the unemployment rate and personal disposable income per person are lagged by one year is there support for opportunity theory. The implications of these associations are discussed further in the latter part of this chapter.

Table 4 Opportunity Theory Models for Violent Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	20.3327***	2.12047***	1.56944***	1.76891***	1.57206***
Unemployment rate (-1)			-1.64100***	-2.21465***	-1.64218***
Labour Force Participation Rate		0.151203	-0.807742		-0.790284**
Labour Force Participation Rate (-1)			0.017127		
Personal Disposable Income per Person		0.00301859	-0.011532**	0.00419808***	-0.011568***
Personal Disposable Income per Person (-1)			0.019298***		0.019321***
Lagged Violent Crime Rate (-1)	0.061342	0.057157	0.513646***	0.812112***	0.51347***
Trend Variable	1.51105***	1.17015***	0.417073**		0.418421**
Constant	-6.54948	-23.4952	22.9277	-9.90742**	22.9375
Model Diagnostics					
R ²	0.979851	0.980542	0.987982	0.982	0.987982
Durbin-Watson d-Statistic	1.60338	1.6323	2.06091	2.01489	2.06066
Standard Error	3.98532	4.0124	3.27762	3.81056	3.23422
Rho	0.614852	0.570348	-0.107537	0.018617	-0.107181
Schwarz Criteria	138.655	141.677	136.113	137.907	134.189

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

In a similar vein, the regression coefficients found for the opportunity theory models are typically opposite to those expected by opportunity theory, thereby refuting

its basic tenets and supporting motivation theory. In addition, the diagnostic statistics for the final property crime models indicate the possibility of autocorrelation, suggesting that additional explanatory variables may be required if this theory were to successfully predict crime rate fluctuations.

Statistical Results for the Motivation/Easterlin Models

The motivation/Easterlin models are quite different from the models for opportunity theory and motivation theory alone because the addition of the age effects component to motivation theory adds a new level of complexity. The statistical findings of this chapter reveal that the proportion of the population age 15-19 was the only age effect component that was significant with the property crime rates; the older age groups (20-24 & 25-29) had little effect.

Table 5 presents five models used to test the combination of motivation theory and Easterlin's age effect. The first model includes the unemployment rate, the age effects component, the lagged property crime rate, and the trend variable. An examination of Table 5 indicates that all of these variables are significant, thereby supporting the expectations anticipated by the motivation/Easterlin model, that is, through our decision to make Easterlin's age effects a component of consideration for motivation theory.

The second model in Table 5 adds the labour force participation rate and personal disposable income per person without any lags. Personal disposable income per person is the only variable that is not significant in this model. Accordingly, the third model adds two-year lags to each of the economic indicators to test for the accumulation of stress and frustration. Interestingly, only the unemployment rate, the age effects component, and

the lagged property crime rate are significant in model three while the trend variable is not.

In contrast, rather than adding new variables, the fourth model removes variables that are not significant. Similar to the third model, this model indicates that the same variables are significant. The only noticeable difference between the two models occurs for the trend variable. This variable was found to be insignificant for model 3 but significant for model 4.

Model 5, the final model removes all of the non-significant variables. As expected, the unemployment rate, the age effects component, the lagged property crime rate, and the trend variable become highly significant when these other factors are removed. In addition, the labour force participation rates are also significant when they are lagged by two years.

Table 5 Motivation Theory & Age Effects Models for Property Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	80.807***	78.3029***	93.2185***	77.0405***	80.6462***
Unemployment rate (-1)			-58.0446**	-16.8172	
Unemployment rate (-2)			52.3862**		
Labour Force Participation Rate		56.0986**	-106.366***	69.3956	
Labour Force Participation Rate (-1)			-66.7728	-79.7109	
Labour Force Participation Rate (-2)			122.685	54.6464	40.6759**
Personal Disposable Income per Person		-0.157443	-0.447338**		
Personal Disposable Income per Person (-1)			0.402123	-0.483095	
Personal Disposable Income per Person (-2)			0.827322***	0.372738	
Proportion of the Population 15-19	0.094995**	0.157068***	0.154176**	0.155454***	0.178434***
Proportion of the Population 15-19 (-1)			-0.013593		
Proportion of the Population 15-19 (-2)			0.154012		
Lagged Property Crime Rate (-1)	0.676704***	0.573994***	0.636076***	0.623456***	0.542231***
Trend Variable	20.7272***	26.6414**	-38.2823***	25.9013**	20.0549***
Constant	-713.968**	-3654.15***	101.543	-3186.27***	-3435.98***
Model Diagnostics					
R ²	0.988567	0.990014	0.994056	0.99189	0.990795
Durbin-Watson d-Statistic	1.818	1.78329	2.34276	1.94015	1.87008
Standard Error	160.692	153.782	153.435	141.596	140.851
Rho	0.286315	0.253307	0.023406	0.078224	0.123439
Schwarz Criteria	320.172	320.838	307.592	309.131	302.476

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

Table 6 presents five of the models used to test the motivation/Easterlin models when violent crimes are the dependent variable. The motivation theory models that include the age effects again provide quite different results than when we tested the motivation and opportunity theory models alone. The previous chapter suggests that increases in the older age groups appear to be responsible for increases in the violent crime rates. For this reason, the time series analysis tested the proportion of the population age 15-19, and 25-29 together. However, the proportion 20-24 had to be examined separately because of multicollinearity problems. Nevertheless, the proportion of the population 20-24 was not significant for any of the models.

Table 6 Motivation Theory & Age Effects Models for Violent Crime

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Unemployment rate	1.94104***	1.15667	0.9233	1.04969	1.18803**
Unemployment rate (-1)			-1.3983	-1.40853***	-1.50933***
Unemployment rate (-2)			-0.522331**		
Labour Force Participation Rate		-0.192339	-0.839162	-0.750035	
Labour Force Participation Rate (-1)			-1.26409	-0.950623	-1.57511***
Labour Force Participation Rate (-2)			0.938102		
Personal Disposable Income per Person		-0.015496	-0.014185**	-0.010181***	-0.011244***
Personal Disposable Income per Person (-1)			0.00190887		
Personal Disposable Income per Person (-2)			0.0077947	0.019979***	0.020083***
Proportion of the Population 15-19	0.000853954	0.00326551**	0.00525467		
Proportion of the Population 15-19 (-1)			-0.00577109		
Proportion of the Population 15-19 (-2)			0.00388735		
Proportion of the Population 25-29	0.00228804	0.00811572***	-0.00208619	0.0023942***	0.00236034**
Proportion of the Population 25-29 (-1)			0.00475559		
Proportion of the Population 25-29 (-2)			0.00433067		
Lagged Violent Crime Rate (-1)	0.045951	0.085296	0.202081	0.350448***	0.34138***
Trend Variable	1.48907***	2.89771***	2.19832**	0.741109***	0.812285***
Constant	-29.3269**	-32.9152	3.38327	52.2677***	48.0592***
Model Diagnostics					
R ²	0.981676	0.983333	0.991217	0.990172	0.989986
Durbin-Watson d-Statistic	1.64259	1.65267	2.02579	2.05594	2.04877
Standard Error	3.89368	3.80987	3.19493	2.96836	2.95445
Rho	0.565374	0.543478	0.035255	-0.072947	-0.062731
Schwarz Criteria	140.266	141.887	142.821	130.091	128.609

Unstandardized b-coefficients are shown. ** = $p < 0.05$ *** = $p < 0.01$

R² varies from 0-1, with the value closest to 1 indicating the best model.

The Durbin-Watson d-statistic varies from 0-4, with the value closest to 2 indicating the least autocorrelation.

The smallest standard error indicates the best model.

Rho or autocorrelation coefficient ranges from 0-1, with the value closest to 0 indicating the least autocorrelation.

The lowest Schwarz Criteria indicates the best model.

The first model presented in Table 6 includes the unemployment rate, the proportion of the population age 15-19 and 25-29, the lagged violent crime rate, and the trend variable. Only the unemployment rate and the trend variable are significant in this model. In the second model, we add the labour force participation rates and personal disposable income. Here, only the proportion of the population age 15-19, 25-29, and the trend variable are significant. The unemployment rate and newly added variables are not statistically significant. This may have resulted from the fact that the unemployment rate is correlated with the labour force participation rate and personal disposable income. The third model adds lagged current economic indicators. The saturated third model has only

three significant variables, the unemployment rate lagged by two years, current personal disposable income, and the trend variable. The fourth model begins removing the non-significant variables. Similar to Table 5, the same variables as the third model in Table 6 are significant as well as the unemployment rate with one lag. The final model in this table testing motivation/Easterlin includes only significant variables. Here, the unemployment rates, personal disposable income per person, and the proportion of the population age 25-29 are significant. The coefficients associated with these variables meet the expectations of the motivation/Easterlin model. The lagged violent crime rate and trend variables are also significant. However, we were surprised to find a significant negative association for the unemployment rate with a one-year lag and a positive association with personal disposable income when it is lagged by two years. These associations are examined in the discussion section of this chapter.

Overall, then, the motivation/Easterlin model provides strong support for integrating motivation theory and Easterlin's age effects. The regression coefficients are consistent with those suggested by the two theoretical perspectives and the diagnostic statistics indicate that motivation theory offers a stronger diagnostic approach when age effects are included in our interpretations of crime rate fluctuations. As expected, the motivation/Easterlin model provides a better explanation of the property crime rates compared to violent crime.

In sum, when considering the best model for explaining the property crime trends in Ontario, the motivation/Easterlin models are also superior to the best models for either motivation theory or opportunity theory alone. An examination of the diagnostic statistics for the motivation/Easterlin model presented in this chapter indicates that

consideration of the age effect results in a vastly superior model. The R^2 and Durbin-Watson d-statistic are higher, and the standard error, Rho, and Schwarz criteria are all lower for the motivation/Easterlin model. In contrast, the models that do not examine demographic structure have inferior diagnostic statistics. This finding also supports the suggestion that age effects play an important role in the explanation of crime trends. Furthermore, the unemployment rates and the proportion of the population age 15-19 concur with the strong positive associations suggested by the previous chapter, and are highly significant. Consistent with the findings in the previous chapter, the labour force participation rates and personal income per person display positive associations with the property crime rates. Nevertheless, the labour force participation rates only become statistically significant when they are lagged by two years.

The statistical findings from testing the motivation/Easterlin models with the property crimes are consistent with the expectations of motivation theory also supported by Britt (1997), Chiricos (1987), Gurr (1981), Kapuscinski, et al., (1998). In addition, the findings for the property crimes are also comparable with the propositions of age effects (Bartusch, et al., 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Brantingham & Brantingham, 1984; Easterlin, 1980; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; Warr, 1993). However, an interesting result found in this study is the positive association between the labour force participation rates and the property crime rates. Because this finding indicates support for previous research on opportunity theory (Britt, 1994; Cantor & Land, 1985), further research on the topic is advised before wholeheartedly accepting the motivation/Easterlin model when considering this factor.

The data presented in this study indicate, however, that the motivation/Easterlin model is the best model for explaining the violent crime trends. Here, an inclusion of age effects results in a dramatic improvement in the diagnostic ability compared to motivation theory and opportunity theory alone. Thus, the models that do not include the age effects component result in a higher autocorrelation coefficient. This points to the fact that age effects (25-29) also play an important role in explaining the violent crime trends.

The statistical results from testing the motivation/Easterlin model with the violent crimes trends are typically consistent with the expectations of motivation theory and the findings of previous research conducted by Britt (1997), Chiricos (1987), Gurr (1981), Kapuscinski et al. (1998). Although, the negative association with the lagged unemployment rate and positive relationship for lagged personal disposable income are consistent with the principles of opportunity theory also supported by Britt (1994) and Cantor and Land (1985). The connection between the proportion of the population age 25-29 and the violent crime rates is comparable to the findings of previous research that claims there is a pattern of escalation in the seriousness of criminal activity as cohorts age (Britt, 1998; Elliott, et al., 1998).

Discussion and Conclusion

Overall, when the statistical findings existing for each of the models in this study are considered, it is clear that the motivation/Easterlin model is superior for explaining the crime trends in Ontario between 1951-1999. For this reason, this section focuses on the theoretical implications of the statistical findings from this model. As part of that discussion, we must also consider the significant associations found for the lagged

dependent variables and the trend variables used in testing those models, as well as the statistical results not supporting the motivation/Easterlin model. Finally, the implications of the significant associations for the lagged dependent variable and trend variable are addressed as well as the implications for predicting future crime trends that can be drawn from the time series results.

The consistent positive associations found in this data between the unemployment rates and the crime rates provide strong empirical support for the arguments of motivation theory. Both property and violent crime trends appear to be heavily influenced by the amount of stress and frustration generated by difficult economic conditions. Further, the consistently positive and significant effect of the unemployment rates suggests that deterioration in economic conditions leads to increases in criminal activity due to increased stress and frustration brought on by not earning a wage. Nevertheless, the significant lagging effect of the unemployment rate implies that the stress and frustration of changing economic conditions have decreased and the effects of guardianship and criminal opportunities may provide a better explanation for the violent crime trends seen during these periods.

Concerning the unemployment rates, the final point to discuss involves the underlying pattern of employment/unemployment that becomes apparent over the 49-year time span involved in this data. Overall, there is an increasing trend in the unemployment rates in Ontario between 1951 and 1999. The strong positive correlation between the unemployment rates and time ($r = 0.77$) suggests that, although there are short-term fluctuations in the unemployment rates, in actuality, a long-term increasing trend exists. For example, in the 1950s and 1960s, the unemployment rates hovered

around 2% during favourable economic conditions and never surpassed 6%, even during a recession. In comparison, the economic conditions of the 1980s and 1990s witnessed unemployment rates of 5-6% during prosperous conditions and 10-11% during a recession.

There are two possible explanations for this increasing trend. One of the most likely sources involves the evolution of technology and the replacement of unskilled labour by machines and computers. During the past fifty years, machines and computers have replaced numerous jobs in Ontario's labour force. As noted previously, the industries most affected by technological improvements include mining, railway, assembly lines, and dock workers. The disappearing jobs in these industries have led to more people seeking work than the economy can support. In addition, the types of jobs that are 'disappearing' tend to attract young males who are poorly educated and unskilled. The new jobs made available in the high technology sector cannot absorb these workers because they lack the experience and training needed for such employment. As such, this population tends to become a permanent part of the under/unemployed sector that serves as a base to which new unemployment rates become added, which increases their likelihood of criminal activity.

A second source of the increasing trend toward higher unemployment rates involves the noticeable change in family structure that has occurred during this same time-period in the Western world. Since 1951, the population of Ontario has experienced increased divorce rates, remarriages, lone parent families and single individuals residing on their own. No longer can people safely rely on other family members for economic support. In addition, changes in the cost of living have made it difficult for one spouse to

provide economically for the family and both parents must work. The overall effect of this situation has been to increase the number of people who are searching for paid employment at a time when there appear to be a decreasing number of employment opportunities. As such, the unemployment rates are also likely to increase accordingly.

The direct implications of the two sources of increase in the unemployment rates in the past imply that unemployment rates may continue to increase in the future as machines and computers continue to evolve and replace people in the workplace. If this is the case, the unavoidable higher future unemployment rate may lead to even higher crime rates than witnessed during previous recessions.

Unlike the unemployment rate, the labour force participation rates used in this study produce some inconsistent associations with the crime rates. When this variable is lagged by one year, a positive association occurs with the property crime rates, but a negative association is found with the violent crime rates. When the labour force participation rates are not lagged, neither variables are significant. The positive association found with the property crime rates is comparable with the arguments of opportunity theory. In other words, the increased participation in the workforce increases criminal opportunities. Nevertheless, the negative association found with the violent crime rates implies support for the assumptions of motivation theory.

One explanation for the inconsistent associations involves the idea that the different shapes of the violent and property crime trends match the trend of the labour force participation rates differently. The property crime rates peak in the early 1980s and again in the early 1990s. Since the association observed in this study occurs one year after the change in the labour force participation rates, the frustration from deteriorating

economic conditions may have subsided and guardianship and the availability of criminal opportunities provides a better explanation. In comparison, the violent offences follow a rather different trend, peaking only once in the early 1990s. The negative association between the violent crime rates and the lagged labour force participation rate implies that the decreased employment opportunities lead to increased violent crime rates. Consequently, there is still sufficient stress and frustration for violent crime one year after the decrease in the labour force participation rates.

Caution must be taken, however, in interpreting these findings. For instance, there is an important drawback to using the labour force participation rates that may have affected its associations with the crime rates. Ip, (1998) notes that unlike the unemployment rate, the labour force participation rates can be deceiving because of changing social conditions. These types of influences can stem from various sectors and levels of society.

This point becomes clear with some explanation accompanied by examples. Recall that the labour force participation rate represents the number of people who are employed or officially unemployed as a percentage of all people in the working age category. Thus, for example, the sharp increase in women's workforce participation in the middle of the 1970s may be interpreted as a change in social conditions that also affects the economic environment. During this time frame, the number of people participating in the work force increased sharply as more women entered the work force, while the number of people of working age did not. This factor caused the labour force participation rates to increase sharply.

The same argument applies to changing demographic structure. For example, when a large cohort nears retirement age and begins early retirement, retirees are no longer in the workforce. However, they are included in the number of people in the working age group. This situation artificially lowers the labour force participation rates. Either of these situations can bias the labour force participation rates and produce misleading results. Attention to the impact of the early retirement situation is especially important in Canada where the baby-boom generation is approaching retirement age and appears to have been biasing the labour force participation rates since the early 1990s (Ip, 1998). If we take this factor into consideration, the labour force participation rates may not be a true reflection of the stress and frustration experienced by individuals in changing economic conditions as motivation theorists suggest.

A final point concerning the labour force participation rates used in this study involves the correlation with time. These labour force participation rates are highly correlated with time ($r = 0.89$), signalling a long-term increasing trend over the 49-year period. Throughout the 1950s and 1960s, the labour force participation rates were stable, averaging around 56.5% of the total population in Ontario. During the 1980s and 1990s, however, the labour force participation rates have fluctuated dramatically, ranging between 65.6 and 69.9% and averaging 67.5%. The most likely explanation for this increasing trend in the labour force participation rates involves two aspects of the increased women's participation observed during the 49-year period. The first aspect involves women's employment as a necessity. As noted previously, during the past fifty years it has become increasingly necessary for both parents in a family to work in order to survive economically, thereby increasing the labour force participation rates.

Secondly, women's participation in the workforce has also increased because of the increased independence and education that has occurred for women in the past fifty years and provided them with greater access to higher paying and more prestigious jobs. As well, more recent attempts to equalize the gap between the salaries of men and women have made continued participation in the paid labour force a more viable option for women. The movements toward improved equality and access to better jobs for women have increased the labour force participation rates noted in this study. Overall, it appears that the labour force participation rates have also been affected by women's independence.

The potential implications of this labour force participation trend indicate a continued growth in future labour force participation. If the labour force participation rates continue to rise, the positive association with the crime trends found in this data suggests that the property crime rates may also increase to some extent in the future. However, Ip (1998) argues that because of the ageing population in Canada, the labour force participation rates may increase slightly during favourable economic conditions, but will never return to the peak witnessed in 1989. The notable increase in women's labour force participation rates has subsided and this trend should stabilize and resume a trend similar to that observed in the 1950s and 1960s. Thus, the bias created by the growth of women's labour force participation likely explains why this variable does not display the negative associations expected, and why it has not been studied in previous research. Given this potential bias, the support for opportunity theory drawn in this study from the labour force participation rates should be interpreted with caution.

The support for motivation theory from personal disposable income per person is also inconsistent. The data demonstrate a significant positive association with the violent crime rates when this variable is lagged by two years and a significant negative association with the violent crime rates when there are not any lags. Moreover, no significant associations were found with the property crime rates. As noted above, the immediate negative association of this variable with the violent crime rates is consistent with motivation theory, but the positive association after two years is comparable to opportunity theory. A possible explanation for the lagged association is one similar to the reasons provided for the change occurring in signs for the unemployment rates. After two years, the frustration from deteriorating economic conditions has subsided and the opportunities for criminal activity provide a better explanation for the violent crime trends.

However, the ability of this variable to indicate economic conditions should also be questioned. Similar to the labour force participation rates, personal disposable income per person does not appear to be as accurate as the unemployment rates for indicating economic conditions because of its lack of variation during difficult or prosperous periods. In fact, the lack of variation existing during changing economic conditions also suggests that this variable may be affected by more than just economic conditions.

There are two possible sources of influence that may have affected the findings for personal disposable income per person in this study. The first involves the ability of personal disposable income per person to fluctuate with changing economic conditions. The lack of decreasing trends in personal disposable income per person implies a resistance to decrease when economic conditions deteriorate. There can be several

possible sources of this resistance. For example, labour unions provide job security thereby preventing employee layoffs and protecting members from decreases in personal disposable income. Government social assistance programs also provide income following unemployment that may serve as a band-aid solution until further employment can be secured.

A second, more global influence emerges from the use of government measures to stimulate a slumping economy. Recall that personal disposable income is calculated after government taxes have been deducted. If there is a tax reduction to increase spending and boost the economy, a potential decrease in personal disposable income can be lessened or offset by the tax reduction. Any or all of these possible sources of bias for personal disposable income per person may have had prominent effects on the trend of this variable during the 49-year series used in this study

Another important point to consider when examining the impact of personal disposable income per person is its association with time. Personal disposable income is the most highly correlated independent variable with time ($r = 0.95$). This finding indicates that despite short-term fluctuations, there is a strong linear association with time. Thus, this variable may not demonstrate the expected associations because there are not any fluctuations in its trend associated with changing economic conditions.

However, the most likely cause of the increasing trend in personal disposable income is the gap separating the incomes of the wealthy and the poor. The income of the wealthiest members of society tends to bias the measure of personal disposable income because this variable is an average of everyone's disposable income in Ontario. Recall that averages are very sensitive to extreme scores. Therefore, the high income of the

wealthiest members of society may have biased personal disposable income as an economic indicator, causing this trend and the strong correlation found between personal disposable income and time. This factor gains significance once we remember that all dollar values have been standardized over time. As a result, the associations found in this data are not a result of fluctuating currency values.

The implications of the increasing trend in personal disposable income are difficult to determine because of the inconsistent association found between this variable and the crime trends. An opportunity theory interpretation would involve full consideration of the additional circulation of targets in society that is associated with the expansion of income. From this perspective, the growing availability of suitable targets for criminal activity would create greater crime rates. Comparatively, a motivation theory interpretation would suggest that increasing personal disposable income will decrease the crime rates because people are experiencing less stress and frustration. However, the evidence for the two theories drawn from personal disposable income per person should be considered with caution because of the numerous influences that have likely affected personal disposable income during the past 49-years in Ontario.

As expected by the motivation/Easterlin model, the age effect variable suggested by Easterlin is highly significant. Increases in the proportion of the population age 15-19 are strongly associated with increases in the property crime rates. Conversely, increases in the proportion of the population age 25-29 are strongly associated with the trends in violent crime. There are two points that help to understand this finding. First, the cohort in the 25-29 age group has likely endured stress and frustration from the increased competition for jobs and decreased financial success associated with belonging to a large

cohort. Second, criminologists suggest that there is an escalation in the seriousness of crimes committed. Criminal careers begin with minor property offences and become increasingly violent in subsequent offences (Britt, 1998; Elliott et al., 1998). This intensification of violence process combined with the weak associations for the 15-19 age group for violent crimes, suggest that youth age 15-19 are just beginning their criminal careers and likely do not escalate to violent offences until they have progressed beyond the 15-19 age group. This suggestion is also evident from the bivariate comparisons of the previous chapter where the increase in violent crime rates appears to coincide with increases in the older age groups.

The association between time and the proportion of the population age 15-19 is weak and negative (-0.14), suggesting that there is a slow decreasing trend in the proportion of the population age 15-19 during the 49-year series. The population of Ontario is ageing and there is a decreasing proportion of this population in the 15-19 age group. The implications of this association suggest that sharp increases in the crime trends of the future will be not be determined as strongly by age effects, and more prominently by economic conditions.

The strong positive association with the lagged property crime rate for both the property and violent offences suggests that the carry over effects of the criminal justice system also have strong effects on the crime trends. The inertia or ongoing capacity of the criminal justice system to charge and convict offenders acts to maintain the crime trends at similar levels from one year to the next. Overall, the strong correlation between the lagged dependent variables and the crime trends suggests that the ongoing function of

the criminal justice system is also an important explanatory variable for the crime trends and should be controlled for in any models testing crime trends.

The significant positive associations between the trend variable and both types of crime suggest two possible explanations for the findings observed in this data. First, improved living standards and technology may be providing more opportunities for criminal activity through the availability of easily portable articles that are of considerable value. Thus, over time, the crime rates may have increased with time due to the availability of these new material goods. From this perspective, the opportunity for this type of criminal behaviour may be an important consideration when looking at long-term trends. On a different note, the expansion of technology may also increase the stress and frustration of the poorest members of society because they are not able to maintain a standard of living that includes the evolving technology. As such, this pattern of behaviour provides greater support for motivation theory. However, it appears more likely that during the past fifty years, Canadian society has created more wealth and opportunities for criminal activity. At the same time, this increasing wealth may have caused additional stress and frustration for those individuals that are not able to maintain a desired standard of living that includes this technology. The strong positive association existing between the trend variable and the crime trends suggest that this variable is also an important explanatory variable that furthers our understanding of the relationship between economics and fluctuating crime trends.

Based on all of the time series evidence discussed in this chapter, motivation theory combined with the age effects from the Easterlin hypothesis provides the best explanation of the crime trends because it permits us to control for this demographic

change. The positive associations between the unemployment rates, the proportion of the population age 15-19, and the property crime trends indicates that increased stress and frustration, especially among youth trying to enter the workforce, leads to larger property crime rates. Moreover, the positive association between the unemployment rates, the proportion of the population age 25-29, and the violent crime rates suggests that deteriorating economic conditions combined with a large cohort leads to the higher levels of stress and frustration associated with increased violent crime rates. However, it should be noted that some of the evidence produced from lagged effects still support opportunity theory. This finding implies that once the initial stress and frustration of difficult economic conditions has subsided, the effects of guardianship and availability of criminal opportunities provides an explanation for the crime trends. In addition, the evidence for opportunity theory provided by the trend variable indicates that the long-term increasing trend of wealth and available targets has also played a prominent role in the crime trends. Therefore, in contrast to the expectations of these theories, motivation theory provides the best explanation for the instantaneous effects of changing economic conditions, while opportunity theory explains long-term fluctuations.

When considering the drawbacks described in this section and the bivariate evidence presented in the previous chapter, the inconsistent time series results occurring in the data, and the lack of non-lagged significant variables, it is highly likely that the labour force participation rates and personal disposable income per person are influenced by more than just changing economic conditions. Therefore, these variables should not be used as economic indicators in examining the association between economic conditions and crime trends.

In sum, there are several implications that can be drawn from the time series results. The long-term increasing trend in the unemployment rates and statistically significant positive association between the unemployment rates and crime suggests that while the crime rates may display short-term fluctuations, the long-term crime rates are likely to increase. In contrast, the crime rates are likely to continue to fall if the decreasing trend in the unemployment rates that began in 1991 continues.

In addition, the positive association with the age effect for both the 15-19 and 25-29 age groups suggests that the crime rates will decrease in the future because of Ontario's ageing population. However, there is a large cohort in the young age groups because the baby boomer generation has produced children. While the baby boomer children represent a slightly larger cohort than those observed recently, the size of this cohort is minor compared to that of the baby boom generation. This echo effect caused by the baby boomers having children should fade away as the effects of the baby boom generation decrease with time. Still, this larger cohort in the young age groups may lead to an increase the property crime rates as they pass through the 15-19 age group, and the violent crime rates as they progress through the 25-29 age group. Although any increase in the crime rates will likely be smaller than the increase caused by the baby boomer generation because the approaching cohort is also smaller.

The findings associated with the time trend variable also have implications for understanding future crime trends. The evolution of technology resulting in more availability of valuable products that can be easily stolen may continue to raise future crime rates. At the same time, the frustration caused by people's inability to maintain a

standard of living that includes this evolving technology may continue to generate stress and frustration.

In conclusion, the purpose of this chapter was to use statistical methods to test motivation theory, opportunity theory, and the combination of motivation theory and the age effects component from the Easterlin hypothesis. The statistical methods provided an opportunity to examine the multivariate association between economic conditions and crime more effectively. The results of this analysis clearly indicates that the integration of motivation theory and the Easterlin hypothesis provides a stronger theoretical base for explaining the fluctuations existing in the crime trends in Ontario between 1951-1999.

Chapter 5

Implications of Varying Economic Conditions and Demographic Structure for Changing Crime Trends

Several theories have attempted to explain the continuous fluctuations in the crime rates of the last half-century. However, as noted in Chapter 1 of this thesis, these theories have gained marginal success when applied to the data. Researchers testing these theories have only met with limited success because these theories have not jointly examined changing economic conditions and demographic structure together in a single statistical model. The most notable finding of previous research is that motivation, age, and cohort size independently all play important, but independent, roles in determination of the crime trends. In contrast, this thesis has tested a combination of variables on longitudinal data extending over a 49-year time span. This process of testing demonstrates strong evidence that, when motivation theory and Easterlin's age effects component are combined, we gain a more effective understanding of the fluctuating crime trends.

Using data from Ontario between 1951-1999, this thesis examined the more dominant criminological theories used currently to explain the relationship between economic change and fluctuation in crime trends. These include: (1) motivation theory, (2) opportunity theory, and (3) a combination of motivation theory and Easterlin's age effects. In Chapter 3, the bivariate comparisons of the economic and demographic indicators with the crime trends revealed that there are some strong associations between

economic conditions, demographic structure, and the crime trends. However, the time series results presented in Chapter 4 show that combining motivation theory with Easterlin's age effects provides a more comprehensive explanation. There is a strong positive association between the unemployment rates and the crime trends, indicating that the greater stress and frustration created by increasing unemployment rates may lead to rising crime rates. The association is strongest for property crimes. Here, Easterlin's age effects were also highly significant. Thus, an increase in the proportion of the population age 15-19 was strongly associated with rising property crime rates because this age group is the most criminally active in terms of property crimes. In a similar way, increases in the proportion of the population age 25-29 were strongly associated with escalation in the violent crime rates. This age group has likely experienced the stress and frustration of belonging to a large cohort. Moreover, the seriousness of their offending has likely escalated from property offences when they were in the 15-19 age group to the types of violent offences characterized by this age cohort.

The highly significant associations found with the trend variables suggest that an extension of opportunity to commit crimes may also play an important role in affecting long-term crime trends. The results of the time series analysis of the data provide inconsistent evidence to support the arguments of opportunity theory concerning the impact of changes in economic conditions. Nevertheless, there is some evidence to support opportunity theory when examining the availability of criminal opportunities over a long period of time. The long-term increasing availability of targets for victimization produced through evolving technology may have led to a long-term

increasing trend in the crime rates. From this perspective, opportunity theory provides important contributions to the explanation of crime trends.

The results of this thesis are consistent by and large, with previous research. The research of Britt (1997), Chiricos (1987), Gurr (1981), and Kapuscinski, et al. (1998) on motivation theory concurs with this study. In addition, the data used in this study highlight the importance of Easterlin's age effect hypothesis. Similar to other studies, the population age 17-18 is the most criminally active and this association is strongest for property crimes (Bartusch, Lynam, Moffitt, & Silva, 1997; Blumstein, et al., 1988a; Blumstein, et al., 1988b; Gottfredson & Hirschi, 1990; Moffitt, 1993; Tittle, 1988; and Warr, 1993). Also, the escalation to violent offences observed in the proportion of the population age 25-29 is comparable with research by Britt (1998) and Elliott et al. (1998). As such, findings of this thesis uphold past research discoveries at the same time as it extends its analysis into another realm.

Policy Implications

The future policy implications of the results presented in this thesis involve full consideration of the relationship existing among the unemployment rates, changing demographic structure, and the trend variables. In this data, the unemployment rates are positively correlated with time. A continuing increase in the unemployment rates may lead to higher crime rates. Caution must be given to this interpretation, however, because testing for the inflation rate was impossible with this data. As previously noted, another primary economic indicator that is strongly associated with changing economic conditions is the inflation rate. The inflation rate was not available as an economic indicator for this study because of inconsistency in its measurement, but may have a

strong influence on the unemployment rates. For example, White (1985) suggests that the sharp increases in the inflation rates in the early 1970s caused by the oil crisis and economic downturn were a major factor affecting the turbulent economic conditions perceived in the following years. Since 1991, however, the Bank of Canada has used the interest rates to control the inflation rates in Canada between 1-3%. The effects of controlling inflation through adjusting the interest rates appear to have stabilized the inflation rates. Previously, the inflation rates had fluctuated considerably. If the cyclical nature of the unemployment rates can be stabilized in a similar manner, the stress and frustration experienced by unemployment in society may subside as its members adjust to a stable unemployment rate.

In a similar way, in 1991, when the Bank of Canada began actively controlling the inflation rate, the unemployment rate immediately began a decreasing trend that continues until the end of the data in 1999. Hopefully, this decreasing trend is the result of the controls placed on the inflation rate. However, the middle and late 1990s were also a time of prosperous economic conditions when unemployment rates would be expected to decrease, regardless of the implementation of the Bank of Canada's inflation rate control policy. Based on current discussions of world economies, specifically Canadian, American, and European economies, the economy during the first year of the 21st century may experience difficulties compared to recent years. At the same time, we will gain a better understanding of the effects of the controlled inflation rates on the unemployment rates. If the unemployment rate is controlled at current levels through the tight controls on the inflation rates, the crime rates may continue to decline in the near future. Future

notice of the relationship between unemployment, inflation rates, and crime rates is, therefore, strongly advised.

An examination of the changing demographic structure in this study raises two areas of concern for public policy. First, the data provide strong evidence that the population age 15-19 is very active in committing property offences and the 25-29 year old population is very active in committing violent offences. These findings indicate two specific age groups that can be effectively targeted with crime prevention programs.

Second, the ageing population of Ontario has resulted in decreasing proportions of the younger population. However, the small increase in the proportion of the population at the young age groups created by 'baby boomer children' suggests that demographic structure may continue to play a role in the future crime trends. Although the increase in the crime rates from the baby boomer children should be less than the increase caused by the baby boomers themselves, these age cohorts may deserve special attention in the development of programs focused on criminal activity and crime prevention.

When economic conditions, demographic structure, and crime trends are considered together, it is apparent that the contribution of demographic structure to the crime trends is decreasing. Recall from the bivariate analysis presented in Chapter 4 that there was not a sharp increase in the proportion of the population 15-19 to correspond with the increase in the property crime trends during the early 1990s. Therefore, as the Canadian population ages, changing economic conditions will likely continue to have a strong effect on the crime trends while changing demographic structure will not contribute as significantly to the crime trends as it has in the past.

The analyses also revealed some support for the arguments of opportunity theory. For instance, the strong association found with the trend variable suggests that there may be increasing criminal opportunities in the future because of technological improvements. However, the effects of the trend variable are only noticeable over long periods of time. The correlation with the trend variable suggests that such implications of the long-term effects will take many years to become visible or realized. Thus, although attention should be paid to this variable, it does not need the strong focus of concern advised for the other variables tested in this study.

Overall, as with other studies, the future of the crime trends in Ontario is uncertain and predictions are difficult to make. On the one hand, the decreasing unemployment rates and ageing population may continue to lead to a declining crime rate. On the other hand, the association between the unemployment rate and the inflation rate is uncertain and requires time for a better understanding to be available. In addition, the baby boomer children progressing through the younger age groups also represent a possible source of increase in future crime rates. Finally, the increasing criminal opportunities through technological advancements combined with the previous points suggest that the crime trends may resume an increasing trend in the future.

Study Limitations

Although the statistical findings are easily discernible, data related issues should also be discussed in our assessment of its utility and predictability. The first issue concerns geographic region. As noted in Chapter 2, as the aggregate level of the data increases, the important variations in the data are smoothed out or lost through averaging with the other geographic regions. This point was in this addressed in this study by using

data from the province of Ontario, and not Canada as a whole. Nevertheless, it would be preferable to break the data down to regions within the province of Ontario to further avoid the possibility of further regional smoothing. A second problem involves the availability of economic indicators for the period of 1951-1999. There are many economic indicators available back to 1951, but the definitions or methods of calculation have changed at some point between 1951-1999. This prevents us from conducting any reliable analyses throughout the entire 49-year series. The previously unused economic indicators used to control for changing economic conditions were consistently measured throughout the 49-year series. However, some of them appear to measure more than just changing economic conditions.

Another data related issue concerns crime statistics. Again, as noted in Chapter 2, the crime statistics for the violent and property-related offences come from two different sources. The difference between the two sources is that crime statistics reporting only became mandatory in 1962. Presumably, the statistics are more reliable after 1962 because of the mandatory reporting, but it is difficult to ever know for sure. Comparability is not the same as equivalency and hidden differences may exist. As has been widely discussed in the literature, the crime statistics can also be influenced by the criminal justice system through the effects of police behaviour and interpretation of legislation (Brannigan & Lin, 1999). In addition, the criminal justice system deals with criminals directly and has the capacity to select the offenders to involve with this system, thereby generating the crime statistics. While the legislation has remained the same during the 49-year period, one may never know if changing governments and social and moral climates may have affected the interpretation and enforcement of the legislation.

This problem exists in all historical crime trend analysis studies. Therefore, like these studies, the results of this study must also be interpreted with caution.

Future Research Possibilities

Given the limitations of the data, there are several interesting areas for future research on crime trends. These areas include (1) explorations of demographic structure by including gender ratios in the analysis, (2) examination of the relationship between opportunity theory and motivation theory, and (3) further tests of the Easterlin hypothesis using better data that may become available in the future.

Gender Ratios

Consideration of the distinctions between male and female crime rates may also prove to be an exciting exploration. Women tend to commit different types of crime than men. Therefore, a study of these distinctions may further our understanding of the theories used to explain crime as well as the general fluctuations appearing in crime trends. However, the impact of gender ratios offers a topic of particular interest. The gender ratios of a population are likely to have pronounced effects on the crime trends. Since males tend to be more criminally active, an increase in the ratio of males to females may lead to an increase in the crime rates. This point is especially important with Canada's ageing population and declining birth rates. If Canada's birth rates continue to decrease, the population growth in Canada will be augmented by higher levels of immigration and international adoption. Many other cultures in the world place an emphasis on having male children. The immigration of families with more male children could alter the balance in the gender ratios in favour of the male population. Conversely, the cultures that prefer male children may also allow more female children to be adopted

internationally, biasing the gender ratio in favour of the females. Overall, the effects of immigration and international adoption may balance one another out, but a proper examination of the gender ratios would certainly improve upon current knowledge of the crime trends.

The Relationship Between Motivation Theory and Opportunity Theory

The relationship between motivation and opportunity in the crime trend analysis is more complicated than it seems. These theories do not appear to be mutually exclusive. In this study, the spontaneous associations agree with motivation theory while the lagged and long-term associations are consistent with opportunity theory. There are several issues that have not been addressed in this, or other, research studies that could be examined further when considering these factors. First, to gain a better understanding of the levels of stress and frustration existing in a society, specific indicators of stress and frustration could be employed to further explore this point. Some of these indicators could include the suicide rates, average rates of psychological or psychiatric visits in a given year, or the yearly sales figures of stress reducing products and prescriptions.

A second issue to examine further is the relationship between chronic and occasional offenders during changing economic conditions. Some individuals continue to offend regardless of economic conditions and may establish a base rate of offending in society. This base rate represents the absolute lowest point that the crime rates can reach due to the continuous criminal activity exhibited by these chronic offenders. An interesting study might examine whether, during prosperous economic conditions, chronic offenders are charged more frequently because of their increased access to suitable targets, thereby increasing the base rate, or more frequently during difficult

economic conditions because of increased frustration. Comparing data of this type against the basic tenets of motivation theory, opportunity theory, and the combination of motivation theory and Easterlin's hypothesis would also test our level of acceptance offered by these approaches.

Empirical Studies of the Easterlin Hypothesis

A final topic that might be usefully explored is the Easterlin hypothesis, itself. Since there has been only one revolution of Easterlin's 40-year cycle, future research will have a better opportunity to examine this hypothesis because researchers will have access to superior data. There are several areas of this theory that require further research and more data. Some of these areas include the effects of growing up in a large family with more brothers/sisters and the decreased interaction time/supervision from the parents, increased student to teacher ratios as class sizes increase, and the individual effects of having access to more material possessions associated with growing up in favourable economic conditions. This analysis presented in this study represents a small first step in that direction by highlighting the demographic variable of age as having an impact on the crime rate.

In general, historical crime trend studies trying to examine causal associations are rather complex and the sources of data can create difficulty. When the economic indicator data used in this study were collected fifty years ago, they were likely not intended for the examination of causal associations by crime trend analysis. Exploring the association between economic conditions and the crime trends is fascinating but can be frustrating at the same time because of the data problems. Autocorrelation in the data also has the potential to generate serious difficulties in most studies using time series

analysis. Overall, historical crime trend studies have difficulty examining causal explanations for the crime trends directly and must examine the associations of the crime trends with other variables to begin to establish possible links. This study cannot make causal inferences concerning the relationship between economic conditions, demographic structure, and crime. However, this study has discovered an important association between economic conditions, demographic structure, and crime while acknowledging that other factors such as personal characteristics, outside influences on stress and frustration, and additional situational components may also be involved in criminal activity.

In sum, this study has examined the relationship existing between economic conditions, demographic structure, and crime trends. It explored how such variables as unemployment rates, labour force participation rates, and age cohorts may affect fluctuations in crime. Those findings were then tested against the basic tenets of motivation theory, opportunity theory, and motivation theory combined with Easterlin's hypothesis concerning the relationship between age cohort and crime. Overall, the combination of motivation theory and the age effects component from the Easterlin hypothesis provides a better explanation of the crime trends in Ontario, 1951-1999, than do motivation theory or opportunity theory alone. The association between economic conditions, demographic structure, and crime is strongest for property-related crimes. While there is still much work to be done on this topic, this study provides significant evidence to indicate that there is a strong relationship between economic conditions, demographic structure, and crime. Deteriorating economic conditions lead to increasing

crime rates. Based on the evidence for this relationship, future research should continue to improve upon our understanding of crime trends in Canada.

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Appendix

Correlation Matrix of the Independent Variables

	UNEMP RTE	UNEMP RTE (-1)	UNEMP RTE (-2)	UNEMP RTE (-3)	LABFORPT
UNEMP RTE	1.00000				
UNEMP RTE (-1)	0.89248	1.00000			
UNEMP RTE (-2)	0.73879	0.89931	1.00000		
UNEMP RTE (-3)	0.62149	0.76004	0.90620	1.00000	
LABFORPT	0.75519	0.75342	0.75676	0.76161	1.0000
LABFORPT (-1)	0.78778	0.77031	0.76304	0.76443	0.99108
LABFORPT (-2)	0.80934	0.79946	0.77821	0.77011	0.97705
LABFORPT (-3)	0.82224	0.81836	0.80493	0.78302	0.95699
PERSDISP	0.73748	0.75146	0.76210	0.76628	0.95829
PERSDISP (-1)	0.76710	0.76082	0.76472	0.76912	0.96465
PERSDISP (-2)	0.80063	0.78643	0.77253	0.77255	0.96391
PERSDISP (-3)	0.82294	0.81755	0.79672	0.78001	0.95946
PROP1519	-0.15110	-0.19569	-0.22018	-0.22090	-0.02672
PROP2024	0.31664	0.26258	0.21504	0.18202	0.53775
TIME	0.76547	0.79941	0.81849	0.82549	0.89028

	LABFORPT (-1)	LABFORPT (-2)	LABFORPT (-3)	PERSDISP	PERSDISP (-1)
LABFORPT (-1)	1.00000				
LABFORPT (-2)	0.99128	1.0000			
LABFORPT (-3)	0.97705	0.99128	1.0000		
PERSDISP	0.94868	0.93636	0.92069	1.00000	
PERSDISP (-1)	0.96052	0.95122	0.93788	0.99607	1.0000
PERSDISP (-2)	0.96572	0.96148	0.95115	0.98924	0.99652
PERSDISP (-3)	0.96503	0.96657	0.96131	0.98191	0.99004
PROP1519	-0.091020	-0.15746	-0.22391	0.056942	0.02393
PROP2024	0.48104	0.41931	0.35532	0.52120	0.49884
TIME	0.89976	0.90979	0.91808	0.95435	0.95781

	PERSDISP (-2)	PERSDISP (-3)	PROP1519	PROP2024	TIME
PERSDISP (-2)	1.00000				
PERSDISP (-3)	0.99664	1.0000			
PROP1519	-0.01427	-0.05415	1.00000		
PROP2024	0.46736	0.43275	0.69943	1.00000	
TIME	0.96370	0.96997	-0.13675	0.28027	.0000

Figure A Bivariate Relationship Between Break and Enter Rates and Unemployment Rates

Figure B Bivariate Relationship Between Theft Rates and Unemployment Rates

Figure C Bivariate Relationship Between Auto Theft Rate and Unemployment Rate

Figure D Bivariate Relationship Between Robbery Rates and Unemployment Rates

Figure E Bivariate Relationship Between Break and Enter Rates and Labour Force Participation Rates

Figure F Bivariate Relationship Between Theft Rates and Labour Force Participation Rates

Figure G Bivariate Relationship Between Robbery Rates and Labour Force Participation Rates

Figure H Bivariate Relationship Between Break and Enter Rates and Personal Disposable Income per Person

Figure I Bivariate Relationship Between Theft Rates and Personal Disposable Income per Person

Figure J Bivariate Relationship Between Robbery Rates and Personal Disposable Income per Person

Figure K Bivariate Relationship Between Break and Enter Rates and Proportion of the Population 15-19

Figure L Bivariate Relationship Between Theft Rates and Proportion of the Population 15-19