Erasmus School of Economics

Master Thesis MSc Policy Economics

The Effect of Variation in Time Between Income Assistance Payments on Crime: Evidence from Vancouver

Name student: L.S. de Boer

Student ID number: 534769

Supervisor: Dr. J. Delfgaauw

Second assessor: Dr. R.A. Poblete Cazenave

Date: 30 June 2021

Abstract

This paper analyses the effect of Income Assistance (IA) payments on crime rates in Vancouver, British Columbia (BC) from 2003 to 2020. IA payments are made 12 times a year, always on Wednesdays. As a result, there is variation in the time between payments, which can either be four- or five-weeks. Using this exogenous variation in the payment dates, I examine the effect of a longer period between payment dates on property crime. I find that in the fifth week of five-week period, crime is significantly higher, compared to the fourth week in a four-week period. As well as compared to the first weeks for a four- or five-week period. However, in both the four- and five-week periods, crime rate are higher in the second-to-last week.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Contents

I. Introduction

Criminal activity costs society enormous amounts of money annually (Anderson, 2012). Therefore, various causes of crime have been studied for decades. One of the leading causes of criminal behaviour is low economic opportunity for individuals. Many studies have analysed the link between crime and poverty (Becker, 1968; Benoit & Osborne, 1995; Mehlum, 2006; Papaioannou, 2017; Mohammed & Hosen, 2018), crime and inequality (Allen, 1996; Imrohoroglu et al., 2000), and crime and unemployment (Allen, 1996; Chiu & Madden, 1998; Fajnzylber et al., 2002; Mohammed & Hosen, 2018). Welfare payments could mitigate the effect of poverty as they are designed to support the most vulnerable in society. In turn, this could lead to lower crime rates (Savage et al., 2008).

Not only the amount of welfare paid to individuals affects behaviour, but also the frequency of the payments. If individuals are not able to smooth consumption over the periods between the payments, they may turn to financially beneficial illegal activity towards the end of the payment cycle to supplement income (Foley, 2008).

This paper analyses the effect of Income Assistance (IA) payments on crime rates in Vancouver, British Columbia (BC) from 2003 to 2020. IA payments are made 12 times a year, always on Wednesdays. Usually the last or second to last Wednesday of the month. As a result, there is variation in the time between payments, which can either be four- or five-weeks. Each payment is equally large, hence does not depend on the time between the payments. Using this exogenous variation in the payment dates, I examine the effect of a longer period between payment dates on property crime. Specifically, I look at the effect of the fifth week in the five-week period. If individuals who receive IA are not fully aware of the time variation between payments dates or are unable to smooth consumption across periods, they could run out of money when the time between payment dates increases. It seems unlikely that individuals will be able to supplement their IA legally when there is a five-week period between payments, as this is very irregular. This could induce people who experience poverty to engage in illegal activities, also because benefits arise sooner compared to legal activities (Freeman, 1999). Additionally, poverty reduces an individual's cognitive functioning, resulting in them making irrational choices (Mani et al., 2013). Thus, individuals may resort to financially beneficial illegal activities to supplement the income assistance. To analyse if individuals supplement their depleted income by illegal activities, I will look at the property crime levels in the fifth week of a five-week period.

If individuals turn to crime in times of need and are not fully aware of the increased time between payment dates or are unable to smooth consumption, I expect to see an increase in the financially beneficial property crime rates in the fifth week of a five-week period. However, this is in stark contrast with the permanent income hypothesis.

The permanent income hypothesis expects predictable changes in income to have no effect on consumption (Hall, 1978). Thus, individuals would be fully aware of the variation between payment dates for IA and would smooth consumption over an entire year. If the permanent income hypothesis holds, a variation in time between payment dates would not affect property crime rates. Individuals would be aware of this variation and would smooth income between four- and five-week periods.

However, a large part of consumers are sensitive to temporary income changes. These consumers are referred to as hand-to-mouth consumers. They spend all their available resources in every period (Kaplan et al., 2014). If most consumers who receive IA are hand-to-mouth consumers and they are not aware of the variation between payment dates, they would deplete their resources in the 'normal' four-week period, leaving them without income in the fifth week of a five-week period. These consumers may then resort to financially beneficial criminal activities to supplement their depleted income. From this theory, we would expect to see an increase in the level of property crime in the fifth week of the five-week period.

Somewhere in between the two aforementioned theories is that individuals may be aware of the time increase between the payment dates, from four to five weeks, however, may feel the need to supplement their incomes because the large reduction in the daily budget that the fifth week introduces. The payment is the same no matter the amount of time between payments. A single adult will receive CA$935.00 of income assistance per month in 2021 (Ministry of Social Development and Poverty Reduction, 2021a), a daily budget of CA$30.75 if income is smoothed over the entire year. If income is not smoothed over the entire year and the time between payment dates is four weeks (28 days), this results in a daily budget of CA$33.40. However, if the time between payment dates is five weeks (35 days), this means CA$26.71. Thus, the daily budget decreases by 20 percent if the time between payment dates is one week longer. If individuals are fully aware of the reduction in the daily budget the fifth week introduces, and due to this reduction feel the need to supplement their income with illegal activities, we would expect the property crime level to increase over the entire five-week period compared to crime levels in four-week period.

For the analysis, I use data from the Vancouver Police Department (VPD) on crime rates from 2003 until 2020. The VPD data includes information on the type of crime, and the time and location the crime was committed. This analysis includes 938 weeks, which are assigned to the treatment- and the control group. The treatment group includes weeks that were part of a five-week period between payment dates, and the control group includes weeks that were part of a four-week period between payment dates. Over the period analysed in this paper, 216 IA payments were made.

Compared to the average of all other weeks, property crime rates in the fifth week of a five-week period are significantly higher. Furthermore, the fifth week of a five-week period has a higher effect on the level of property crimes than the fourth week of a four-week period. Comparing five-week

periods to four-week periods, I find significantly higher crime rates in the five-week periods. Interestingly, the first weeks of both the four- and five-week period have a significantly lower property crime rate than the fifth week of a five-week period, or any of the other weeks. Therefore, there seems to be some evidence of individuals being sensitive to temporary income changes, and hence no evidence of the permanent income hypothesis.

I find that the coefficients are higher for the second-to-last week in both the four- and five-week period. Thus, the third week in a four-week period, and the fourth week in a five-week period. These weeks have higher levels of property crime than any of the other weeks. However, since there is no exogenous variation here, no conclusions can be made about the causality.

Additionally, I analyse if the effect of a variation in time between payment dates on property crime is different for neighbourhoods with different income levels. Splitting the sample based on the average median income, and the percentage of low-income households in a neighbourhood. Neighbourhoods with lower income levels experience higher levels of property crimes, and also see a higher increase in the level property crimes in the fifth week of a five-week period.

This paper is structured as follows; section II will discuss the background characteristics of the analyses, section III will go over the existing academic literature on the subject, section IV will introduce the data, section V discusses the methodology, section VI goes over the results, and section VII presents the conclusion.

II. Background

British Columbia

British Columbia is the third largest province in Canada, with a population of around 5 million people (Government of Canada, 2018). Its largest city, Vancouver, has approximately 650,000 inhabitants (Vancouver, n.d.). The city of Vancouver is policed by the Vancouver Police Department (VPD), which was established in 1886. Today, the VPD stands 1,700 civilians and sworn officers strong (Vancouver Police Department, n.d.). The jurisdiction of the VPD comprises 24 neighbourhoods: Fairview, West End, Central Business District (Downtown), Hastings-Sunrise, Strathcona, Grandview-Woodland, Kitsilano, Kensington-Cedar Cottage, Sunset, Mount Pleasant, Stanley Park, Shaughnessy, Marpole, Oakridge, West Point Grey, Victoria-Faserview, Kerridale, Riley Park, Arbutus Ridge, Renfrew-Collingwood, Killarney, Dunbar-Southlands, South Cambie, and Musqueam.

Income Assistance in British Columbia

The government of BC offers Income Assistance to people who cannot support themselves. Temporary assistance and disability assistance are the two main programs that comprise IA in BC (Petit et al., 2020). Temporary assistance is aimed at people that are out of work and do not earn

enough to meet basic needs, people who are waiting for other sources of money to arrive, people who are not able to work, and people who urgently need food, shelter or medical attention (Ministry of Social Development and Poverty Reduction, 2020a). Individuals are eligible for disability assistance if they have a severe physical or mental impairment which is expected to continue for more than two years, and are significantly restricted in their ability to perform daily-living activities (Ministry of Social Development and Poverty Reduction, 2020b). The IA program is the largest income assistance program distributed by the BC government. The program costs the government more than CA$2B a year and reaches 155,970 households, 205,195 persons, and 41,532 children, approximately eight percent of the households in the province (Petit & Tedds, 2020).

Individuals who want to receive IA must have exhausted nearly all assets, making IA a program of last resort (Wang et al., 2017). The amount of IA depends on the family size and structure, and IA phases out with legally earned income (Petit & Tedds, 2020). In 2021 temporary assistance for a single adult is CA$934.00 a month plus medical service plan coverage, CA$1,427.22 if both spouses are on assistance, CA$1,270.58 for a single parent with one child, and CA$1,611.06 if both spouses are on assistance and have one child (Ministry of Social Development and Poverty Reduction, 2021a). Furthermore, a single adult on disability assistance receives CA$1,358.42 a month. Moreover, disability assistance payments increase to CA$2,423.06 if spouses are on disability insurance, CA$1,694.08 for a single parent with one child, and CA$2,131.56 if both spouses are on disability insurance and have one child (Ministry of Social Development and Poverty Reduction, 2021c).

Petit and Tedds (2020) state that the income assistance benefit payments are below the Market Basket Measure (MBM) poverty line in British Columbia, and individuals that receive the benefits are limited in the amount of assets and income they can acquire. Yet, individuals living in Vancouver face some of the highest living costs in Canada (The Economist Data Team, 2016).

Timing of Income Assistance Payments in British Columbia

Income Assistance payments are issued monthly, twelve times a year. Payments are made on Wednesdays, in most cases on the last or second to last Wednesday of the month (Ministry of Social Development and Poverty Reduction, 2021b). Due to this specific setup of the payments, one payment for each month out of the year and the fact that not all months have the same number of days, a variation occurs of the time between payments dates. Resulting in four- and five-week periods between payments dates. These variations are randomly spread out throughout the year, and over the 18 years included in this analysis. However, if the government of BC would want the time between payments to be the same for each period, they could simply spread the yearly IA benefit out over 13 payments, all with four-weeks in between them.

Crime in Canada

The crime rate in Canada, and in the rest of developing countries, has been falling over the last few decades (Farrell & Brantingham, 2013, Hodgkinson et al., 2016). Furthermore, the Crime Severity Index (CSI), which measures both the seriousness and volume of police-reported crime in Canada, has been decreasing since 1998 (Keighley, 2017). According to Carrington (2001), the crime drop could be explained by the aging of the Canadian population. As the population ages, the crime prone young people's share in Canada's population falls. Thus, crime rates should continue to decline, as aging continues. It is important to note that this forecast assumes that age-specific crime rates are constant. Similarly, Stevens et al. (2013) finds that for the province of Alberta, which borders British Columbia on the east, crime rates are expected to decline as the population ages.

Pottie Bunge et al. (2005) evaluate the decreasing crime rate in Canada from 1962 to 2003 and find the largest decline came from property crimes committed by young offenders. They also find a significant decrease in robberies with firearms, and homicides. The authors find that years with higher inflation have higher rates of financially motivated crimes, such as robbery, break and enter, and motor vehicle theft. Moreover, years with higher rates of unemployment and per capita alcohol consumption had higher rates of homicide. The authors explain that during periods of high inflation, real income decreases as the price of goods, relative to wages, increases. This has a particularly high impact on individuals that live off minimum or fixed wage, increasing the likelihood for criminal activity.

Ouimet (1999) compares the crime drop in Canada and the US. Similar factors are responsible for the crime drop in both countries. The changing demographics of both countries reduce the number of adolescents, which results in fewer crimes. Furthermore, the 1990s economic expansion resulted in an increase in low-wage jobs for unskilled adolescents. In the US, many argue that increased policing and imprisonment also influence the crime rates. However, this argument is only applicable to the US. Improvements in home and vehicle security have decreased the opportunities for crime and are more likely to explain the crime drop in Canada (Hodgkinson et al., 2016).

It is important to note that the CSI has been increasing again since 2015 (Statistics Canada, 2020). From 2018 to 2019, this increase was mainly driven by increases in police-reported rates of fraud, child pornography, uttering threats, mischief, sexual assault, and shoplifting of CA$5,000 or under. On the other hand, there was a one percent decrease in the rate of break and enter (Moreau et al., 2020). Furthermore, of the three largest provinces in Canada, British Columbia has the highest CSI (Statistics Canada, 2020).

Crime in Vancouver

Vancouver has one of the highest crime rates between the three largest metropolitan areas in Canada. In 2013, Vancouver had 6,897 criminal code offences per 100,000, compared to 2,941 in Toronto, and

4,072 in Montreal. A similar pattern can be found for violent offences, 1,023 per 100,000 persons in 2013 in Vancouver, 749 in Toronto, and 903 in Montreal (Andresen et al., 2017).

III. Literature

In the next section I will be going over the academic literature related to economic circumstances and crime. First, I will go over the rationality of crime and what are known as the main causes of crime. Second, I will explore the relationship between the business cycle and crime. Third, I will analyse the effect of welfare on crime. Finally, I will go into the other papers that investigate IA payment frequency and its effect on substance abuse and criminal activity in Vancouver.

Rationality of Crime

The foundations for the rational choice perspective of crime were laid by Becker (1968) who frames the choice of committing a crime as any other economic choice. If the expected utility of committing a crime is higher than the utility from another activity, the individual will commit the crime. Thus, individuals choose to commit a crime due to a difference in costs and benefits from other individuals who do not choose to commit a crime, not due to a difference in basic motivation. As a result, an individual's probability of committing a crime and the number of crimes committed by the individual depend on the probability of getting caught and convicted, the punishment if convicted, income available in legal and other illegal activities, and the willingness to commit an illegal act. Furthermore, individuals are more likely to commit a crime in the case of a negative income shock. Sjoquist (1973) uses data to empirically test Becker's (1968) model for robbery, burglary, and larceny over $50. He finds that an increase in the probability of getting caught and being convicted results in a decrease in the number of property crimes committed. Similarly, an increase in the cost of crime, the punishment, reduces property crime rates. Ehrlich (1973) goes beyond Becker's 1968 model by incorporating both punishment and reward, instead of the cost of punishment alone. The model assumes legal and illegal activities are not mutually exclusive and predicts the relative extent of the response of specific offenders to changes in several observable opportunities. Furthermore, crimes against property pay in the specific sense that their expected gains are higher than the expected costs at the margin, comparable to legitimate market activities. Ehrlich finds that relative gains of a specific felony are positively related to the rate of the felony. Moreover, the costs associated with a specific felony are negatively related to the rate of the felony.

Benoit and Osborne (1995) study a model where society has two instruments to control crime, punishment severity and social expenditure. The authors argue that, given any punishment, social expenditure increases an individual's disposable income which reduces the difference between the return to market activity and the expected return to crime. This increases the opportunity costs of imprisonment and will help mitigate criminal activity.

Imrohoroglu et al. (2000) construct a general equilibrium model to analyze crime-control policies. Using Becker's 1968 model and Benoit and Osborne's 1995 continuation. They estimate the model using various datasets from the US. The key parameters in the model are the cost of property crime to victims and the consumption value to criminals if caught. They find that higher inequality leads to a higher crime rate, more policing leads to more redistribution, and a low correlation between crime and redistribution.

Another popular explanation of criminal behaviour is the General Strain Theory (GTS) as presented by Agnew (1995) which explains that people feel strain due to events and conditions that are disliked. GTS argues there are various factors that influence an individual's ability to cope with strain through criminal activities. These factors include opportunities for crime, low social control and support, poor coping skills and resources, beliefs favourable to crime, and criminal associates (Agnew, 2001). Agnew (2013) and Thaxton and Agnew (2018) find that criminal behaviour is more likely among individuals will a strong propensity for criminal coping and among gang members.

On the other hand, Lott (1990) argues that the market failure in capital markets, due to bankruptcy and antislavery laws, leads to criminal activity. He states that the criminal justice system can be viewed as a borrower who allows individuals to borrow against their future human capital. Criminal activity gives access to an item now, however the payment will be made in the future when the individual is arrested and goes to prison. The cash constraint imposed by incomplete capital markets affects poor people the most. This in turn could explain the different crime rates between the poor and rich.

Furthermore, more recent literature focusses on the effect of poverty on the cognitive function of individuals. The human cognitive system has a limited capacity, thus being preoccupied by concerns about budgets may leave less cognitive resources available to guide choice and action (Mani et al., 2013). Mani et al. (2013) use sugarcane farmers in India to analyse the effect of being poor. Sugarcane farmers receive their income annually at harvest time; however, they find it hard to smooth income and thus experience poverty before harvest. The authors then measure cognitive abilities after harvest, when the farmers are rich, and before the harvest. They find that when individuals experience poverty it reduces their cognitive ability.

Crime and the Business Cycle

Various studies have researched the effect of the business cycle on property crime. While some of them find a negative relationship between the business cycle and property crime (Allen, 1996, Mohammed & Hosen, 2018, Chiu & Madden, 1998; Fajnzylber et al., 2002), other studies do not find a significant relationship (Mehanna, 2004; Brush, 2007). The relationship between crime and the business cycle can be explained by four reasons according to Cook and Zarking (1985). First, the quality and quantity of legitimate opportunities move with the cycle and could reduce the opportunity cost of time spent on criminal activities or prison. Second, criminal opportunities are countercyclical,

especially the quality. Third, in good economic times more criminogenic commodities are used and sold, for example alcohol and guns, resulting in procyclical crime rate movements. Finally, recessions can hit judicial systems and result in lower prosecution and prevention. However, recessions can also lower the opportunity cost of time for the victims reporting a crime.

Rosenfeld and Fornango (2007) state that 'robbery and property crime are forms of parasitical consumption: offenders subsist directly on the income and the consumption of others.' Furthermore, robbery and property crime rates should increase as legitimate consumption opportunities decline with deteriorating economic conditions. They find that improvements in consumer sentiment reduces the rates of robbery and property crime. Implicating that perceived economic conditions could be more important than objective circumstances in their effect on crime rates. Changes in economic opportunities could affect crime rates, as legitimate consumption opportunities decline, robbery and property crime rates should increase. However, on the other hand, declining economic conditions would decrease rates of robbery and property crime, as potential victims spend more time at home and carry less of value with them outside of the home. Furthermore, most stolen items must be sold on a second-hand market where prices would decrease as economic conditions deteriorate.

Allen (1996) uses time series data from the national Uniform Crime Report from 1959 to 1992 to test the effect of socioeconomic conditions on property crime in the US. He finds that macroeconomic stability, such as inflation and criminal justice system actions, are important in reducing criminal activity. Furthermore, family and community structure have no impact on the property crime trend. However, a decrease in absolute poverty and in general income inequality has the opposite effect. On the other hand, Mohammed and Hosen (2018) use historic data from 1965 to 2016 to find a positive relationship between poverty and property crime in the US. One of main drawbacks of this analysis is the limited sample, and small number of variables. Moreover, Wassie et al. (2020) finds, among a sample of convicted offenders in Ethiopia, that average monthly income does not affect the property crime rates. Yet, the offender's immediate economic situation was found to be a perceived reason in the individual's property crime offending. Important to note is that the authors only look at convicted offenders, which does not paint the full picture. Furthermore, finding a causal relationship between economic conditions and crime can be complicated. For example, there may be an endogenous relationship between poverty and crime. Poverty may lead more people to commit crime, as they look for an alternative source of income. However, crime could also undermine economic stability, investments, and productivity (Papaioannou, 2017).

To control for the possible endogeneity in the crime and poverty relationship Papaioannou (2017) uses rainfall variation as an instrumental variable for rice production in British Colonial Asia to estimate the impact of poverty on different types of crime. He finds that extreme rainfall, resulting in lower rice production and higher poverty, leads to a large increase in property crimes. In the analysis,

the author distinguishes between property crimes like robbery, petty theft, and cattle raiding, and violent crimes such as murder, homicides, and assaults. Papaioannou explains that property crimes would be the main result of 'absolute poverty', where farmers are directly affected by the lower rice production. On the other hand, violent crimes are expected to be the result of 'relative poverty', where rice production drops lead to an increase in inequality. A one standard deviation decrease in annual rice production increases property crime by 21.2 percent, however, it has no effect on violent crimes. Similarly, Mehlum et al. (2006) use rainfall as an instrumental variable for rye prices to estimate its effect on crime rates in 19th century Bavaria, Germany. Rye was the main staple and thus an indicator for the cost of living. Excessive rainfall reduces rye yields and harvests. The authors find that an increase of rye prices by one standard deviation increased property crime by 8 percent. Furthermore, they find a negative relationship between rye prices and violent crime, however, this may be able to be explained through beer prices. High rye prices led to higher beer prices, which decreased beer consumption and reduced violent crime.

Welfare and Crime

The effect of social welfare spending on crime is hypothesised to work in two directions. One school of thought believes that social welfare spending leads to more dependency and laziness due to a decline in intrinsic motivation, which in turn will lead to higher crime rates (Savage et al., 2008). However, due to the often-found positive relation between poverty and crime, (Allen, 1996, Mohammed & Hosen, 2018, Chiu & Madden, 1998; Fajnzylber et al., 2002; Papaioannou, 2017) welfare could reduce crime rates.

Individual's time allocation to legal and criminal activities is affected by welfare programs. Given that poorer individuals are more likely to commit a crime and are more likely to receive welfare, welfare programs are be expected to reduce crime. Zhang (1997) shows this in a simple theoretical economic model of criminal activity, under the assumption that individuals are risk averse and that unsuccessful criminal activity will lead to no welfare being received. The author then uses cross-sectional data from the US for 1987 to support the theoretical model with empirical findings. He finds a significant negative relationship between welfare generosity and crime rates.

Niskanen (1996) finds that a 1 percent increase in the welfare dependent population increases the violent crime rate by about 0.6 percent. He finds that a higher average income reduces violent crime. However, he does not control for the overall poverty rate, which potentially was positively correlated to both the percentage of individuals on welfare and the violent crime rate.

Savage et al. (2008) use a pooled, cross-nation, time-series design to estimate the relationship between welfare spending and crime. They find a negative relationship between social welfare spending and theft and homicide. Moreover, the relationship has diminishing returns on spending. The authors mention that their results suggest that crime control through social welfare spending is extremely

costly. Comparing different countries, they find that a 10 percent increase in social welfare spending reduces theft rates by 2.3 percent and homicide rates by 3.3 percent. Back of the envelope calculations lead them to conclude that, on average, each theft prevented by higher social welfare spending cost US$153,000 and each homicide prevented cost US$57.6 million. Likewise, DeFornzo and Hannon (1998) find that while controlling for various social structural factors, welfare aid reduces homicide rates in the US.

Fishback et al. (2010) analyze the relationship between relief spending and crime in 81 US cities during the Great Depression, 1930 to 1940. As the authors' state, testing whether New Deal relief alleviated theft 'to keep from starving'. In their analysis, the authors look at the effect of welfare relief on property crime, where they include robbery, burglary, larceny, and motor vehicle theft. Even though robbery is defined by the Federal Bureau of Investigation as a violent crime, here it is included in property crime since it is committed to obtain something of value. The authors find that a 10 percent increase in per capita relief spending decrease property crime rates by 1.5 percent. However, the authors mainly accredit this to the work relief programs, since work relief reduced the amount of free time for recipients.

Loureiro (2012) studies the effect of a Conditional Cash Transfer (CCT) program on crime rates in Brazil. CCTs substantially increase income for the poorest individuals who are more likely to be involved in criminal activities due to the lower opportunity costs. The program increases the opportunity costs of the recipient which in turn affects the probability of the individual committing a crime. The author finds that CCTs contribute to a decrease in robbery, theft, and kidnapping rates. However, the results are not robust to different specifications. It is important to note that even with the CCT, families live below the poverty line, thus they may still feel the need to supplement their income with illegitimate activities.

Instead of looking if overall increase in welfare decrease crime rates, Foley (2008) tests the effect of time passed since a welfare payment has occurred, on criminal activity. He finds an increase in criminal activity, further into the welfare payment cycle. If individuals do not smooth consumption but exhaust their income relatively quickly, they may turn to crime to supplement the income. Additionally, these individuals are unlikely to have access to savings or credit and are thus not able to supplement their income in case of a temporary cash shortfall. The increase is seen in crimes with a direct financial motivation; burglary, larceny-theft, motor vehicle theft, and robbery. The author's analysis covers 12 cities in the United States (US), where more than ten percent of the population receives payments from the Food Stamp program. The author finds that payment frequency influences crime levels, and suggests that staggered, frequent payments would smooth levels of crime.

Like Foley (2008), I will be looking if IA influences crime rates. Specifically, if the payments supplement income enough for individuals to restrain them from committing illegal activities.

However, I will use the exogeneity of payment dates to analyse if an increase in time between payment dates influences criminal activity. My contribution to this subject will be regarding an exogenous increase in time between payments dates and its effect on crime rates, thus not only looking at the effect of being further away from the payment date.

The Effects of the Frequency of Income Assistance Payments

Following the Life-Cycle/Permanent Income Hypothesis (LCPIH), predictable changes in income should have no effect on consumption (Hall, 1978). Thus, predictable income receipt, like income assistance, should not affect an individual's consumption levels. However, there seems to be a large sensitivity to temporary income that cannot be explained by the Permanent Income Hypothesis. This can, however, be explained by a significant share of the consumers being hand-to-mouth consumers. Who have a high marginal propensity to consume out of temporary income changes and deplete all their available resources in each payment period (Kaplan et al., 2014). The hand-to-mouth theory explains individual's behavioural changes with respect to Income Assistance payments better.

Stephens (2003) finds that for households where Social Security is a significant portion of their income, consumption increases between 7- and 20 percent the week after Social Security is received. Moreover, these increases were larger the day of and the day after receiving the income.

Similarly, in Vancouver, IA payments affect individual's behaviour. Various studies have been done to analyse the effect of IA payments on drug use (Wang et al., 2017; Richardson et al., 2021), overdoses (Riddell & Riddell, 2006; Zlotorzynska et al., 2014), and mental health apprehensions by police (Pickett et al., 2015) in Vancouver. Wang et al. (2017) find an increase in drug usage following IA payments, and a decrease in drug usage in the 7-10 days prior to the payment date. The authors state that even though welfare payments could reduce harm to the individual's health from extreme poverty, it may also unintentionally increase drug related harm. Zlotorzynska et al. (2014) analyse the effect of IA payments on drug overdoses and find that the risk of injections resulting in overdose doubled during the three days from the IA payment date. Furthermore, the total number of injections simultaneously increases. Pickett et al. (2015) find an increase in mental health apprehensions by the police in the seven days following IA payments, compared to other days of the months. Additionally, in the same period, the number of mental health and substance related arrivals to emergency departments increases.

Richardson et al. (2021) analyse the effect of different payment schemes on the usage of illicit drugs. The authors designed a randomised experiment where participants were enrolled in one of three groups. A control group that received payments according to the government payment schedule, a staggered group where participants received single desynchronised payments, and a split staggered group where participants received their income assistance split twice a month. The authors find that

participants in the split staggered payment group showed a reduced likelihood of increased drug use corresponding with IA payment dates compared to the control group.

These studies all suggest that individuals who receive IA change their behaviour and increase consumption immediately after a payment date. This is not in line with the permanent income hypothesis, as individuals do respond to receiving predictable income, but more in line with the hand-to-mouth consumers. This lack of income smoothing is very relevant to my analyses as it may result in individuals running out of money before the next payment, and supplementing income with crime. Individuals impulsive consumption behaviour after receiving a payment may be more problematic when the time between payments is increase by a week. Thus, resulting in higher crime rates in the fifth week of a five-week period.

IV. Data

The purpose of this analysis is to analyse whether an exogenous increase in the time between payment dates for income assistance and disability insurance affects the number of property crimes committed. The data used for this analysis is from the Vancouver Police Department and the Government of British Columbia. The VPD dataset contains data on crimes committed in Vancouver, and the payment dates are from the Government of British Columbia.

Payment dates for income assistance and disability insurance are provided by the government of British Columbia (Ministry of Social Development and Poverty Reduction, 2021b). This dataset contains an overview of the payment dates for income assistance and disability insurance from January 2003 until January 2021.

The VPD data can be downloaded freely from geodash.vpd.ca/opendata/. The dataset covers microdata from January 2003 until March 2021. Every crime reported in the jurisdiction of the VPD is recorded in this dataset. The data includes information on the type of crime, the date and time of the crime, the block the crime is committed on, and the neighbourhood. The dataset is updated every week. This dataset does not include the total number of calls or complaints made to the VPD. The data produced is based upon information from the VPD Records Management System. Importantly, all data provided is based on ‘Occurred Time’, the date and time an incident took place, and not ‘Reported Time’, the time an incident was reported.

The amount of crime reported does not paint the full picture. Not all crimes are reported to the police, and the most important reason for not reporting a crime was that victims did not consider the crime to be important enough. Other reasons for a victim to not report a crime included feeling that the police could not have done anything, or that the crime was dealt with in another way (Boyce et al., 2014). Approximately 31 percent or one-third of the crimes committed in Canada are reported to the police. This estimate arises when comparing the Uniform Crime Reporting (UCR) Survey and the General

Social Survey (GSS) on Victimization. The UCR is based on police reported data, whereas the GSS is based on information from a sample of the Canadian population aged 15 and over and conducted every five years. The percentage of crimes reported to the police differs with type of crime, e.g., only 12 percent of sexual assaults committed against Canadians aged 15 and over are reported to the police (Boyce et al., 2014). In their 1990 paper, van Dijk et al. estimate that Canadians report approximately 80 percent of burglaries, between 55 and 60 percent of robberies, and over 80 percent of car thefts. Furthermore, Farrell and Brantingham (2013) found that in 2009, according to the General Social Survey, 54 percent of burglaries, 50 percent of vehicle thefts, 43 percent of robberies, 34 percent of assaults, and approximately 25 percent of thefts were reported to the police. This is slightly different from what the International Crime Victims Survey finds.

The VPD dataset includes non-violent and violent crimes. Non-violent crimes include break and enter commercial, break and enter residential/other, other theft, theft from a vehicle, theft of a bicycle, and theft of a vehicle. Non-violent crimes will from now on be referred to as property crimes, in line with the academic literature on the subject. Violent crimes include homicide, mischief, and offence against a person. The data set also includes vehicle collision or pedestrian struck with fatality, and vehicle collision or pedestrian struck with injury.

The VPD uses the following descriptions for the type of criminal activity (Vancouver Police Department, 2021a):

- BNE Commercial, Commercial Break and Enter: ‘Breaking and entering into a commercial property with intent to commit an offence.’
- BNE Residential/Other, Residential Break and Enter: ‘Breaking and entering into a dwelling/house/apartment/garage with intent to commit and offence.’
- Vehicle Collision or Pedestrian Struck with Fatality: ‘Includes primarily pedestrian or cyclist struck and killed by a vehicle. No neighbourhood information.’
- Vehicle Collision or Pedestrian Struck with Injury: ‘Includes all categories of vehicle involved accidents with injuries. This includes pedestrian and cyclist involved incidents with injuries. No neighbourhood information.’
- Homicide: ‘A person, directly or indirectly, by any means, causes the death of another person.’ No time, neighbourhood, or hundred block information included.
- Mischief: ‘A person commits mischief that willfully causes malicious destruction, damage, or defacement of property. This also includes any public mischief toward another person.’
- Offence Against a Person: ‘An attack on a person causing them harm that may include usage of a weapon.’ No time, neighbourhood, or hundred block information included.
- Other Theft: ‘Theft of property that includes personal items (purse, wallet, cellphone, laptop, etc.), bicycle, etc.’

- Theft from Vehicle: ‘Theft of property from a vehicle.’
- Theft of Vehicle: ‘Theft of a vehicle, motorcycle, or any motor vehicle.’
- Theft of Bicycle: ‘Theft of a bicycle.’ No neighbourhood information.

I will use property crime to analyse the effect of a time difference between IA payment dates. Property crime contains break and enter commercial, break and enter residential/other, other theft, theft from vehicle, theft of vehicle, and theft of bicycle. I expect to see the effect of a difference in payment dates mainly in property crime, as a lower income can force people into committing financially beneficial crimes to supplement their income.

This analysis will be made over data starting from January 22nd, 2003 to January 12th, 2021. Income assistance and disability insurance payments are made once a month on a Wednesday. The dataset for this analysis will be set up by week, each week starting on Wednesday and ending on Tuesday. This ensures that the payment will be on the first day of the week. The 22nd of January 2003 is a payment day and will be the start of the first week for this analysis. The data has been aggregated by day for each type of crime and neighbourhood, and thereafter by week. I have assigned each week a unique number, running from 1 to 938. I created a variable that indicates if the date is in the first, second, third, fourth, or fifth week from the payment date. Furthermore, I generated a variable that sums the total number of crimes in a week, the total number of violent crimes, and the total number of property crimes. Violent crime includes homicide, mischief, and offence against a person. The ‘Vehicle Collision’ variable sums vehicle collision or pedestrian struck with fatality, and vehicle collision or pedestrian struck with injury. The theory predicts that, through poverty, there will be an increase in property crime in the weeks closer the next payment date, which should be especially clear in the fifth week of the five-week period. However, this should not affect violent crimes and vehicle collisions since these crimes do not have an immediate financial benefit. To test for the mechanism that property crimes are affected by poverty, I will use the vehicle collision and violent crime variables.

I generated several dummy variables for the analysis. ‘Payment’ has been created to indicate if a week included a payment day. ‘Five Weeks’ indicates if a week was part of the ‘treatment’, with treatment being a part of a five-week period between payment dates. Furthermore, I generated a dummy variable to indicate which week each week is. Thus, if a week was week one, two, three, four, or five in the payment period, and if the week was part of the treatment or control period. Here, ‘Week3T’ refers to the third week of a treatment period.

To analyse if the median income level of a neighbourhood has an impact on the crime rates, I have added a median split dummy. I have added an additional dummy if the level of low-income households in a neighbourhood is greater than 20 percent. More information on the median income level and percentage of low-income household per neighbourhood can be found in Appendix Table 1. Furthermore, Figure 1 and Table 2 in the appendix provide some additional information on the

neighbourhoods in Vancouver. Appendix Figure 1 is a map of Vancouver which includes all the neighbourhoods. Appendix Table 2 gives a snapshot of crime levels per 10,000 by neighbourhood for 2016. Appendix Figures 4 and 5 show the crime levels split by average median income and low-income households.

To control for seasonal or year effects, each week number has been assigned a month or a year. Because months and years start on random days, the week was assigned the month or year that would have the majority (>4) of days in the week.

In total, there are 335 weeks that fall into the five-week periods, and 496 that fall into the four-week period. There are two periods in the dataset where the time between two payment dates is three weeks, between the 26th of November 2003 and the 16th December 2003, and between the 24th of November 2010 and the 15th of December 2010. Not having a payment date on Christmas is the most likely reason for these three-week periods. There are 216 payments dates in the 18 years that are included in the analysis. On average over 800 crimes are reported in a week, of which 636 are property crimes and 167 are violent crimes. The most common crime committed is 'Theft from Vehicle', with 'Other Theft' being a close second. The least likely form of reported property crime is 'Theft of Bicycle'.

The total amount of reported crime in Vancouver has been decreasing until the 400th week, in 2011, see figure 1. After 2011 there has been a slight increase in the amount of reported crimes. With a decrease around the 800th week, in 2020, which was mainly driven by a decrease in property crimes. The decrease can mainly be explained by the Covid-19 pandemic. Thefts from vehicles declined by 40.1 percent because businesses were closed, people were driving less during the initial months of the pandemic, and there were fewer parked vehicles to be the target of theft. Since theft from vehicle made up 28.8% of property crimes, a large decrease in this type of property crime will decrease overall property crime (Vancouver Police Department, 2021b).

The large spike is the result of the Vancouver Riots on the 15th of June 2011, which were a reaction to the Vancouver Canucks losing the National Hockey League finals. This led to a spike in violent crimes reported on that day. To ensure this does not bias the result, I will also be running regressions excluding this week as a robustness check.

Figures 2 shows the development of total crimes in Vancouver by year. Where a large drop can be seen between 2005 and 2011 and an increase after that. From Figures 3 and 4, this is drop was mainly the result of a drop in property crimes, whereas violent crimes stay more stable over the years. Figure 5 shows the development of all types of property crime per year. The total crime figure is most like the trend in theft from vehicle. Which is in line with theft from vehicle represents a large part of crimes committed (Vancouver Police Department, 2021b). Figure 6 shows the average number of property crimes per week based on how far a week is from the payment date.

Table 1. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Payment Week	938	.23	.421	0	1
Week Since Payment	938	2.699	1.271	1	5
5 Week Period	938	.405	.491	0	1
Break and Enter Commercial	938	44.918	15.267	16	212
Break and Enter Residential	938	72.892	30.693	11	180
Homicide	938	.291	.562	0	3
Mischief	938	96.764	23.6	54	482
Offence Against a Person	938	70.446	13.386	41	126
Other Theft	938	202.009	33.621	69	298
Theft from Vehicle	938	236.027	77.919	87	518
Theft of Vehicle	938	44.92	34.335	6	153
Theft of Bicycle	938	35.472	22.477	2	135
Vehicle Collision Fatality	938	.317	.583	0	4
Vehicle Collision Injury	938	28.015	8.56	5	62
Total Crime	938	832.07	167.462	480	1361
Total Property Crime	938	636.238	152.209	282	1108
Total Violent Crime	938	167.501	28.009	109	578
Vehicle Collision	938	28.332	8.628	5	62
Week1T	938	.081	.273	0	1
Week2T	938	.081	.273	0	1
Week3T	938	.081	.273	0	1
Week4T	938	.081	.273	0	1
Week5T	938	.081	.273	0	1
Week1C	938	.149	.357	0	1
Week2C	938	.149	.357	0	1
Week3C	938	.149	.357	0	1
Week4C	938	.147	.354	0	1
Vancouver Riots	938	.001	.033	0	1

Figure 1. Total Crimes by Week

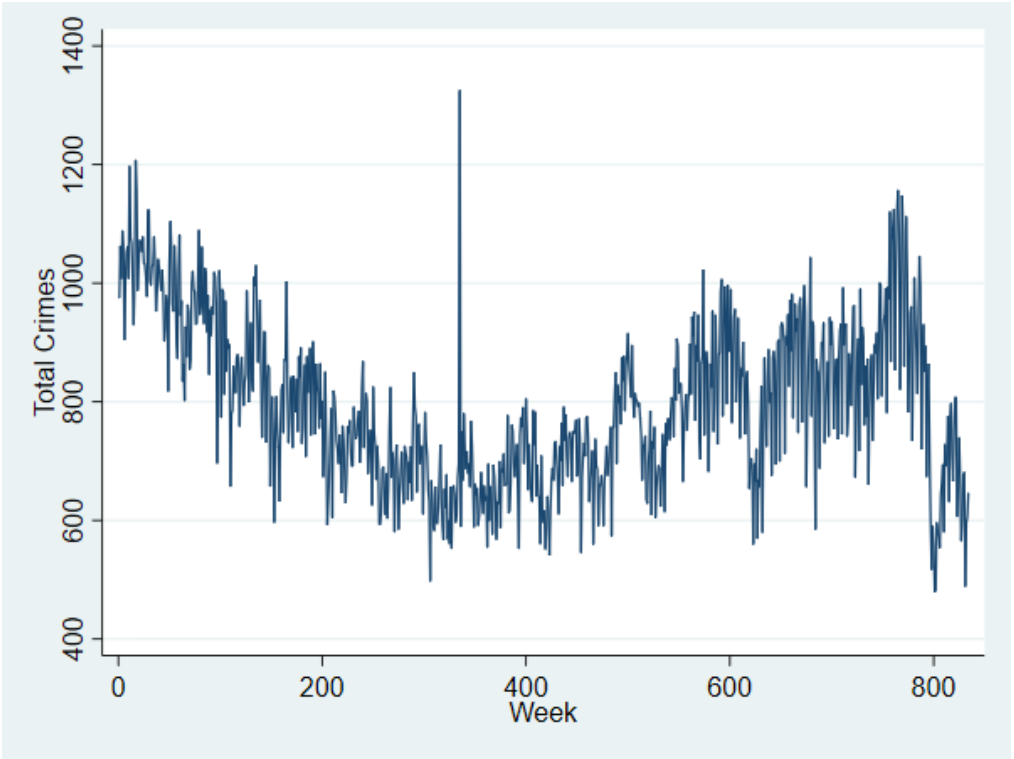


Figure 2. Total Crimes by Year

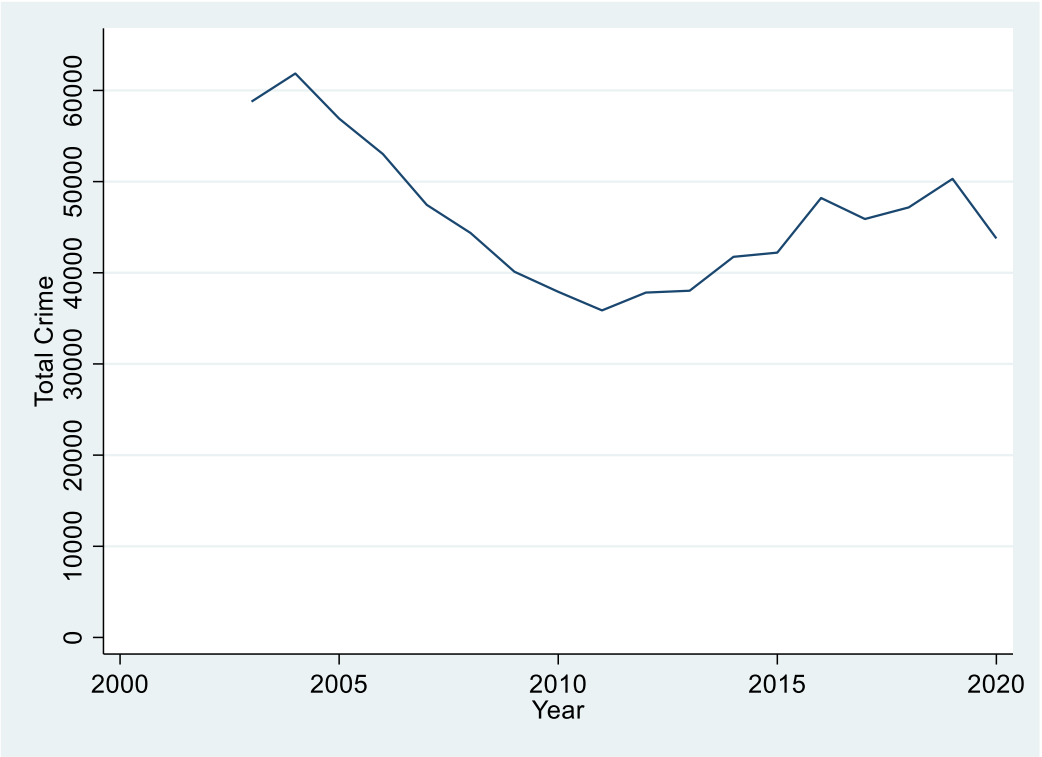


Figure 3. Total Property Crimes by Year

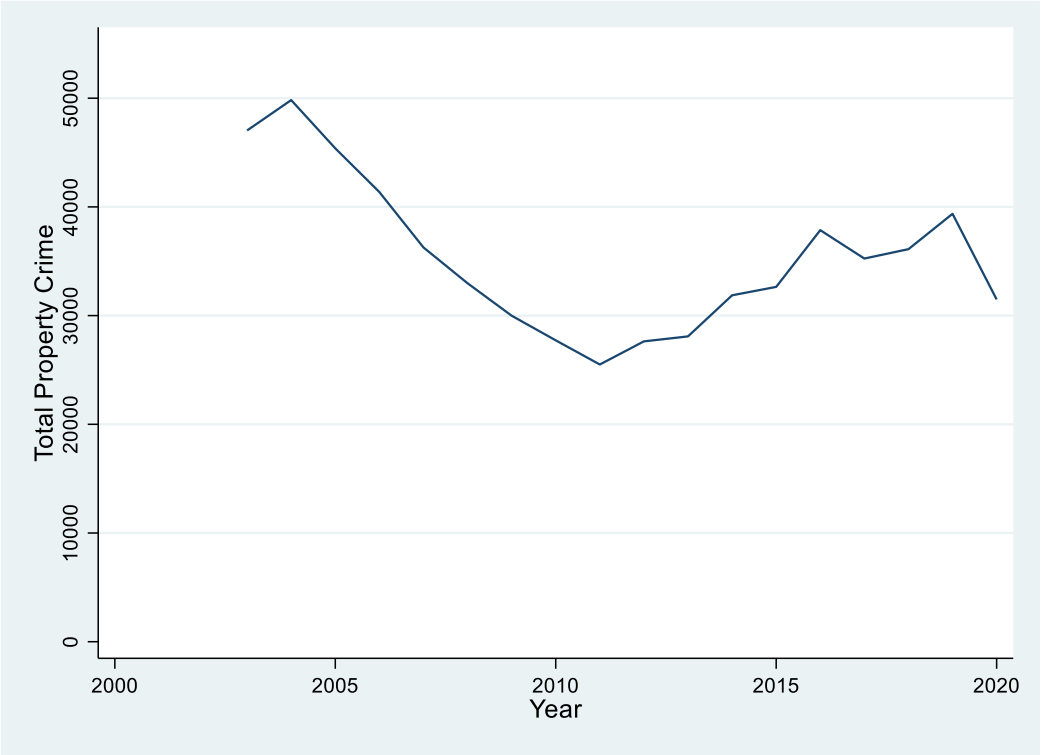


Figure 4. Total Violent Crimes by Year

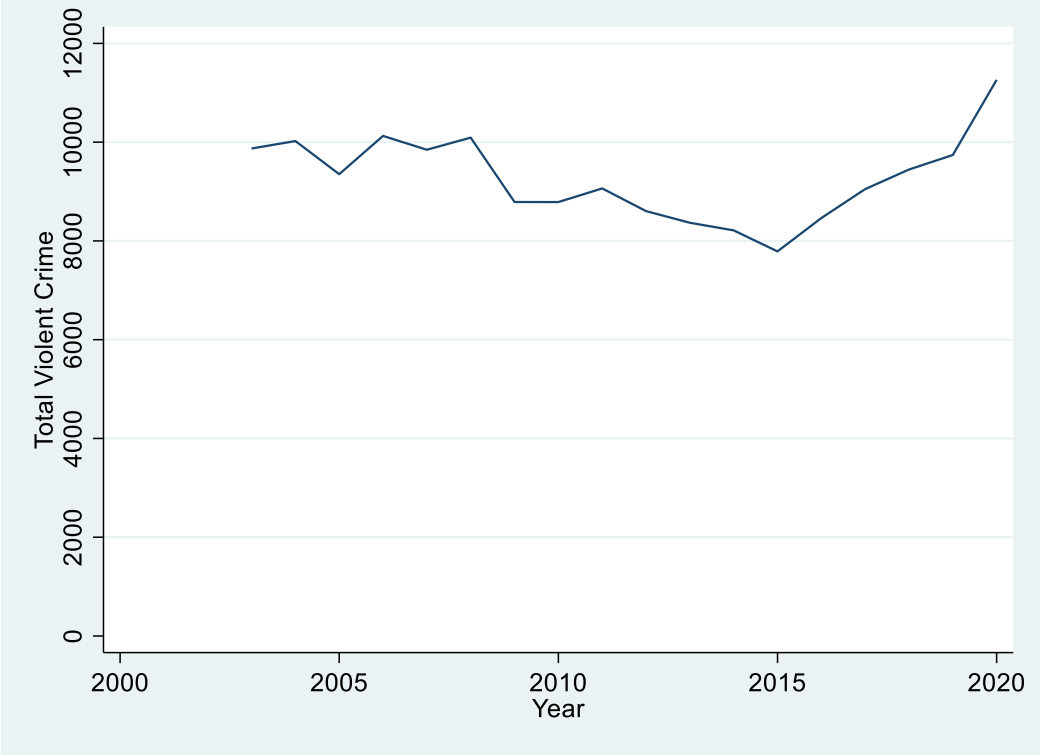


Figure 5. Property Crimes by Year

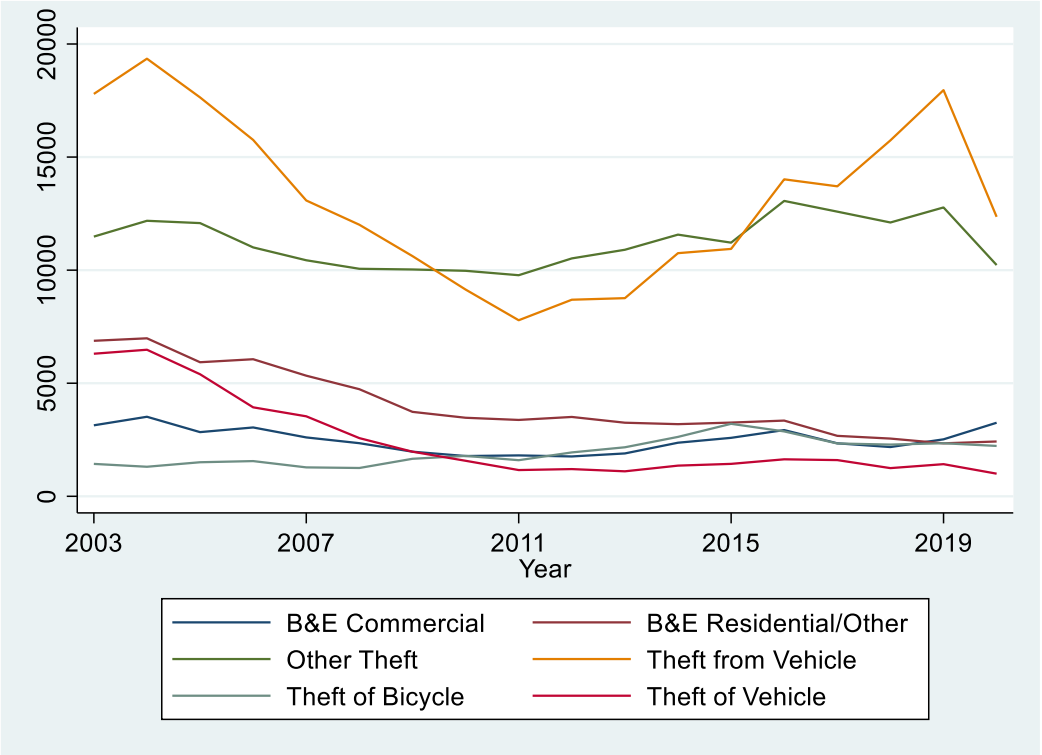
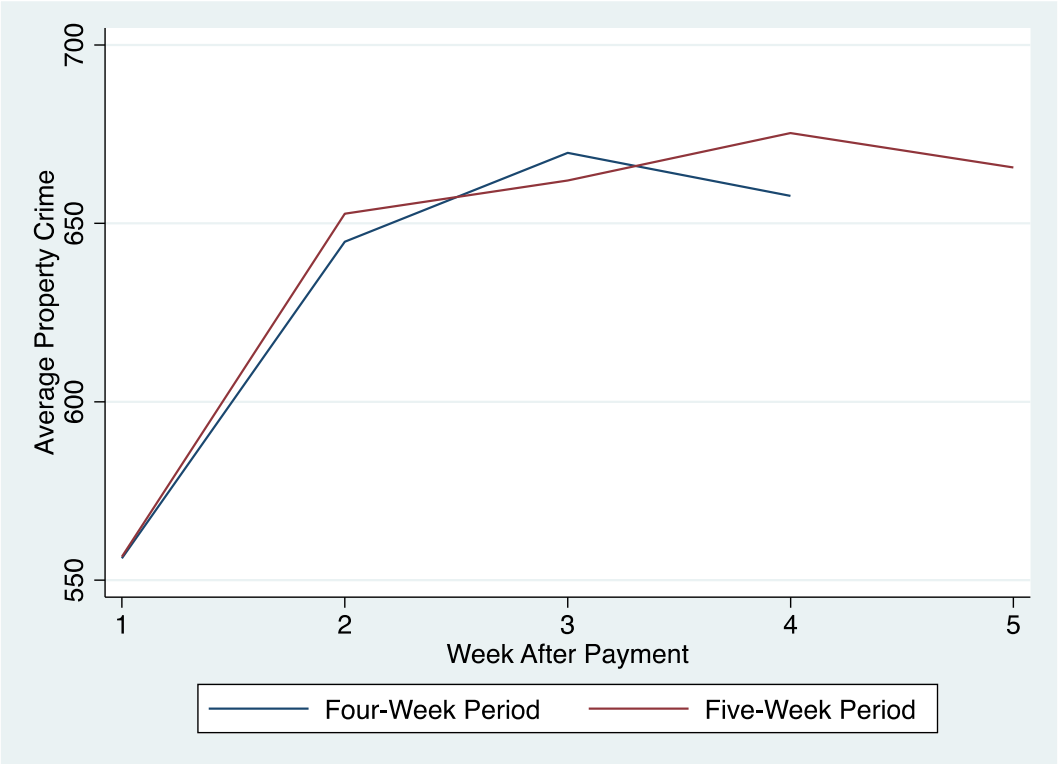


Figure 6. Average Number of Property Crimes per Week by Week from Payment Date



V. Methodology

Monthly IA payments are predictable and exogenously determined, thus not including endogeneity which is expected in other income generating activities (Wang et al., 2017). Due to the nature of the payment system set up by the BC government, payments are once a month on a Wednesday and the time between payments varies between four and five weeks. If people are not aware of the time until the next payment, the likelihood that people will run out of money increases. This can force people into committing petty thefts to supplement the income. The permanent income hypothesis says that these temporary income changes should not affect consumption, thus no effect would be expected to be seen in the fifth week of a five-week period. However, if the majority of IA receiving individuals are hand-to-mouth consumers, sensitive to temporary income changes, an unexpected fifth week between payment dates would lead to a lack of income. Here, I would expect to see an increase in crime rates in the fifth week of a five-week period, as individuals try and supplement their incomes. On the other hand, if individuals are aware of the variation in payment dates and know their decreased daily budgets in a five-week period, there could be an overall increase in property crime levels of the entire five-week period.

To analyse the difference between crime rates in the four-week and the five-week periods. I will run an OLS regression comparing the treatment and the control group. I will only include the effect on property crimes, as the purpose of this analysis is to investigate if people feel forced to supplement their income with theft. Property crimes, compared to violent crimes, have a higher financial benefit.

The following OLS regression will be used to estimate the effect:

$$(1)\ Total\ Property\ Crime_w = \beta_0 + \beta_1 Fiveweeks_w + \beta_3 Month_w + \beta_4 Year_w + \varepsilon_w$$

Where w refers to the week and β_1 estimates the effect of an additional week between income assistance payment dates on the non-violent crime rate. The month and year variables will be included to control for seasonal effects and possible trends in crime.

The following two regressions will be used to test the effect of the fifth week in a five-week period.

$$(2)\ Total\ Property\ Crimes_w = \beta_0 + \beta_1 Week5_{Tw} + \beta_2 Week4_{Tw} + \beta_6 Week4_{Cw} + \beta_{10} Month_w + \beta_{11} Year_w + \varepsilon_w$$

Where w refers to the week and β_1 estimates the effect of an additional week between income assistance payment dates on the non-violent crime rate. T refers to a week being a part of the treatment group, a five-week period. C refers to a week being a part of the control group, a four-week period. The month and year variables will be included to control for seasonal effects on crime.

Next, I will run a regression with all other weeks as controls.

$$(3)\ Total\ Property\ Crimes_w = \beta_0 + \beta_1 Week5_{Tw} + \beta_2 Week4_{Tw} + \beta_3 Week3_{Tw} + \beta_4 Week2_{Tw} + \beta_5 Week1_{Tw} + \beta_6 Week4_{Cw} + \beta_7 Week3_{Cw} + \beta_8 Week2_{Cw} + \beta_9 Week1_{Cw} + \beta_{10} Month_w + \beta_{11} Year_w + \varepsilon_w$$

Where w refers to the week and β_1 estimates the effect of an additional week between income assistance payment dates on the non-violent crime rate. T refers to a week being a part of the treatment group, a five-week period. C refers to a week being a part of the control group, a four-week period. The month and year variables will be included to control for seasonal effects and possible trends in crime.

To ensure that the mechanism poverty leads to property crimes holds, I will run the following regressions. The first will be run on the vehicle collision variable, which sums vehicle collisions with both injury and fatality. The second on violent crimes.

$$(4)\ Vehicle\ Collision_w = \beta_0 + \beta_1 Week5_{Tw} + \beta_2 Week4_{Tw} + \beta_3 Week3_{Tw} + \beta_4 Week2_{Tw} + \beta_5 Week1_{Tw} + \beta_6 Week4_{Cw} + \beta_7 Week3_{Cw} + \beta_8 Week2_{Cw} + \beta_9 Week1_{Cw} + \beta_{10} Month_w + \beta_{11} Year_w + \varepsilon_w$$

$$(5)\ Total\ Violent\ Crimes_w = \beta_0 + \beta_1 Week5_{Tw} + \beta_2 Week4_{Tw} + \beta_3 Week3_{Tw} + \beta_4 Week2_{Tw} + \beta_5 Week1_{Tw} + \beta_6 Week4_{Cw} + \beta_7 Week3_{Cw} + \beta_8 Week2_{Cw} + \beta_9 Week1_{Cw} + \beta_{10} Month_w + \beta_{11} Year_w + \varepsilon_w$$

Where w refers to the week and β_1 estimates the effect of an additional week between income assistance payment dates on the non-violent crime rate. The month and year variables will be included to control for seasonal effects and possible trends in crime.

To analyse the effect of neighbourhood income levels, I will also run Regression 2 while splitting the sample. First, I will split the sample by median income, thus neighbourhoods below and above the median income per neighbourhood in Vancouver. Second, I will split the sample by the percentage of low-income households in a neighbourhood, above or below 20 percent. I will also run Regression 2 with neighbourhood fixed effects.

VI. Results

The results from Regression 1 are summarized in Table 2. When controlled for year and month effects the five-week period significantly increases the total property crime levels, at a ten percent level. However, the coefficient itself barely changes. The five-week period increase amount of property

crimes by 10.39. This is approximately seven percent of the total standard deviation of property crime (Table 1). Thus, there is an effect of the five-week period on the property crime levels.

Table 2. Regression 1 – Five Week Period on Property Crime

	(1)	(2)
	Total Property	Total Property
VARIABLES	Crime	Crime
5 Week Period	10.43	10.39*
	(10.21)	(5.365)
Constant	632.0***	877.5***
	(6.318)	(14.74)
Observations	938	938
R-squared	0.001	0.747
YEAR FE	NO	YES
MONTH FE	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 summarizes the results of Regression 2 and 3. Here I look at the effect of the fifth week in a five-week period on the level of total property crime. The fifth week is significant in all the columns; however, the coefficient changes depending to which week the fifth week is compared. The effect of being in the fifth week in a five-week period is larger than the effect of the fourth week in a four-week period. As can be found in column 8 in Table 3, being in the fifth week increase the number of property crimes in a week by 111.5 compared to the levels in week one of a four-week period. The fourth week of a four-week period increase the number of property crimes by 108.7. The standard deviation of property crime is 152.21 (Table 1), thus the increase in the number of property crime in the fifth week of a five-week period is approximately 73 percent of the standard deviation. Furthermore, the mean value of property crimes reported per week is 636.24 (Table 1), making the increase in the number of property crimes in the fifth week of a five-week period approximately 17.5 percent. A Wald test shows that the coefficients of the weeks, excluding the first week of a four-week period, are not equal. The p-value is 0.0000.

However, the second to last week in both the four-week and the five-week periods have a larger coefficient for the number of property crimes committed. In Table 2 these are 'Week4T' and 'Week3C'. The coefficient for the fourth week of a five-week period is 121.2 and the coefficient for the third week of a four-week period is 122.3. Yet, since there is not exogenous variation here, we cannot conclude anything about causality.

Furthermore, the first week in a five-week period has a larger effect on the property crime levels than the first week of four-week period. The coefficient of 'Week1T' implies that the number of property

crimes is increased by 8.181 compared to the first week of the control period. However, the coefficient is not significant. Thus, we cannot reject the hypothesis that the effect of the first week in a five-week period compared to the first week in a four-week period is equal.

Nevertheless, the fact that the other weeks are both statistically and economically significant, with the average number of property crimes being 636 a week, supports the hypothesis that IA receivers do respond to the payment received. In both the four- and five-week periods the first week has a significantly lower level of property crime, and all the other weeks have a relatively high effect on crime. Thus, the results found in Table 2 can be explained by the fact that in the five-week periods there are relatively more weeks with higher crime levels. It could be, as found in Foley (2008), that spending increases immediately after receiving the payment. If individuals exhaust the income rapidly, they may feel the need to supplement their income with property crime in the second or third week.

Controlling for year and month fixed effects does not affect the coefficients of the weeks in most of the columns. Only in the column 8 the coefficients for all the weeks increase. Furthermore, adding the controls increase the R-squared, indicating a better fit for the model. A residuals plot of the regression in column 8 can be found in Appendix Figure 3.

In Appendix Table 3, the results can be found where the week the Vancouver Riots of 2011 occur is excluded, however, the effect of the Vancouver Riots on property crime seems negligible.

Appendix Tables 4, 5, 6, 7, 8, and 9 summarize the results of Regression 2 and 3 for the specific types of property crimes. The highest effects can be found for 'Theft from Vehicle', however, for all other types of property crime the results are still significant. For 'Theft of Vehicle', week 5 is not significant which is interesting. Of all the property crimes, this would be the largest crime as more planning would likely go into stealing a car versus stealing something from a car, or from a store for that matter. Thus, car theft may be more of an organized crime and thus not influenced as much by a temporary lack of income.

Table 4 and 5 summarize the results of Regressions 4 and 5. The significant effect of the later weeks has disappeared when looking at the effect of vehicle collisions and violent crimes. Furthermore, all the coefficients are negative compared to the first week of the control period. Weeks have no significant effect on the number of violent crimes, none of the coefficients are significant. Thus, the mechanism that is found between the IA payment dates and crime, for property crime, is not found for violent crime or vehicle collisions. Providing evidence that property crime rates are affected by IA payment dates. Both regressions can also be found in the appendix (Tables 10 and 11) where the Vancouver Riots are excluded. Similarly, as for property crimes, the Vancouver Riots have a negligible effect on the vehicle collision and violent crimes.

Table 3. Regression 2 & 3 – Week Effects on Property Crime

VARIABLES	(1) Total Property Crime	(2) Total Property Crime	(3) Total Property Crime	(4) Total Property Crime	(5) Total Property Crime	(6) Total Property Crime	(7) Total Property Crime	(8) Total Property Crime
Week5T	41.99**	40.59***	63.68***	63.37***	109.4***	108.6***	109.5***	111.5***
	(18.00)	(8.037)	(18.44)	(8.221)	(19.38)	(8.278)	(20.39)	(8.742)
Week4T	51.65***	50.25***	73.34***	73.03***	119.0***	118.3***	119.2***	121.2***
	(18.36)	(8.174)	(18.79)	(8.370)	(19.71)	(8.451)	(20.71)	(8.899)
Week4C	34.06**	35.69***	55.75***	58.30***	101.4***	105.8***	101.6***	108.7***
	(13.66)	(6.619)	(14.23)	(6.879)	(15.41)	(7.000)	(16.67)	(7.503)
Week3T			60.04***	59.72***	105.7***	105.0***	105.9***	107.9***
			(19.04)	(8.769)	(19.95)	(8.864)	(20.94)	(9.328)
Week3C			67.82***	71.80***	113.5***	119.4***	113.7***	122.3***
			(14.60)	(6.672)	(15.76)	(6.812)	(16.99)	(7.358)
Week2T					96.45***	102.2***	96.61***	105.3***
					(20.23)	(8.512)	(21.20)	(9.013)
Week2C					88.58***	89.76***	88.74***	92.58***
					(15.23)	(6.268)	(16.50)	(6.819)
Week1T							0.452	8.181
							(19.90)	(8.382)
Constant	623.6***	867.0***	601.9***	844.6***	556.3***	804.4***	556.1***	801.5***
	(6.014)	(14.13)	(7.187)	(13.48)	(9.295)	(12.85)	(11.25)	(13.19)
Observations	938	938	938	938	938	938	938	938
R-squared	0.016	0.761	0.044	0.792	0.086	0.836	0.086	0.836
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Regression 4 – Week Effect on Vehicle Collison

VARIABLES	(1) Vehicle Collision	(2) Vehicle Collision
Week5T	-0.0996	0.569
	(1.196)	(0.903)
Week4T	-0.968	-0.299
	(1.229)	(0.927)
Week4C	-1.001	-0.947
	(1.059)	(0.763)
Week3T	-2.810**	-2.141**
	(1.140)	(0.912)
Week3C	-1.021	-1.031
	(1.048)	(0.772)
Week2T	-2.810**	-2.643***
	(1.241)	(0.920)
Week2C	-1.207	-1.387*
	(1.059)	(0.774)
Week1T	-0.929	-0.575
	(1.222)	(0.895)
Constant	29.43***	35.17***
	(0.742)	(1.332)
Observations	938	938
R-squared	0.010	0.471
YEAR FE	NO	YES
MONTH FE	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Regression 5 – Week Effect on Total Violent Crime

VARIABLES	(1) Total Violent Crime	(2) Total Violent Crime
Week5T	0.553	0.662
	(3.377)	(2.779)
Week4T	-2.960	-2.851
	(4.111)	(3.363)
Week4C	1.229	2.068
	(4.125)	(3.780)
Week3T	0.408	0.518
	(3.562)	(2.863)
Week3C	0.443	1.402
	(2.941)	(2.333)
Week2T	3.119	4.406
	(3.618)	(2.999)
Week2C	1.150	1.861
	(2.865)	(2.394)
Week1T	-4.158	-2.287
	(3.272)	(2.543)
Constant	167.3***	182.4***
	(2.071)	(4.322)
Observations	938	938
R-squared	0.004	0.306
YEAR FE	NO	YES
MONTH FE	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Crime levels differ per neighbourhood. Property crime levels are on average higher for neighbourhoods that have an average income below the median in Vancouver, and for neighbourhoods that have more 20 percent of households being low income. Appendix Figures 4 and 5 show the property crime levels from 2003 to 2020 comparing neighbourhoods with different income levels. The figures also give an indication that property crime levels in neighbourhoods with higher income levels are more stable from 2003 to 2020 compared to property crime levels in neighbourhoods with lower income levels.

Table 6 and 7 summarize the results from Regression 3 using a sample split based on neighbourhood characteristics. Table 6 uses the 'Median Income', a dummy for neighbourhoods that have an income below the median in Vancouver. The first column summarizes the regression results for neighbourhoods with incomes that are above the median in Vancouver. The second column summarizes the regression results for neighbourhoods with income levels below the median in

Vancouver.[1] Compared to the average of all other weeks, property crime rates in the fifth week of a five-week period are significantly higher in neighbourhoods with lower household incomes. Furthermore, the coefficients for all weeks are higher in the neighbourhoods with lower income levels. However, the constant for neighbourhoods with lower median income is also higher. The fifth week in a five-week period in neighbourhoods with higher incomes increases property crimes by 2.184, or approximately 11 percent compared to the first week of a four-week period. The fifth week in a five-week period in neighbourhoods with lower incomes increase property crimes by 6.946, or approximately 15 percent compared to the first week of a four-week period. Thus, the increase in property crime in the fifth week of a five-week period is higher for neighbourhoods with lower household incomes.

Table 6. Total Property Crime – Split by Median Income Neighbourhood

	(1)	(2)
	Total Property	Total Property
VARIABLES	Crime	Crime
Week5T	2.184***	6.946***
	(0.568)	(1.892)
Week4T	3.310***	8.902***
	(0.599)	(1.961)
Week4C	2.330***	6.708***
	(0.460)	(1.529)
Week3T	6.045***	16.06***
	(0.701)	(2.243)
Week3C	5.099***	13.80***
	(0.511)	(1.704)
Week2T	2.350***	6.094***
	(0.574)	(1.844)
Week2C	3.692***	9.781***
	(0.490)	(1.562)
Week1T	0.161	0.342
	(0.528)	(1.634)
Constant	19.83***	46.19***
	(1.091)	(2.977)
Observations	12,194	11,256
R-squared	0.069	0.036
Median Income	0	1
YEAR FE	YES	YES
MONTH FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[1] Adding neighbourhood fixed effects to the regression does not change the results.

Table 7 summarizes the result from Regression 3 which uses the low-income dummy variable, which indicates if the percentage of low-income households in a neighbourhood is above 20 percent in Vancouver. In total, 8 of the 23 neighbourhoods, excluding Stanley Park, have a percentage of low-income households which is larger than 20 percent. Column 1 of Table 7 summarizes the results for the regression 3 for neighbourhoods with a lower percentage of low-income households. Column 2 summarizes the results for neighbourhoods with a higher percentage of low-income households. Compared to the average of all other weeks, property crime rates in the fifth week of a five-week period are significantly higher in neighbourhoods with lower household incomes. The coefficients are larger for neighbourhoods with a higher percentage low-income households.[2] However, the constants are also larger. The fifth week of a five-week period increases property crimes by 2.856 for neighbourhoods with less low-income households, or approximately 12 percent compared to the first week of a four-week period. For neighbourhoods with more than 20 percent low-income households, property crime increases by 6.218 in the fifth week of a five-week period, or approximately 15 percent.

For both the results in Table 6 and 7 the fifth week in a five-week period has a larger effect on property crime than the fourth week in a four-week period for neighbourhoods with more low-income households, but not for neighbourhoods with a lower percentage of low-income households. And similarly, for the median income level. Since it is expected more people that rely on IA live in neighbourhoods with either more low-income households or with lower median incomes, this may be the effect of the IA payments. Which would not be seen in higher income neighbourhoods, especially if property crime is committed in within an individual's own neighbourhood.

Appendix Tables 11, 12, 13, and 14 summarize the results for Regression 4 and 5 while splitting the sample by low income households and median income. The effect of the fifth week on vehicle collisions and violent crime is not significant, similar to the regressions without neighbourhoods. Giving evidence for the mechanism between property crime and IA payment dates.

VII. Conclusion

In this thesis I analysed the effect of the difference in time between income assistance payment dates on crime. The permanent income hypothesis predicts individuals do not respond to temporary income changes and would smooth income. However, empirical evidence shows that individuals are in fact sensitive to temporary income changes. These individuals are known as hand-to-mouth consumers and they deplete all their resources in the pay period.

[2] Adding neighbourhood fixed effects to the regression does not change the results.

Table 7. Total Property Crime – Split by Neighbourhoods with Less versus More than 20 Percent of Low-Income Households

VARIABLES	(1) Total Property Time	(2) Total Property Time
Week5T	2.856***	6.218***
	(0.648)	(1.936)
Week4T	4.167***	7.974***
	(0.681)	(2.003)
Week4C	2.896***	6.095***
	(0.525)	(1.562)
Week3T	7.490***	14.49***
	(0.787)	(2.294)
Week3C	6.522***	12.26***
	(0.585)	(1.741)
Week2T	2.870***	5.530***
	(0.654)	(1.886)
Week2C	4.737***	8.649***
	(0.559)	(1.598)
Week1T	0.154	0.350
	(0.598)	(1.673)
Constant	23.99***	41.68***
	(1.174)	(3.066)
Observations	12,194	11,256
R-squared	0.072	0.028
Low Income Dummy	0	1
YEAR FE	YES	NO
MONTH FE	YES	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the analysis, I use the exogenous variation between payment dates to study the effect of an increase in time between the dates. IA payment are made 12 times a year, once every month on a Wednesday. Due to this set up there is variation in the time between payment dates, the periods are either four or five weeks long.

I find that being in a five-week period significantly increases the number of property crimes. Furthermore, being in the fifth week of a five-week period also significantly increases the number of property crimes. The number of property crimes is significantly higher in the fifth week of a five-week period than in the fourth week of a four-week period as well as higher than the first week of both four- and five-week periods. Hence, this implies that an increase in the payment period by one week significantly increases the level of property crimes.

I find that property crime rates are highest in the second-to-last week of the payment period. Both the fourth week of a five-week period and the third week of a four-week period have higher coefficients.

I do not find a difference in property crime between the first week of a four-week and the first week of a five-week period. Comparing this to all the other weeks, there seems to be a lower level of property crimes immediately after the payment both in the four-week and the five-week period. Thus, individuals who receive IA seem to be responding to the payments. Since the coefficients differ between the weeks, especially the difference between the first weeks and all the other weeks, this points towards a sensitivity of individuals to temporary income changes. Hence, the permanent income hypothesis would not hold in this scenario. Furthermore, the results from Regression 1 (Table 2), 2 and 3 (Table 3) do not necessarily point to hand-to-mouth consumers. Even though the fifth week significantly increase the number of property crimes, the larger coefficients in some of the other weeks make it hard to interpret. Moreover, the results from Regression 1 seem to point to overall higher crime levels in the five-week periods. Yet to say that, in the five-week periods, people are fully aware of their lower daily budget and thus try and supplement their income by crime over the entire period is too strong of a statement to make.

To conclude, individuals who receive IA do seem to respond to payments made, as seen in the significant difference between the first week in the four-week period and the first week in the five-week period compared to the coefficients of all the other weeks. A graphic representation can be found in Figure 6. However, it is very hard to say anything about the response after the first week.

The findings of this paper suggest that individuals who receive IA payments change their behaviour after the payment date. I find lower levels of property crimes in both the four- and five-week period for the first week. Since this effect seems to disappear after the first week a potential policy implication could be making the period between IA payments shorter. Thus, making it easier for individuals to smooth income of the periods between payments dates. On the other hand, if IA payments are simply too low to sustain individuals and entire month, and therefore property crime levels are higher towards the end of the payment cycle, an absolute increase in the level of IA is needed in order to decrease property crime levels in Vancouver.

The most important limitation of this paper is the sole focus on IA payments, and thus on individuals that receive these IA payments. If most crime in Vancouver is committed by people who do not receive IA, then any kind of patterns found in the data should not be interpreted as causal. Furthermore, approximately eight percent of households in British Columbia receive income assistance, which could be too low to see an impact of payment cycles on crime levels. However, due to the nature of the data, I do not have any information on the background characteristics of the perpetrators. Nevertheless, since there is a pattern for property crimes and not for violent crimes and vehicle collisions this strongly suggest the existence of a causal relationship. Another limitation is that

the data only represents the crimes reported to the VPD. Nevertheless, it sees safe to assume that there is no significant difference in the reporting rates of crime between the weeks in the payment cycles of IA.

Further research is needed to fully understand the difference in the coefficients. Especially the higher coefficients for the second to last weeks in both the four-week and the five-week periods are noteworthy.

References

Agnew, R. (1995) Controlling delinquency: Recommendations from general strain theory. In: Barlow H (ed) Crime and public policy: putting theory to work. Westview Press, Boulder, pp 43–70

Agnew, R. (2001). Building on the foundation of general strain theory: specifying the types of strain most likely to lead to crime and delinquency. Journal of Research in Crime and Delinquency, 38(4), 319–361.

Agnew, R. (2013). When criminal coping is likely: an extension of general strain theory. Deviant Behavior, 34(8), 653–670.

Allen, R. C. (1996). Socioeconomic conditions and property crime: a comprehensive review and test of the professional literature. The American Journal of Economics and Sociology, 55(3), 293–293.

Anderson, D. A. (2012). The cost of crime. Foundations and Trends® in Microeconomics, 7(3), 209–265.

Andresen, M. A., Linning, S. J., & Malleson, N. (2017). Crime at places and spatial concentrations: exploring the spatial stability of property crime in vancouver bc, 2003-2013. Journal of Quantitative Criminology, 33(2), 255–275.

Becker, G. S. (1968). Crime and punishment: an economic approach. Journal of Political Economy, 76(2), 169–217.

Benoit, J.-P., & Osborne, M. J. (1995). Crime, punishment and social expenditure. Journal of Institutional & Theoretical Economics, 151(2), 326.

Boyce, J., Cotter, A., & Perreault, S. (2014). Police-reported crime statistics in canada, 2013 (No. 85–002–X). Canadian Centre for Justice Statistics. Retrieved June 8, 2021, from https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2014001/article/14040-eng.pdf?st=bARA4bUc

Brush, J. (2007). Does income inequality lead to more crime? a comparison of cross-sectional and time-series analyses of united states counties. Economics Letters, 96(2), 264–268.

Carrington, P. J. (2001). Population aging and crime in canada, 2000-2041. Canadian Journal of Criminology, 43(3), 331-356.

Chiu, W. H., & Madden, P. (1998). Burglary and income inequality. The Journal of Public Economics, 69(1), 123.

Cook, P. J., & Zarkin, G. A. (1985). Crime and the business cycle. Journal of Legal Studies, 14(1), 115–128.

DeFronzo, J., & Hannon, L. (1998). Welfare assistance levels and homicide rates. Homicide Studies, 2(1), 31–45.

Dijk, J. J. M. van, Mayhew, P., & Killias, M. (1990). Experiences of crime across the world: key findings from the 1989 international crime survey. Kluwer Law and Taxation.

Ehrlich, I. (1973). Participation in illegitimate activities: a theoretical and empirical investigation. Journal of Political Economy, 81(3), 521–565.

Fajnzylber, P., Lederman, D., & Loayza, N. (2002). Inequality and violent crime*. The Journal of Law & Economics, 45(1), 1–39.

Farrell, G., & Brantingham, P. J. (2013). The crime drop and the general social survey. Canadian Public Policy, 39(4), 559–580.

Fishback, P. V., Johnson, R. S., & Kantor, S. (2010). Striking at the roots of crime: the impact of welfare spending on crime during the great depression. The Journal of Law & Economics, 53(4), 715–740.

Foley, C. F. (2008). Welfare payments and crime. The Review of Economics and Statistics, 93(1), 97–112.

Freeman, R. (1999). The economics of crime. Handbook of Labour Economics. Harvard University and NBER Center J or Economic Performance.

Government of Canada (2018, February 07). Population and Dwelling Count HIGHLIGHT TABLES, 2016 Census. Retrieved April 09, 2021, from https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/pd-pl/Table.cfm?Lang=Eng&T=101&S=50&O=A

Hall, R. E. (1978). Stochastic implications of the life cycle-permanent income hypothesis: theory and evidence. Journal of Political Economy, 86(6), 971–987.

Hodgkinson, T., Andresen, M. A., & Farrell, G. (2016). The decline and locational shift of automotive theft: a local level analysis. Journal of Criminal Justice, 44, 49–57.

Imrohoroglu, A., Merlo, A., & Rupert, P. (2000). On the political economy of income redistribution and crime. International Economic Review, 41(1), 1–25.

Kaplan, G., Violante, G. L., & Weidner, J. (2014). The wealthy hand-to-mouth. Brookings Papers on Economic Activity, 2014(1), 77–138.

Keighley, K. (2017). Police-reported crime statistics in canada, 2017 (No. 85-002-X). Canadian. Centre for Justice Statistics. Retrieved June 8, 2021, from https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2017001/article/54842-eng.pdf?st=p9Bu2-PR

Linning, S. J., Andresen, M. A., Ghaseminejad, A. H., & Brantingham, P. J. (2017). Crime seasonality across multiple jurisdictions in british columbia, canada. Canadian Journal of Criminology and Criminal Justice, 59(2), 251-280.

Lott, J. R. J. (1990). A transaction-costs explanation for why the poor are more likely to commit crime. Journal of Legal Studies, 19(1), 243–245.

Loureiro, A. (2012). Can Conditional Cash Transfers Reduce Poverty and Crime? Evidence from Brazil. SSRN Electronic Journal. 10.2139/ssrn.2139541.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. Science, 341(6149), 976–980.

Mehanna, R.A. (2004) Poverty and economic development: not as direct as it may seem. Journal of Socio - Economics, 33(2), 217–228.

Mehlum, H., Miguel, E., & Torvik, R. (2006). Poverty and crime in 19th century Germany. Journal of Urban Economics, 59(3), 370–388.

Ministry of Social Development and Poverty Reduction. (2020a, November 30). Apply for assistance. Retrieved April 09, 2021, from https://www2.gov.bc.ca/gov/content/family-social-supports/income-assistance/apply-for-assistance

Ministry of Social Development and Poverty Reduction. (2020b, November 30). Disability Assistance - Province of British Columbia. Retrieved May 20, 2021 from https://www2.gov.bc.ca/gov/content/family-social-supports/services-for-people-with-disabilities/disability-assistance

Ministry of Social Development and Poverty Reduction. (2021a, April 08). On assistance. Retrieved April 09, 2021, from https://www2.gov.bc.ca/gov/content/family-social-supports/income-assistance/on-assistance

Ministry of Social Development and Poverty Reduction. (2021b, March 24). Income assistance payment dates. Retrieved April 09, 2021, from https://www2.gov.bc.ca/gov/content/family-social-supports/income-assistance/payment-dates

Ministry of Social Development and Poverty Reduction. (2021c, April 8). On disability assistance - Province of British Columbia. Retrieved May 20, 2021 from https://www2.gov.bc.ca/gov/content/family-social-supports/services-for-people-with-disabilities/disability-assistance/on-disability-assistance

Mohammed, I., & Hosen, M. (2018). Does poverty lead to crime? evidence from the united states of america. International Journal of Social Economics, 45(10), 1424–1438.

Moreau, G., Jaffray, B., & Armstrong, A. (2020). Police-reported crime statistics in canada, 2019 (No. 85-002-X). Canadian Centre for Justice Statistics. Retrieved June 8, 2021, from https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2020001/article/00010-eng.pdf?st=bKRVfYk_

Niskanen, W. A. (1996). Welfare and the culture of poverty. Cato Journal, 16(1), 1–15.

Ouimet, M. (1999). Crime in canada and in the united states: a comparative analysis. The Canadian Review of Sociology and Anthropology, 36(3), 389.

Papaioannou, K. J. (2017). “hunger makes a thief of any man”: poverty and crime in British colonial Asia. European Review of Economic History, (20170117). https://doi.org/10.1093/ereh/hew019

Petit, G., & Tedds, L. (2020) Income Assistance in British Columbia: Reforms Along Basic Income Lines. Research paper commissioned by the Expert Panel on Basic Income, British Columbia. Retrieved June 8, 2021, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3781896

Petit, G., Scott, C., Gallacher, B., Zwicker, J., & Tedds, L., (2020). Less Income for More Hours of Work: Barriers to Work for Social Assistance Recipients in B.C. The School of Public Policy Publications. Retrieved June 8, 2021, from https://journalhosting.ucalgary.ca/index.php/sppp/article/view/69731

Pickett, T. A., Stenstrom, R. J., & Abu-Laban, R. B. (2015). Association between mental health apprehensions by police and monthly income assistance (welfare) payments. Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie, 60(3), 146–50.

Pottie Bunge, V., Johnson, H., Balde, T. (2005) Exploring crime pattern in Canada (No. 005). Crime and Justice Research Paper Series.

Richardson, L., Laing, A., Choi, J. C., Nosova, E., Milloy, M.-J., Marshall, B. D. L., Singer, J., Wood, E., & Kerr, T. (2021). Effect of alternative income assistance schedules on drug use and drug-related harm: a randomised controlled trial, 6(5), 334.

Riddell, C., & Riddell, R. (2006). Welfare checks, drug consumption, and health: evidence from Vancouver injection drug users. The Journal of Human Resources, 41(1), 138–161.

Rosenfeld, R., & Fornango, R. (2007). The impact of economic conditions on robbery and property crime: the role of consumer sentiment. (report). Criminology, 45(4), 735.

Savage, J., Bennett, R., & Danner, M. (2008). Economic assistance and crime. European Journal of Criminology, 5(2), 217–238.

Sjoquist, D. L. (1973). Property crime and economic behavior: some empirical results. The American Economic Review, 63(3), 439–446.

Statistics Canada. (2020, October 29). Crime severity index and weighted clearance rates, Canada, provinces, territories and Census Metropolitan Areas. Retrieved June 8, 2021, from https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3510002601

Stephens, M. (2003). "3rd of tha month": do social security recipients smooth consumption between checks? The American Economic Review, 93(1), 406–422.

Stevens, G., Hartnagel, T., Odynak, D., & Brazil, J. (2013). Demographic trends and crime in the province of alberta. International Journal of Child, Youth and Family Studies, 4(1), 24–24.

Thaxton, S., & Agnew, R. (2018). When criminal coping is likely: an examination of conditioning effects in general strain theory. Journal of Quantitative Criminology, 34(4), 887–920.

The Economist Data Team, 2016. Worldwide Cost of Living Survey September 2015, 10 March 2016. Retrieved June 8, 2021, from http://www.economist.com/blogs/graphicdetail/2016/03/daily-chart-4.

Vancouver (n.d.). Population. Retrieved April 09, 2021, from https://vancouver.ca/news-calendar/population.aspx

Vancouver Police Department. (n.d.). History | Vancouver Police Department. https://vpd.ca/police/about/history/index.html

Vancouver Police Department (2021a). VPD Crime Data. Retrieved April 02, 2021, from geodash.vpd.ca/opendata/

Vancouver Police Department. (2021b). Year-end 2020 Year-to-Date key performance indicators report (No. 2102P01). Vancouver Police Board. https://vancouverpoliceboard.ca/police/policeboard/agenda/2021/0218/5-1-2102P01-Year-end-2020-KPI-Report.pdf

Wang, L., Krebs, E., Olding, M., DeBeck, K., Hayashi, K., Milloy, M. J., Richardson, L., & Nosyk, B. (2017). Increased drug use and the timing of social assistance receipt among people who use illicit drugs. Drug and Alcohol Dependence, 171, 211.

Wassie, N., Melese, B., & Eyasu, N. (2020). Socioeconomic determinants of property crime offending in ethiopia: convicted offenders in focus. Journal of Financial Crime, Ahead-of-print (Ahead-of-print). https://doi.org/10.1108/JFC-11-2019-0145

Zhang, J. (1997). The effect of welfare programs on criminal behavior: a theoretical and empirical analysis. Economic Inquiry, 35(1), 120.

Zlotorzynska, M., Milloy, M.-J. S., Richardson, L., Nguyen, P., Montaner, J. S., Wood, E., & Kerr, T. (2014). Timing of income assistance payment and overdose patterns at a Canadian supervised injection facility. International Journal of Drug Policy, 25(4), 736–739.

Appendix

Table 1. Median Household and Low-Income Split Dummies

Neighbourhood	Median Household Income[25]	Median Split	Population in Low-Income Household	>20%
Arbutus Ridge[1]	$ 71,008	0	24.4%	1
Central Business District[2]	$ 66,583	1	23.8%	1
Dunbar-Southlands[3]	$ 104,450	0	15.9%	0
Fairview[4]	$ 69,337	0	14.7%	0
Grandview-Woodland[5]	$ 55,141	1	20.5%	1
Hastings-Sunrise[6]	$ 68,506	1	16.9%	0
Kensington-Cedar Cottage[7]	$ 70,815	0	14.8%	0
Kerrisdale[8]	$ 75,419	0	22.0%	1
Killarney[9]	$ 71,559	0	17.0%	0
Kitsilano[10]	$ 72,839	0	14.7%	0
Marpole[11]	$ 53,782	1	24.7%	1
Mount Pleasant[12]	$ 66,299	1	15.7%	0
Musqueam[13]	$ 29,968	1	0.0%	0
Oakridge[14]	$ 62,988	1	26.2%	1
Renfrew-Collingwood[15]	$ 64,179	1	17.6%	0
Riley Park[16]	$ 83,513	0	11.3%	0
Shaughnessy[17]	$ 111,566	0	15.5%	0
South Cambie[18]	$ 83,111	0	13.1%	0
Stanley Park[19]	-	-	-	-
Strathcona[20]	$ 21,195	1	49.8%	1
Sunset[21]	$ 68,855	1	16.0%	0
Victoria-Fraserview[22]	$ 68,126	1	17.0%	0
West End[23]	$ 51,410	1	23.3%	1
West Point Grey[24]	$ 84,951	0	18.4%	0
Median	$ 68,855		17.0%	

All data is from the 2016 Canadian Census retrieved on 21 May 2021 from:

[1]https://vancouver.ca/files/cov/Arbutus-Ridge-census-data.pdf

[2]https://vancouver.ca/files/cov/Downtown-census-data.pdf

[3]https://vancouver.ca/files/cov/Dunbar-census-data.pdf

[4]https://vancouver.ca/files/cov/Fairview-census-data.pdf

[5]https://vancouver.ca/files/cov/Grandview-Woodland-census-data.pdf

[6]https://vancouver.ca/files/cov/Hastings-Sunrise-census-data.pdf

[7]https://vancouver.ca/files/cov/Kensington-Cedar%20Cottage-census-data.pdf

[8]https://vancouver.ca/files/cov/Kerrisdale-census-data.pdf

[9]https://vancouver.ca/files/cov/Killarney-census-data.pdf

[10]https://vancouver.ca/files/cov/Kitsilano-census-data.pdf

[11]https://vancouver.ca/files/cov/Marpole-census-data.pdf

[12]https://vancouver.ca/files/cov/Mount%20Pleasant-census-data.pdf

[13]https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=5915803&Geo2=PR&Code2=59&SearchText=Musqueam%202&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=5915803&TABID=1&type=0

[14]https://vancouver.ca/files/cov/Oakridge-census-data.pdf

[15]https://vancouver.ca/files/cov/Renfrew-Collingwood-census-data.pdf

[16]https://vancouver.ca/files/cov/Riley%20Park-census-data.pdf

[17]https://vancouver.ca/files/cov/Shaughnessy-census-data.pdf

[18]https://vancouver.ca/files/cov/South%20Cambie-census-data.pdf

[19]No population

[20]https://vancouver.ca/files/cov/Strathcona-census-data.pdf

[21]https://vancouver.ca/files/cov/Sunset-census-data.pdf

[22]https://vancouver.ca/files/cov/victoria-fraserview-census-data.pdf

[23]https://vancouver.ca/files/cov/West%20End-census-data.pdf

[24]https://vancouver.ca/files/cov/West%20Point%20Grey-census-data.pdf

[25]All dollar amounts are in Canadian Dollars

Appendix Figure 1. Vancouver Neighbourhoods

Source: https://geodash.vpd.ca/Html5Viewer/?disclaimer=on&viewer=VPDPublicRefresh_gvh&x=43&y=33

Table 2. Crime by Neighbourhood

Neighbourhood	Population 2016	Total Number of Crimes 2016	Crimes per 10,000
Arbutus Ridge[1]	15,295	490	320
Central Business District[2]	62,030	13,351	2,152
Dunbar-Southlands[3]	21,425	472	220
Fairview[4]	33,620	2,411	717
Grandview-Woodland[5]	29,175	2,423	831
Hastings-Sunrise[6]	34,575	1,400	405
Kensington-Cedar Cottage[7]	49,325	1,934	392
Kerrisdale[8]	13,975	546	391
Killarney[9]	29,325	639	218
Kitsilano[10]	43,045	2,052	477
Marpole[11]	24,460	1,027	420
Mount Pleasant[12]	32,955	3,129	949
Musqueam[13]	1,652	37	224
Oakridge[14]	13,030	670	514
Renfrew-Collingwood[15]	51,530	2,079	403
Riley Park[16]	22,555	1,114	494
Shaughnessy[17]	8,430	477	566
South Cambie[18]	7,970	435	546
Stanley Park[19]	-	197	-
Strathcona[20]	12,585	2,936	2,333
Sunset[21]	36,500	1,189	326
Victoria-Fraserview[22]	31,065	720	232
West End[23]	47,200	3,968	841
West Point Grey[24]	13,065	458	351
Total	634,787	44,156	696

All data is from the 2016 Canadian Census retrieved on 21 May 2021 from:

[1]https://vancouver.ca/files/cov/Arbutus-Ridge-census-data.pdf

[2]https://vancouver.ca/files/cov/Downtown-census-data.pdf

[3]https://vancouver.ca/files/cov/Dunbar-census-data.pdf

[4]https://vancouver.ca/files/cov/Fairview-census-data.pdf

[5]https://vancouver.ca/files/cov/Grandview-Woodland-census-data.pdf

[6]https://vancouver.ca/files/cov/Hastings-Sunrise-census-data.pdf

[7]https://vancouver.ca/files/cov/Kensington-Cedar%20Cottage-census-data.pdf

[8]https://vancouver.ca/files/cov/Kerrisdale-census-data.pdf

[9]https://vancouver.ca/files/cov/Killarney-census-data.pdf

[10]https://vancouver.ca/files/cov/Kitsilano-census-data.pdf

[11]https://vancouver.ca/files/cov/Marpole-census-data.pdf

[12]https://vancouver.ca/files/cov/Mount%20Pleasant-census-data.pdf

[13]https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=5915803&Geo2=PR&Code2=59&SearchText=Musqueam%202&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=5915803&TABID=1&type

=0

[14]https://vancouver.ca/files/cov/Oakridge-census-data.pdf

[15]https://vancouver.ca/files/cov/Renfrew-Collingwood-census-data.pdf

[16]https://vancouver.ca/files/cov/Riley%20Park-census-data.pdf

[17]https://vancouver.ca/files/cov/Shaughnessy-census-data.pdf

[18]https://vancouver.ca/files/cov/South%20Cambie-census-data.pdf

[19]No population

[20]https://vancouver.ca/files/cov/Strathcona-census-data.pdf

[21]https://vancouver.ca/files/cov/Sunset-census-data.pdf

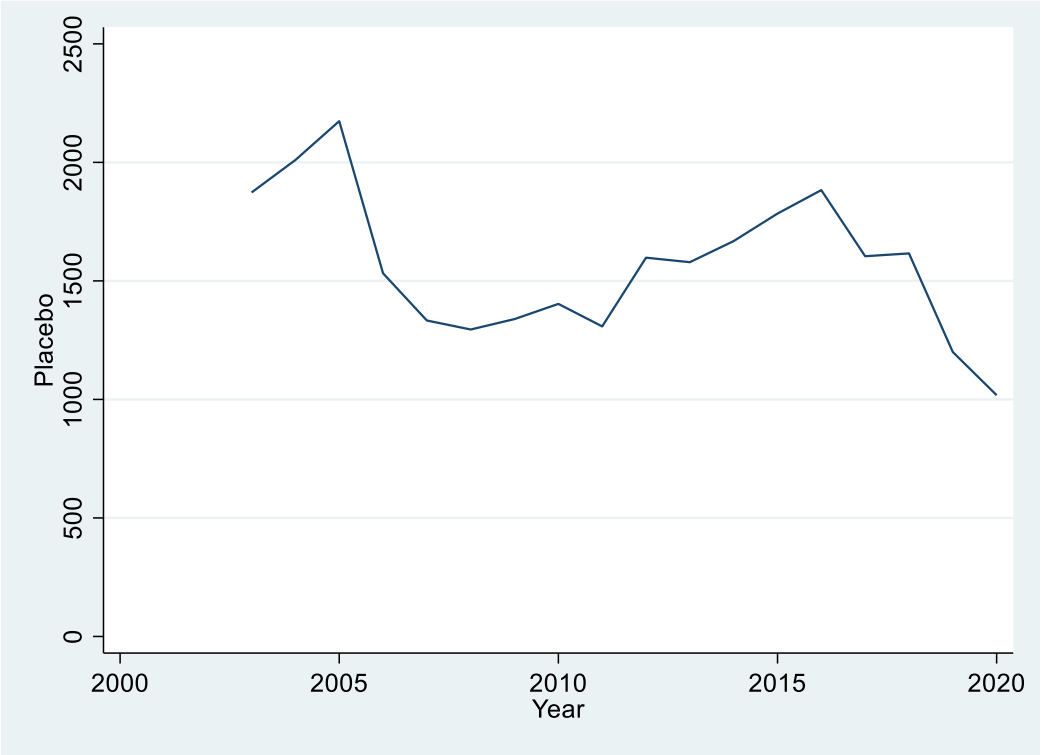
[22]https://vancouver.ca/files/cov/victoria-fraserview-census-data.pdf

[23]https://vancouver.ca/files/cov/West%20End-census-data.pdf

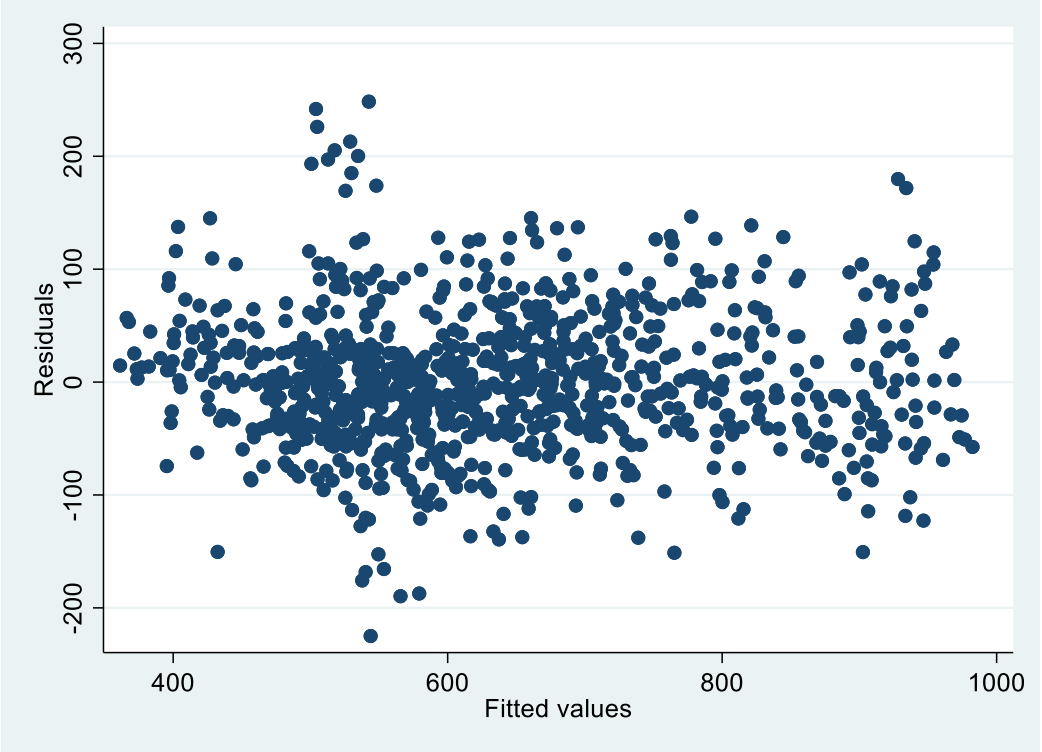
[24]https://vancouver.ca/files/cov/West%20Point%20Grey-census-data.pdf

[25]All dollar amounts are in Canadian Dollars

Appendix Figure 2. Total Vehicle Collision



Appendix Figure 3. Residuals Plot Regression 3



Appendix Table 3. Regression 2 & 3 – Excluding Vancouver Riots

VARIABLES	(1) Total Property Crime	(2) Total Property Crime	(3) Total Property Crime	(4) Total Property Crime	(5) Total Property Crime	(6) Total Property Crime	(7) Total Property Crime	(8) Total Property Crime
Week5T	41.99**	40.73***	63.68***	63.53***	109.4***	108.8***	109.5***	111.7***
	(18.00)	(8.012)	(18.44)	(8.198)	(19.38)	(8.259)	(20.39)	(8.727)
Week4T	51.65***	50.39***	73.34***	73.19***	119.0***	118.5***	119.2***	121.4***
	(18.36)	(8.169)	(18.79)	(8.366)	(19.71)	(8.451)	(20.71)	(8.902)
Week4C	33.52**	33.92***	55.21***	56.53***	100.9***	104.0***	101.0***	107.0***
	(13.73)	(6.430)	(14.30)	(6.697)	(15.47)	(6.821)	(16.72)	(7.344)
Week3T			60.04***	59.89***	105.7***	105.2***	105.9***	108.1***
			(19.04)	(8.768)	(19.95)	(8.868)	(20.94)	(9.334)
Week3C			67.82***	71.75***	113.5***	119.4***	113.7***	122.3***
			(14.60)	(6.667)	(15.76)	(6.813)	(16.99)	(7.362)
Week2T					96.45***	102.3***	96.61***	105.4***
					(20.23)	(8.508)	(21.20)	(9.013)
Week2C					88.58***	89.73***	88.74***	92.58***
					(15.23)	(6.278)	(16.50)	(6.831)
Week1T							0.452	8.277
							(19.90)	(8.403)
Constant	623.6***	867.2***	601.9***	844.8***	556.3***	804.6***	556.1***	801.7***
	(6.014)	(14.16)	(7.187)	(13.51)	(9.295)	(12.88)	(11.25)	(13.23)
Observations	937	937	937	937	937	937	937	937
R-squared	0.016	0.764	0.044	0.794	0.086	0.838	0.086	0.838
VANCOUVER RIOTS DUMMY	0	0	0	0	0	0	0	0
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4. Theft from Vehicle

VARIABLES	(1) Theft from Vehicle	(2) Theft from Vehicle	(3) Theft from Vehicle	(4) Theft from Vehicle	(5) Theft from Vehicle	(6) Theft from Vehicle	(7) Theft from Vehicle	(8) Theft from Vehicle
Week5T	20.34**	22.08***	29.78***	32.23***	49.18***	51.36***	49.40***	52.86***
	(9.538)	(5.139)	(9.716)	(5.208)	(10.10)	(5.363)	(10.60)	(5.657)
Week4T	21.58**	23.31***	31.01***	33.47***	50.41***	52.60***	50.64***	54.10***
	(9.804)	(5.141)	(9.978)	(5.215)	(10.36)	(5.371)	(10.84)	(5.648)
Week4C	14.19**	13.65***	23.63***	23.63***	43.03***	43.70***	43.25***	45.22***
	(7.151)	(3.593)	(7.381)	(3.728)	(7.880)	(3.929)	(8.507)	(4.338)
Week3T			25.12**	27.57***	44.52***	46.70***	44.75***	48.21***
			(10.03)	(5.295)	(10.40)	(5.453)	(10.89)	(5.751)
Week3C			30.04***	31.18***	49.45***	51.30***	49.67***	52.82***
			(7.734)	(4.012)	(8.212)	(4.210)	(8.816)	(4.605)
Week2T					39.68***	43.36***	39.90***	44.98***
					(10.14)	(5.055)	(10.64)	(5.427)
Week2C					38.33***	37.84***	38.56***	39.33***
					(7.659)	(3.869)	(8.302)	(4.251)
Week1T							0.640	4.304
							(9.451)	(5.101)
Constant	230.5***	336.6***	221.1***	326.4***	201.7***	309.4***	201.5***	307.9***
	(3.037)	(9.528)	(3.532)	(9.134)	(4.471)	(8.948)	(5.497)	(9.221)
Observations	938	938	938	938	938	938	938	938
R-squared	0.012	0.714	0.032	0.737	0.061	0.767	0.061	0.767
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5. Break and Enter Commercial

VARIABLES	(1) Break and Enter Commercial	(2) Break and Enter Commercial	(3) Break and Enter Commercial	(4) Break and Enter Commercial	(5) Break and Enter Commercial	(6) Break and Enter Commercial	(7) Break and Enter Commercial	(8) Break and Enter Commercial
Week5T	4.179**	4.116***	6.128***	6.182***	9.415***	9.483***	9.112***	9.304***
	(1.793)	(1.350)	(1.825)	(1.381)	(1.909)	(1.436)	(2.018)	(1.528)
Week4T	3.403**	3.340***	5.352***	5.406***	8.639***	8.707***	8.336***	8.528***
	(1.622)	(1.155)	(1.658)	(1.191)	(1.749)	(1.252)	(1.867)	(1.354)
Week4C	4.266**	4.200***	6.215***	6.125***	9.502***	9.573***	9.199***	9.392***
	(1.780)	(1.617)	(1.814)	(1.634)	(1.897)	(1.688)	(2.007)	(1.745)
Week3T			6.642***	6.695***	9.929***	9.997***	9.626***	9.817***
			(1.653)	(1.183)	(1.744)	(1.241)	(1.863)	(1.340)
Week3C			5.416***	5.407***	8.703***	8.864***	8.400***	8.682***
			(1.468)	(1.140)	(1.570)	(1.217)	(1.701)	(1.313)
Week2T					7.731***	8.356***	7.428***	8.162***
					(1.762)	(1.310)	(1.880)	(1.420)
Week2C					5.946***	6.027***	5.643***	5.850***
					(1.453)	(1.085)	(1.593)	(1.190)
Week1T							-0.861	-0.514
							(1.769)	(1.395)
Constant	43.68***	60.31***	41.73***	58.03***	38.44***	55.07***	38.74***	55.25***
	(0.560)	(2.014)	(0.653)	(2.001)	(0.855)	(1.959)	(1.076)	(2.020)
Observations	938	938	938	938	938	938	938	938
R-squared	0.015	0.396	0.038	0.419	0.060	0.444	0.060	0.444
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 6. Break and Enter Residential

VARIABLES	(1) Break and Enter Residential	(2) Break and Enter Residential	(3) Break and Enter Residential	(4) Break and Enter Residential	(5) Break and Enter Residential	(6) Break and Enter Residential	(7) Break and Enter Residential	(8) Break and Enter Residential
Week5T	3.568	3.418**	5.670	5.655***	10.49**	10.44***	11.38***	11.27***
	(3.873)	(1.591)	(3.952)	(1.628)	(4.145)	(1.679)	(4.330)	(1.784)
Week4T	4.490	4.339***	6.591*	6.576***	11.41***	11.36***	12.31***	12.19***
	(3.712)	(1.538)	(3.794)	(1.577)	(3.994)	(1.627)	(4.186)	(1.720)
Week4C	2.540	3.504***	4.642	5.740***	9.461***	10.78***	10.36***	11.62***
	(2.830)	(1.233)	(2.934)	(1.281)	(3.187)	(1.386)	(3.423)	(1.500)
Week3T			5.710	5.694***	10.53***	10.48***	11.42***	11.31***
			(3.823)	(1.561)	(4.022)	(1.618)	(4.212)	(1.716)
Week3C			6.629**	7.195***	11.45***	12.24***	12.34***	13.09***
			(3.127)	(1.279)	(3.366)	(1.379)	(3.591)	(1.487)
Week2T					9.450**	9.902***	10.34***	10.80***
					(3.768)	(1.634)	(3.970)	(1.751)
Week2C					9.741***	10.00***	10.64***	10.83***
					(3.302)	(1.315)	(3.531)	(1.432)
Week1T							2.542	2.391
							(4.068)	(1.668)
Constant	71.87***	137.3***	69.76***	135.1***	64.94***	130.9***	64.05***	130.0***
	(1.205)	(3.179)	(1.429)	(3.102)	(1.890)	(3.031)	(2.264)	(3.041)
Observations	938	938	938	938	938	938	938	938
R-squared	0.003	0.823	0.009	0.830	0.021	0.842	0.021	0.843
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 7. Theft of Bicycle

VARIABLES	(1) Theft of Bicycle	(2) Theft of Bicycle	(3) Theft of Bicycle	(4) Theft of Bicycle	(5) Theft of Bicycle	(6) Theft of Bicycle	(7) Theft of Bicycle	(8) Theft of Bicycle
Week5T	2.124	1.673	3.450	2.948*	6.487**	5.789***	5.451*	6.033***
	(2.916)	(1.502)	(2.962)	(1.534)	(3.065)	(1.585)	(3.204)	(1.653)
Week4T	3.506	3.055*	4.831	4.329***	7.868**	7.171***	6.833**	7.415***
	(3.096)	(1.587)	(3.140)	(1.620)	(3.239)	(1.670)	(3.370)	(1.733)
Week4C	2.742	2.590***	4.068*	3.984***	7.105***	6.975***	6.069**	7.222***
	(2.119)	(0.973)	(2.180)	(1.012)	(2.317)	(1.096)	(2.497)	(1.202)
Week3T			2.529	2.027	5.566*	4.868***	4.530	5.112***
			(2.970)	(1.502)	(3.073)	(1.554)	(3.212)	(1.625)
Week3C			4.763**	5.154***	7.800***	8.151***	6.764***	8.399***
			(2.198)	(1.001)	(2.334)	(1.089)	(2.512)	(1.191)
Week2T					5.632*	5.892***	4.596	6.156***
					(2.944)	(1.464)	(3.088)	(1.559)
Week2C					6.314***	5.936***	5.279**	6.177***
					(2.213)	(1.100)	(2.400)	(1.194)
Week1T							-2.944	0.699
							(2.631)	(1.439)
Constant	34.61***	4.379**	33.29***	3.383*	30.25***	0.867	31.29***	0.622
	(0.854)	(1.890)	(0.992)	(1.987)	(1.261)	(2.038)	(1.566)	(2.097)
Observations	938	938	938	938	938	938	938	938
R-squared	0.003	0.765	0.009	0.771	0.017	0.779	0.018	0.779
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTE FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 8. Theft of Vehicle

VARIABLES	(1) Theft of Vehicle	(2) Theft of Vehicle	(3) Theft of Vehicle	(4) Theft of Vehicle	(5) Theft of Vehicle	(6) Theft of Vehicle	(7) Theft of Vehicle	(8) Theft of Vehicle
Week5T	-0.589	-1.760	0.0152	-1.115	1.703	0.854	2.820	1.717
	(4.048)	(1.140)	(4.171)	(1.186)	(4.498)	(1.293)	(4.748)	(1.364)
Week4T	2.345	1.174	2.949	1.820	4.637	3.789***	5.754	4.651***
	(4.232)	(1.200)	(4.349)	(1.248)	(4.665)	(1.349)	(4.906)	(1.421)
Week4C	-1.668	-0.504	-1.064	0.172	0.624	2.229*	1.741	3.101**
	(3.078)	(1.031)	(3.235)	(1.071)	(3.646)	(1.207)	(3.949)	(1.293)
Week3T			2.476	1.346	4.163	3.315**	5.280	4.177***
			(4.512)	(1.406)	(4.817)	(1.495)	(5.051)	(1.559)
Week3C			1.452	2.336**	3.140	4.399***	4.257	5.276***
			(3.284)	(0.931)	(3.689)	(1.082)	(3.989)	(1.175)
Week2T					4.690	4.948***	5.807	5.880***
					(5.031)	(1.420)	(5.256)	(1.500)
Week2C					2.661	3.615***	3.779	4.466***
					(3.677)	(1.054)	(3.977)	(1.148)
Week1T							3.175	2.470
							(5.162)	(1.604)
Constant	45.02***	122.1***	44.42***	121.6***	42.73***	119.8***	41.61***	118.9***
	(1.369)	(2.905)	(1.688)	(3.005)	(2.379)	(3.070)	(2.820)	(3.062)
Observations	938	938	938	938	938	938	938	938
R-squared	0.001	0.915	0.001	0.916	0.003	0.917	0.003	0.918
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 9. Other Theft

VARIABLES	(1) Other Theft	(2) Other Theft	(3) Other Theft	(4) Other Theft	(5) Other Theft	(6) Other Theft	(7) Other Theft	(8) Other Theft
Week5T	12.37***	11.06***	18.65***	17.47***	32.09***	30.71***	31.35***	30.30***
	(3.832)	(2.523)	(3.920)	(2.607)	(4.046)	(2.699)	(4.273)	(2.944)
Week4T	16.33***	15.02***	22.61***	21.43***	36.05***	34.67***	35.31***	34.26***
	(3.913)	(2.840)	(3.999)	(2.915)	(4.123)	(3.013)	(4.346)	(3.248)
Week4C	11.99***	12.26***	18.26***	18.65***	31.70***	32.55***	30.96***	32.14***
	(3.054)	(2.371)	(3.161)	(2.464)	(3.314)	(2.599)	(3.588)	(2.834)
Week3T			17.57***	16.39***	31.01***	29.63***	30.27***	29.22***
			(4.113)	(3.140)	(4.234)	(3.242)	(4.452)	(3.468)
Week3C			19.51***	20.53***	32.95***	34.46***	32.21***	34.04***
			(3.171)	(2.391)	(3.324)	(2.539)	(3.597)	(2.786)
Week2T					29.27***	29.77***	28.53***	29.33***
					(4.213)	(3.036)	(4.432)	(3.267)
Week2C					25.58***	26.34***	24.84***	25.94***
					(3.139)	(2.336)	(3.426)	(2.597)
Week1T							-2.101	-1.169
							(3.824)	(3.112)
Constant	197.9***	206.3***	191.6***	200.1***	178.2***	188.3***	178.9***	188.7***
	(1.318)	(4.331)	(1.545)	(4.268)	(1.834)	(4.284)	(2.290)	(4.481)
Observations	938	938	938	938	938	938	938	938
R-squared	0.034	0.430	0.082	0.480	0.157	0.558	0.157	0.558
YEAR FE	NO	YES	NO	YES	NO	YES	NO	YES
MONTH FE	NO	YES	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 10. Vehicle Collision – Vancouver Riots Excluded

VARIABLES	(1) Vehicle Collision	(2) Vehicle Collision
Week5T	-0.0996	0.562
	(1.196)	(0.903)
Week4T	-0.968	-0.307
	(1.229)	(0.927)
Week4C	-1.001	-0.882
	(1.059)	(0.763)
Week3T	-2.810**	-2.149**
	(1.140)	(0.912)
Week3C	-1.021	-1.031
	(1.048)	(0.773)
Week2T	-2.810**	-2.647***
	(1.241)	(0.920)
Week2C	-1.207	-1.387*
	(1.059)	(0.774)
Week1T	-0.929	-0.579
	(1.222)	(0.894)
Constant	29.43***	35.17***
	(0.742)	(1.333)
Observations	938	937
R-squared	0.010	0.471
VANCOUVER RIOTS	0	0
MONTH FE	NO	YES
YEAR FE	NO	YES

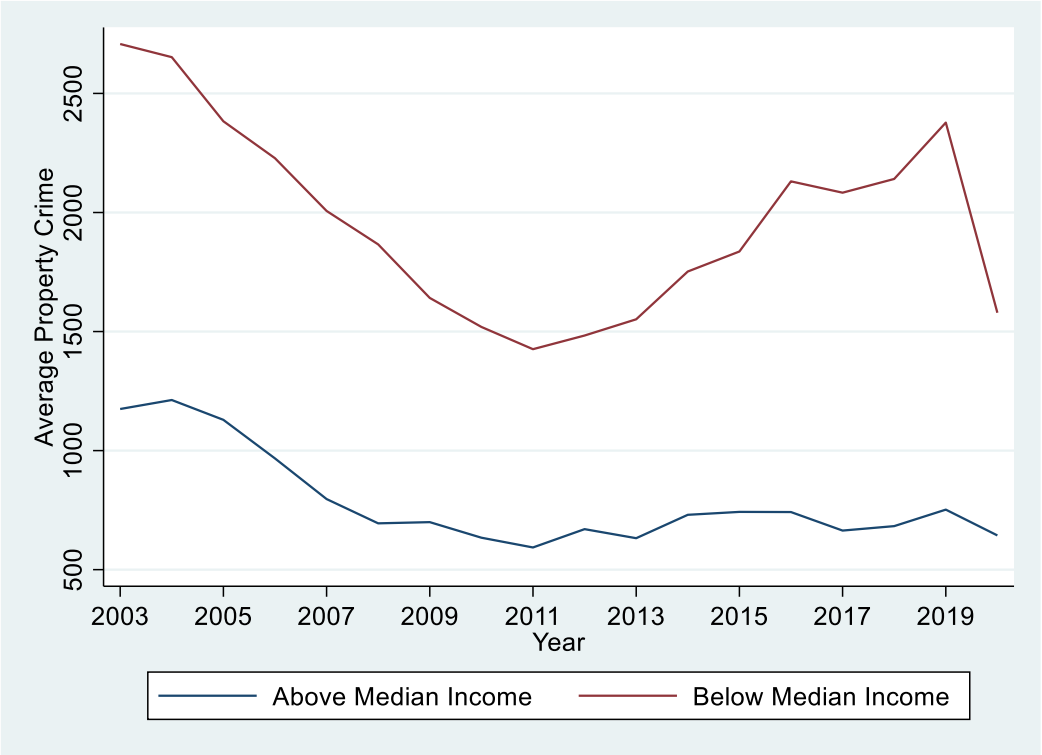
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 11. Total Violent Crime – Vancouver Riots Excluded

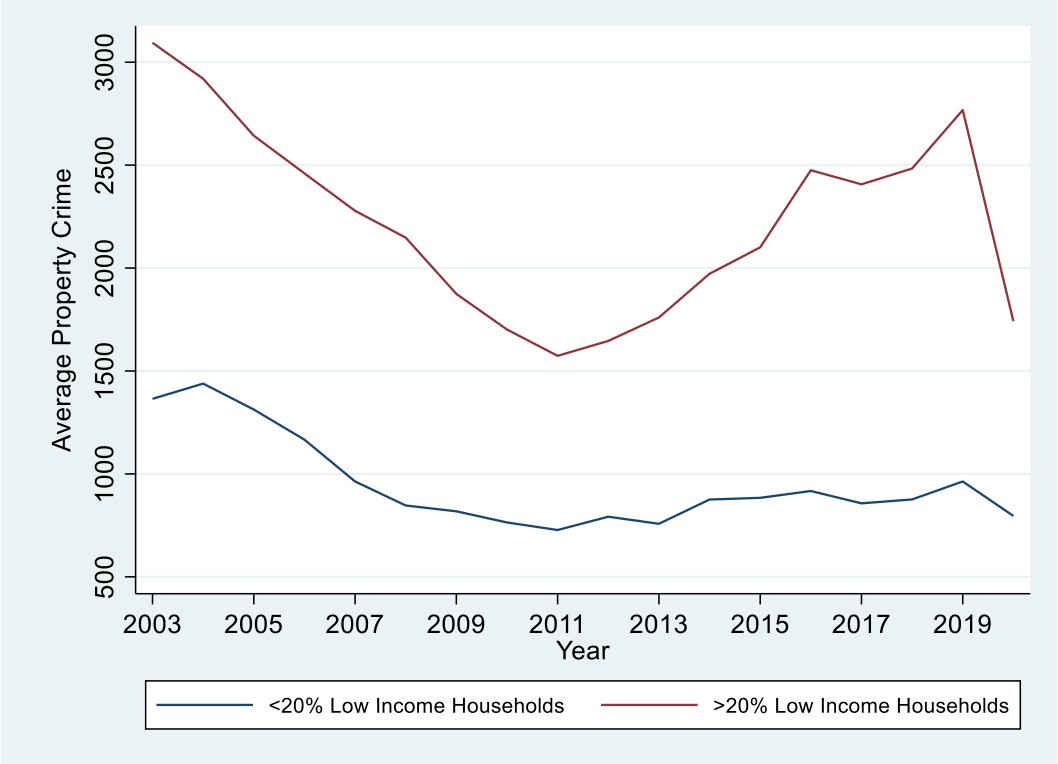
VARIABLES	(1) Total Violent Crime	(2) Total Violent Crime
Week5T	0.553	1.020
	(3.377)	(2.783)
Week4T	-2.960	-2.493
	(4.111)	(3.366)
Week4C	1.229	-1.008
	(4.125)	(2.291)
Week3T	0.408	0.875
	(3.562)	(2.830)
Week3C	0.443	1.389
	(2.941)	(2.351)
Week2T	3.119	4.608
	(3.618)	(2.995)
Week2C	1.150	1.857
	(2.865)	(2.407)
Week1T	-4.158	-2.119
	(3.272)	(2.545)
Constant	167.3***	182.7***
	(2.071)	(4.350)
Observations	938	937
R-squared	0.004	0.393
VANCOUVER RIOTS	0	0
YEAR FE	NO	YES
MONTH FE	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Figure 4. Average Property Crime by Neighbourhood – Median Income Split



Appendix Figure 5. Average Property Crime by Neighbourhood – Low Income Split



Appendix Table 12. Total Violent Crime – Split by Neighbourhoods with Less versus More than 20 Percent of Low-Income Households

VARIABLES	(1) Total Violent Crime	(2) Total Violent Crime
Week5T	-0.0909	0.158
	(0.157)	(0.531)
Week4T	-0.0119	0.326
	(0.162)	(0.551)
Week4C	0.0481	0.151
	(0.134)	(0.500)
Week3T	1.160***	2.261***
	(0.191)	(0.613)
Week3C	0.624***	1.776***
	(0.144)	(0.488)
Week2T	0.0707	0.245
	(0.163)	(0.527)
Week2C	0.488***	1.094**
	(0.140)	(0.445)
Week1T	-0.193	-0.0303
	(0.159)	(0.518)
Constant	5.144***	9.587***
	(0.256)	(0.729)
Observations	12,194	11,256
R-squared	0.030	0.007
Low Income Dummy	0	1
YEAR FE	YES	YES
MONTH FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 13. Total Violent Crime – Split by Median Income Neighbourhood

VARIABLES	(1) Total Violent Crime	(2) Total Violent Crime
Week5T	0.0107	0.0480
	(0.129)	(0.515)
Week4T	-0.00347	0.317
	(0.132)	(0.534)
Week4C	0.0622	0.136
	(0.108)	(0.488)
Week3T	0.747***	2.708***
	(0.157)	(0.590)
Week3C	0.511***	1.899***
	(0.116)	(0.474)
Week2T	0.0450	0.273
	(0.131)	(0.509)
Week2C	0.432***	1.155***
	(0.114)	(0.430)
Week1T	-0.112	-0.118
	(0.129)	(0.500)
Constant	4.009***	10.82***
	(0.220)	(0.702)
Observations	12,194	11,256
R-squared	0.034	0.010
Median Income Dummy	0	1
YEAR FE	YES	YES
MONTH FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 14. Vehicle Collision – Split by Neighbourhoods with Less versus More than 20 Percent of Low-Income Households

VARIABLES	(1) Vehicle Collsion	(2) Vehicle Collision
Week5T	0.00454	0.0409
	(0.0513)	(0.0673)
Week4T	0.0258	0.0694
	(0.0530)	(0.0663)
Week4C	-0.0225	-0.0470
	(0.0426)	(0.0545)
Week3T	0.128**	0.212***
	(0.0582)	(0.0752)
Week3C	0.0773*	0.212***
	(0.0461)	(0.0598)
Week2T	-0.0547	-0.165***
	(0.0512)	(0.0619)
Week2C	0.0768*	0.0528
	(0.0458)	(0.0579)
Week1T	-0.0331	-0.0171
	(0.0516)	(0.0660)
Constant	1.285***	1.548***
	(0.0817)	(0.0968)
Observations	12,194	11,256
R-squared	0.034	0.028
Low Income Dummy	0	1
YEAR FE	YES	YES
MONTH FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 15. Vehicle Collision – Split by Median Income Neighbourhood

VARIABLES	(1) Vehicle Collision	(2) Vehicle Collision
Week5T	0.0179	0.0265
	(0.0416)	(0.0705)
Week4T	0.0280	0.0670
	(0.0426)	(0.0701)
Week4C	-0.0180	-0.0519
	(0.0338)	(0.0574)
Week3T	0.101**	0.241***
	(0.0477)	(0.0788)
Week3C	0.124***	0.161**
	(0.0379)	(0.0625)
Week2T	-0.0648	-0.154**
	(0.0396)	(0.0666)
Week2C	0.0813**	0.0479
	(0.0376)	(0.0608)
Week1T	0.0215	-0.0763
	(0.0430)	(0.0689)
Constant	1.014***	1.842***
	(0.0667)	(0.104)
Observations	12,194	11,256
R-squared	0.033	0.035
Median Income Dummy	0	1
YEAR FE	YES	YES
MONTH FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1