From one election to another, crime remains one of the biggest social and political issues, and it is a favourite subject of campaign promises by politicians. Crime imposes large costs onto society which are not taken into account by official measures of well-being and happiness of the nations. In addition, crime responds to economic conditions and incentives, which is well accepted among economists ever since the seminal papers by Garry Becker (Becker, 1968) and Isaac Ehrlich (Ehrlich, 1973). According to the standard economic model of crime, an individual’s criminal activity depends on total income from legal activities, the preferences of the individual, and exogenous factors that affect the probability of arrest and the sanctions imposed. Despite the substantial work in the area, the public seems largely unaware of the economics view of crime and its implications.

From an economic perspective, crime is easily described in a supply-and-demand framework in which criminals supply crime, the public demands protection from crime, and the government provides public protection (Becsi, 1999). The supply of crime is seen as a choice between legitimate activities and work on the one hand and criminal activities on the other. The choice depends on the net benefit to crime, which is the benefit of the criminal activity above all other costs associated with the crime. Eide (2000) gives a thorough overview of benefits and costs of crime. Gaines obtained from criminal activity depend on the type of crime and the individual criminal, and can be monetary or psychic (thrill of danger, peer approval, sense of accomplishment or satisfaction of wants in case of rape). Costs of crime include direct and indirect (opportunity) costs. Direct costs of crime are material costs (equipment, guns, vehicles), psychic costs (guilt, anxiety, fear, dislike or risk), and expected punishment costs (fines, incarceration, and other sanctions, as well as pecuniary costs arising from lawsuits). Opportunity costs of crime consist of net benefit (benefit minus cost) of the legal activity forgone while planning, performing, and concealing the criminal act. For example, education and welfare might be thought to increase the opportunity cost of committing crime by increasing legitimate earnings. The supply of crime is positively related to the net benefit to criminal activities, meaning that criminals will increase their activities when the net benefit rises. Examples of conditions that might cause a rightward shift of the supply curve include demographics (a higher proportion of youth), fewer employment opportunities at a given wage, and reductions in imprisonment. While property crimes might be thought of as most responsive to economic conditions, many violent crimes are committed as by-products to crimes for economic gain and thus are also explainable with economics.
This dissertation mainly focuses on the supply side of crime, analysing the relationship between crime and economic incentives using aggregate (national) time series data (US and UK), aggregate cross-sectional data (UK), and individual survey data (Australia). The main purpose of this study is to show empirical evidence that if we consider crime as a rational behaviour, then economic and social levers should be the main tools of a society in order to prevent and combat crime.

Chapter 2 focuses on crime trends in the United States, particularly in Virginia. Historically, crime trends in the US have been increasing through the 1960s and 1970s, have radically been reversing the trend through the 1980s, in order to see a dramatic fall in crime in almost all categories in the 1990s. Levitt and Dubner (2005) writes that the 1960s and the 1970s were “the heyday of a liberal justice system and the criminal’s right movement” – the likelihood of punishment was so low that it simply did not cost very much to become a criminal. However, by the 1980s this trend has radically reversed. Criminals’ rights were limited and stricter sentencing guidelines were put in place. During the 1990s, almost all states in the US adopted one or more mandatory sentencing laws. They all had one thing in common: they all imposed mandatory, statutory increases in prison sentences on individuals who were already going to be imprisoned. However, there is still a large debate among criminologists and policy makers as to which factors contributed to the crime-drop in the US in the 1990s (e.g., legalized abortion 20 years earlier, expanding economy, community policing, changes in crack and other drug markets, and/or higher arrest and incarceration rates). Levitt and Dubner (2005) write that a sharp drop in crime throughout the US in the 1990s have been mainly explained by increased reliance on prisons, increased number of police officers per capita, the crash if the crack market, and the legalisation of abortion. This chapter tries to contribute to better understanding of the statistical relationship between anti-crime efforts and crime reductions over time, using data for Virginia, in the period from 1984 to 2006.

We examine the impact of the new legislation in Virginia on reported property (burglary, larceny, motor vehicle theft, and robbery) and violent (aggravated assault, murder, and forcible rape) crime rates using different time series approaches. Virginia abolished parole and reformed sentencing for all felony offenders committed on or after January 1, 1995. The net result of the implementation of the new legislation was a substantial increase in the sentences for the violent offences (especially rape and murder) and also for offenders with a violent past. Although property crimes have not been directly targeted by this new legislation, increases in prison sentences have also been anticipated for some categories of property crimes (burglary and robbery in particular). To the extent that severity of punishment serves as a deterrent to committing crimes, we would expect that the Virginia’s anti-crime initiatives reduced the reported crime rates, especially for violent offences.

Virginia’s abolition of parole and reform of the sentencing system provides a useful social experiment to study. First the legislation was very sweeping and impacted all felonies. Further, such sweeping legislation was enacted at a time in which there were very large (and favourable) changes in a number of social and economic indicators. Finally, the 1990s also saw the implementation of a number of initiatives focused on reducing crime at the Federal, State and Community levels. Disentangling the impact of parole abolition from the other factors poses multiple design and analytical challenges.
We examine the impact of this new legislation in Virginia on reported crime rates using different time series approaches. In particular, structural time series models and Box-Jenkins ARIMA models are considered. Both time series approaches provide effective methodologies for intervention analysis. The new legislation is modelled as the level shift or step intervention, where the value of the level of the crime time series instantly changes at the time point when the intervention takes place, and where the level change is permanent after the intervention. The empirical literature provides some but limited support for the deterrent impact of parole abolition and sentence reform in Virginia. Further, Kessler and Levitt (1999) report that previous research on the impact of sentence enhancements on reported crime rates in the United States has reported conflicting findings and often find no effect (see for example Loftin et al., 1983). We confirm these findings based on univariate time series models. We also consider a parsimonious framework of multivariate structural time series models, which allow the inclusion of control groups in the analysis. We illustrate the flexibility of the multivariate approach and provide new evidence for the deterrent impact of the new legislation.

This chapter contributes to the existing literature as follows. First, we see it as a comprehensive evaluation of the new legislation. According to the Virginia crime officials, research to date was unable to determine if the observed reductions in crime rates were due to specific anti-crime initiatives. Second, we view our work as an introduction of structural time series (STS) methods to crime data analysis. To our knowledge, the STS estimation approach has not been used extensively in crime analysis. On the other hand, the regression and especially the ARIMA models have been widely used in the criminal justice literature. Hence, we view the present chapter as a potential contribution to time series methodology in criminology. Third, when dealing with time series, proposed models for analysing the intervention effects of parole abolition and sentence reform in Virginia clearly favour ARIMA and/or structural time series approaches to modelling intervention.

Chapter 3 focuses on the crime trends in the United Kingdom. Particularly, we look at the effect of a business cycle on property crime rates (burglary and theft) in England and Wales throughout the second half of the twentieth century. In the UK crime also increased rapidly through the 1970s and 1980s, reaching record levels by the start of the 1990s, becoming an important public policy issue. The increase was far greater than that experienced in the rest of Europe. Moreover, property crime rose rapidly in the UK through the 1970s, 1980s, and early 1990s. Literature shows that the level of property crime in England and Wales was higher than in the US through the mid-1990s (Machin and Meghir, 2004).

The business cycle has a pervasive effect on the structure of economic opportunity and hence on behaviour. The effect is reflected in social indicators as diverse as school enrolments, birth rates, and labour force participation. It would be then surprising if crime rates were immune to general business conditions. Cook and Zarkin (1985) write that “the relationship between general business cycle condition and crime has been a popular subject of study for empirical criminologists since the mid-nineteenth century,” particularly in England and Wales (see for example Swaine-Thomas, 1927 and Wolpin, 1978). Literature suggests that property crimes have a counter-cyclical pattern, falling and rising along with the ups and downs of the cycle in economic activity, while violent crimes are not so much business cycle driven (except maybe for robbery, which has a clear
for-profit motivation).

In order to study economic-induced behaviour in recorded burglary and theft data in England and Wales in the period from 1955 to 2001, we adopt both univariate and multivariate time series frameworks within the unobserved components models. We explicitly model the business cycle as a stationary autoregressive moving average (ARMA) process, which is a novelty of our approach as compared to the existing examinations of the effect of a business cycle in the crime economics literature. In the multivariate structural time series framework, we have simultaneously modelled the time series of burglary and theft together with the time series of real GDP, unemployment, and police. The second contribution of this chapter is the simultaneous analysis of crime (burglary and theft), economic (GDP and unemployment), and deterrence (police) time series. We also account for various other variables that can explain variations in crime rates, like criminal justice variables (conviction rate, sentence length, and imprisonment), demographic variables (male, youths aged 15-24 years), the effect of a change in recording practice (a dummy variable accounting for the introduction of the Theft Act in 1968), and the effect of number of police officers. We find strong evidence for cyclical behaviour in burglary and theft crime rates. However, we find no evidence of a separate crime cycle, it can be fully explained by economic cyclical behaviour. The explanatory variables affect more the short-term dynamics than the long-term dynamics.

A seminal paper by Cantor and Land (1985) built foundations for the macroeconomic link between economic conditions and crime. They propose two paths through which the business cycle could affect the level of crime. Criminal motivation works through the impact of changing economic conditions on social strain and social control, whereas criminal opportunity affects the availability and vulnerability of criminal targets through routine activities theory. The two effects run in opposition to each other and they need not occur at the same time. The third contribution of this chapter is that the model detects the motivational and opportunity effects of burglary and theft in relation to economic conditions.

Crime is widespread among young people, particularly young men. Examples in the literature abound. Rutter et al. (1998) report that a significant minority of young people will go on to acquire a criminal record at some point in their adolescence. The UK Home Office analysis of two cohorts of people born in 1953 and 1958 shows that approximately a third of male adults had been convicted of at least one standard list offence by their thirties (Home Office, 1995). Many of these convictions were as a result of offences committed before adulthood. In their longitudinal study of 411 males in inner London followed from age 7 into adulthood, Farrington et al. (1998) report that the average criminal career began at some point between 14 and 21 years, lasted ten years, ended at about age 26, and (for those who committed more than one offence) consisted of 4.6 offences leading to conviction. This relationship between age and crime is robust over time, across countries, demographic subgroups, types of crime, and holds irrespective of the way the crime is measured (Hirschi et al., 1983). In the US these numbers are similar. Grogger (1998) writes that thirty-five percent of all Philadelphia males born in 1945 were arrested before the age of 18, and one-third of all California men born in 1956 were arrested between the ages of 18 and 30. The 1990 US Census counted 1.1 million persons in jail, the vast majority of who were men in their twenties and thirties.
In chapter 4 we argue that one of the main causes of high numbers of crime among young people are due to the early school drop-out and reduced years of education, which then have repercussions on individual’s labour market productivity and legal versus illegal income opportunities. Conceptually, there are difficulties in isolating the impact of education. Specifically, it is difficult to guarantee that the direction of causation flows from education to crime (and not the other way round). To address this problem we adopt a quasi-experimental approach relying on variations in education induced by changes in compulsory school leaving age laws in England and Wales over time to validate the direction of causation. We look at the relationship between crime and education using two British data sources. The first, the Offenders Index Database (OID) covers all convictions in England and Wales, and we match this to Labour Force Survey data on education for age cohorts over time. The second is data on imprisonment from the 2001 Census, where we look at crime and education in a large cross-section of the British population.

Our results show sizeable effects of education on crime. Moreover, empirical estimates from the instrumental variables strategy that we adopt are, when we use an education variable that is best suited to this approach, rather similar to those that are just based on ordinary least squares regressions that may not have a causal interpretation. In our empirical models of property crime convictions, we report that having low education levels, especially possessing no educational qualifications, is significantly associated with higher levels of offending. We corroborate this with cross-sectional findings on imprisonment and lack of educational qualifications from the 2001 Census. The implications of these findings are clear and they show that improvements in human capital accumulation through the education system or other means that can be showed to be effective for enhancing individual labour market productivity and should be thought of as a key policy tool in the drive to reduce crime. In words of Eide (2000), “young people are perhaps not different, just poorer.”

In chapter 5, we address the relationship between human capital and crime using data of a sample of young Australian twins. We exploit two aspects of the Australian survey data on education and crime. First, because the data are obtained from twins, we are able to control for many unobserved characteristics affecting both criminal behaviour and schooling decisions. Second, because criminal behaviour is measured over different periods of time – prior to and after senior high school completion – we can address the causality between crime and education as well. Since early criminal behaviour may affect human capital formation, and human capital may influence criminal behaviour in later stages of life, we follow a two step analysis.

First, we study the relationship between early crime and the accumulation of human capital. In particular, we estimate the effect of arrests before the age of 18 on educational attainment by using within-twin estimation. In addition, we investigate whether the timing of the arrest matters for educational attainment. Second, we estimate the effect of educational attainment on three measures of crime: incarceration, arrests since the age of 18, and number of arrests. As early criminal behaviour might be an important confounder in the estimation, we control for early arrests and measures of conduct disorder within pairs of twins.

This chapter contributes to the economic literature on the relationship between education and crime in several aspects. First, we add to the not so abundant literature on the
causal relationship between education and crime and use an identification strategy that
has not been applied in this context before – that is, we exploit the longitudinal nature of
our data in order to estimate the relationship between human capital and crime in both
directions. Second, we investigate the effect of early criminal behaviour on investment in
human capital while controlling for fixed effects within pairs of twins. We are not aware of
studies in the economic literature that estimate the causal effect of early criminal activity
on educational attainment. Third, there is growing interest in the economic literature
over the effects of early conditions in life on adult outcomes (Currie and Stabile 2006,
2007; Borghans et al., 2008). This chapter addresses similar issues.

We find that early arrests (arrests before the age of 18) have a strong effect on human
capital accumulation. These effects are largely driven by the timing of the early arrest,
showing that arrests at age 13, 14 or 15 are most detrimental for educational attainment.
We also find human capital to reduce crime. However, when controlling for early arrests
and early behaviour problems, the estimated effect of human capital on crime reduces
to less than a quarter of the previously estimated association. The strong detrimental
effects of early criminal behaviour become also transparent if we consider the estimated
effects of early arrests on all three measures of crime. We then find large effects of early
criminal behaviour on participation in crime later on. These effects are much larger than
the (isolated) impact of human capital on crime. We conclude that the strong association
between human capital and crime is mainly driven by the effect of early criminal behaviour
on educational attainment. Programs that succeed in preventing early criminal behaviour
might yield high social and private returns.

Benefiting further from the data on Australian twins, in chapter 6 we analyse the
effect of early behavioural problems on human capital accumulation, where we see crime
as a negative human capital (“building capital in anti-social or criminal activities,” Currie
and Stabile, 2007). Literature shows that many children have mental health problems
which hinder their normal development and functioning. Anxiety, conduct disorder, at-
tention deficit hyperactivity disorder, and depressive disorders are the most common. For
example, up to 500,000 (14%) of Australian children between the ages of 4 and 18 years
have significant mental health problems (Australian Centre for Community Child Health,
2006); up to 50% of ‘hard to manage’ pre-school children are likely to have continuing
hardships requiring professional help; approximately one in five children and adolescents
in the US may have a mental health disorder (Currie and Stabile, 2006). Despite these
large numbers little is known about the longer term effects of these mental health problems
of children.

This chapter analyses the longer term effects of childhood conduct disorder on human
capital accumulation and violent and criminal behaviour later in life using data of Aus-
tralian twins. If someone shows “a repetitive and persistent pattern of behaviour in which
the basic rights of others or major age-appropriate societal norms or rules are violated,”
then he/she falls into a category of individuals with a conduct disorder problem. Conduct
disorder is known as a ‘disruptive behaviour disorder’ because of its impact on children and
their families, neighbours, and schools, and is largely associated with delinquent or crim-
inal activity. We measure conduct disorder using diagnostic criteria from the American
Psychiatric Association (APA, 1994). In line with Currie and Stabile (2007) we estimate
effects on positive human capital, including measures such as grade repetition, marks in
primary and high school, and educational attainment, and on ‘negative’ human capital, including measures such as being arrested, spent time in jail, and physically attacking others.

The two main challenges in estimating the longer term effects of childhood conduct disorder on human capital are the measurement of conduct disorder and omitted variable bias. This chapter contributes to the economic literature by addressing these two main challenges. First, it is easy to know when a child has a fever but a child’s mental health problem is harder to identify. We use self-reports of adult twins on 21 statements that follow the definition of conduct disorder according to the American Psychiatric Association criteria. Another contribution of this chapter is that we also have information on the age at which the conduct disorder behaviours occurred. We use this information for investigating the effects of the timing of the problem behaviours on human capital. Second, estimates of the effect of conduct disorder on human capital might be confounded by unobserved differences between children and their families. In this chapter we estimate within-family models using data on (identical) twins. The advantage of using twins instead of siblings is that the family circumstances for twins will typically be more similar than with siblings. More importantly, identical twins are genetically identical, whereas siblings, on average, share only half of their genetic endowments. Therefore, using data on twins, in particular genetically identical twins, may reduce the bias caused by heterogeneity within families.

We find large deleterious effects of conduct disorder on positive and negative human capital, even within pairs of identical twins. Conduct disorder increases the probability of grade retention and not completing high school. In addition, conduct disorder behaviours measured before the age of 18 have a strong effect on violent and criminal behaviour since the age of 18. For instance, within pairs of identical twins we find that conduct disorder reduces the probability of high school graduation with 4 to 13 percentage points and increases the probability of being arrested with 7 to 16 percentage points. Another important finding is that the effect of conduct disorder on human capital is more deleterious if these behaviours occur earlier in life. Various robustness checks, for instance sensitivity analyses that address the issues of measurement error and spill-over effects within pairs of twins, suggest that our main estimates may be lower bounds of the true effect of conduct disorder on human capital. We conclude that childhood mental health problems have high human and financial costs for families and society at large. Effective treatment early in life may yield high returns.