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Abstract

We seek to determine whether one of the unanticipated side-effects of social and economic changes associated with the adoption of neoliberal and monetarist economics during the 1970s/1980s was rising crime rates. Undertaking time series analysis of social and economic determinants of property crime (using official statistics on recorded crime for England and Wales from 1961 to 2006) we develop a model of the effect of changes in socio-economic variables (unemployment, inequality, welfare spending and incarceration) on property crime rates. We find that while three of these had significant effects on change in the property crime rate, income inequality did not. We conclude with a discussion of the extent to which neoliberal economic and welfare (and later criminal justice) policies can be held to have influenced the property crime rate since the early 1980s and what this tells us about the social and economic determinants of crime at the macro-level.

1. Introduction

The radical agendas of the Thatcher governments between 1979 and 1990 are widely accepted to have had a great influence on many areas of modern life in Britain — both at the
time and in the period since Thatcher left office. Such influence has been identified in housing, education policies, social security and, of course, the economy (e.g., Marsh and Rhodes, 1992). In particular, macroeconomic policies were associated with increases in unemployment and economic inequalities. The post-war goal of full employment was abandoned, and the economy was given a dose of ‘tough medicine’ to help cure the inflationary disease of the 1970s — in particular through neoliberal and monetarist policies of economic liberalisation, labour market reform and weakening of power of the trade unions. Unemployment became viewed as an unfortunate side-effect of the tough love that needed to be administered to the British economy. Long since this period, these structural changes in Britain’s socio-economic settlement have persisted, with rising economic inequality mirroring the experience across the Atlantic (see Bartels, 2008; Hacker and Pierson, 2010). Despite the longstanding credentials of the Conservatives on law and order, criminal justice did not receive as much attention from the Thatcher governments as other areas of policy (Loader, 2006; Farrall and Hay, 2010). Instead, Thatcherism shifted its focus from policy arena to policy arena, with the policies promoted in one (for example, the economy or housing) cascading into others (such as crime, see Hay and Farrall, 2011).

It has been argued that macroeconomic outcomes are not wholly exogenous to political choice, with political parties delivering different configurations of economic performance (Alt, 1985a, 1985b; Hibbs, 1977, 1987), such as reduced unemployment but higher inflation under governments of the left, and the reverse under governments of the right. Further, studies of the economy–crime link suggest that crime rates, in turn, are not wholly exogenous to structural and cyclical aspects of macroeconomic policies and outcomes, with higher rates of offending associated with higher levels of unemployment and economic inequality (e.g., Freeman, 1983; Cantor and Land, 1985; Chiricos, 1987; Land et al., 1990; Hale and Sabbagh, 1991; Pyle and Deadman, 1994). Since both these observations are consistent with the broad trends observed in Britain during the 1970s and 1980s, in this paper we explore whether one of the unanticipated side-effects of the macroeconomic outcomes associated with neoliberal and monetarist economics during the 1970s and 1980s (i.e. higher levels of unemployment and income inequality) was rising crime rates. This is consistent with the claim that the major impact of the Thatcher governments on crime was felt ‘downstream’ as a result of abrupt shifts in policy elsewhere (Farrall and Hay, 2010). We explore this theoretical proposition using time series data from the 1960s, focussing in particular on the economic changes during the 1970s and 1980s and beyond, and their effects on rates of offending. In particular, our findings suggest that changes in crime rates are strongly related to economic variables and, further, that this relationship is structured in time.

We begin the rest of the paper by reviewing what is known about long-term trends in crime from the 1960s and the relationship between social and economic change and crime. Further, we theorise the mechanisms through which individual-level behaviour, at the micro-level, gives rise to aggregate trends in national crime rates, at the macro-level. While there has been much methodological discussion of time series characteristics of national crime rates (inter alia, Pyle and Deadman, 1994; Hale, 1998; Greenberg, 2001; Cook and Cook, 2011), there has been little substantive theorisation of the processes through which heterogeneous patterns of offending at the level of the individual give rise to persistence at the aggregate level (‘nonstationarity’).

1Norman Lamont, Chancellor of the Exchequer from late-1990 to May 1993 remarked in May 1991 that “…Rising unemployment and the recession have been the price that we have had to pay to get inflation down. That price is well worth paying”.
National crime rates are a function of data-generation processes at the individual-level, and understanding of these should inform statistical tests and debates.

Following this, we develop a model of the effect of socio-economic outcomes on property crime rates, conditional on time. This identifies variation over time in the marginal effect of unemployment and income inequality on crime, suggesting that the relationship between the economy and crime is structured in time. We conclude with a discussion of the implications of these findings, in particular the idea that crime rates are not exogenous to economic outcomes, while macroeconomic performance itself is not exogenous to political choice. Together, this set of observations provide insights on the social and economic changes experienced in the 1980s and the degree to which the present economic climate might repeat some of the aspects of that experience and what the consequences might be for crime levels.

2. Long-term trends in crime and social and economic change

From the 1960s and 1970s onwards, crime rates started to rise in countries across the western democratic world, peaking in a number of countries some point during the late 1980s or the early 1990s. Such a trend was observable in the rate of both property and violent crime.

While there have been numerous accounts of these trajectories of offending, a puzzle remains. What caused the apparent breakdown of law and order in advanced democracies observed during the 1960s, 1970s and 1980s and its subsequent reversal in the 1990s? The longitudinal pattern of persistence and change at the aggregate level perhaps offers the best prospect for an answer to this question. Previous studies of the economy-crime nexus tend to make little reference to the quite fundamental social and economic changes that were experienced during the 1970s and 1980s, in the aftermath of the post-war era. Despite this period of instability, programmes of welfare state retrenchment and economic reform coincided with the upward trend in crime rates on both sides of the Atlantic, encapsulated in clear parallels between the macroeconomic policies of the Reagan administrations in the US and the Thatcher governments in Britain — in particular of fiscal retrenchment, economic liberalisation, labour market reform and privatisation.

In the British context, sustained economic crises in the 1970s led to a collapse of post-war Keynesian consensus (Kavanagh and Morris, 1989), the rise of monetarist theories (Kerr, 2001) and dramatic reform of the institutions of government (Moran, 2003). The problem of sustained rises in crime became politicised as political parties competed on the issue — with the Conservative government promoting its reputation for maintaining law and order throughout the 1980s (Farrall, 2006) and the Labour opposition seizing back the political agenda in the 1990s, as Shadow Home Secretary Tony Blair famously declared it was time to be “tough on crime, tough on the causes of crime”.

Long-term persistence, trends and fluctuations in crime rates are critical for understanding underlying processes of social, economic and political change — both for the past and for the future. This paper undertakes analyses of socio-economic determinants of property crime (i.e. crime related to theft, burglary, fraud and other forms of property crime), based upon official Home Office recorded crime statistics. Specifically, the analyses use annual time series data on the unemployment rate, income inequality, welfare expenditure and the incarceration rate from 1961 to 2006 to explore the impact of neoliberal and monetarist economics and its outcomes — most prominent under the Thatcher governments, but also of influence both under
their predecessors and successors — on crime rates. To do so, we first consider the mechanisms through which individual-level behaviour gives rise to aggregate trends in national crime rates, and in particular the degree of persistence observed both in socio-economic outcomes and in incarceration rates and rates of offending (H1). We then estimates time series regression models of the effects of change in these variables (H2) and the degree to which these effects are conditional upon time for unemployment and income inequality (H4). This model calculates the marginal effect of the relationship between unemployment, income inequality variables and property crime, finding that the impact of unemployment has strengthened over time. This suggests not only that the causes of the rise in property crime rates during the 1970s and 1980s were economic in nature, but also that the economy-crime link is contingent in time. We discuss a number of theoretical issues, as a basis for formulating our hypotheses.

2.1. The micro-foundations of macro-level trends in crime (H1)

The nature of the relationship between macroeconomic outcomes and national crime rates is a topic of longstanding enquiry and some contention (e.g. Wolpin, 1978; Cohen and Felson, 1979; Cohen et al., 1980; Field, 1990; Pyle and Deadman, 1994; Greenberg, 2001; Cantor and Land, 2001; Levitt, 2001; Rosenfeld and Messner, 2009), in particular with respect to the effect of unemployment rates on crime (e.g. Tarling, 1982; Cantor and Land, 1985, 1991; Hale and Sabbagh, 1991). Overall, the economic cycle is widely thought to be a coincident or leading indicator of criminal behaviour, in the aggregate. Some attribute the observed link between economic conditions and crime rates to behavioural motivations and contextual effects at the individual level (e.g. Cantor and Land, 1985). Others are more sceptical about causation at the level of the individual behaviour regardless of findings at the aggregate level (e.g. Levitt, 2001; Greenberg, 2001). The specification and interpretation of macro-level models of crime itself often divides opinion (e.g. Levitt, 2001; Cantor and Land, 2001; Greenberg, 2001). Levitt (2001) argues that although national time series data enables the description of long-term trends and dynamics in aggregate-level variables, these overlook variations and causal relationships in local level data, such as from the effects of geographical or demographic factors. While national crime rates do not explain behaviour at the individual level, these nevertheless reveal central tendencies of the distribution of the entire population, as regularities emerge from stochastic processes at the level of the individual.

By construction, national level measures of offending and socio-economic outcomes capture the level of, and change in, an aggregation of a large number of individual states in a total population. Trends in national crime rates occur because a wide range of social and economic changes shape the behaviour of a large number of individuals in the same direction. Often, debate has centred upon the degree to which crime rates measured at the aggregate level exhibit memory of past shocks (inter alia, Pyle and Deadman, 1994; Hale, 1998; Greenberg, 2001; Cook and Cook, 2011). This is of substantive consequence. Stationary data processes have a constant mean, variance and autocorrelation structure over time. This means that the effects of shocks are not

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2One of the benefits of time series analysis is that it avoids the “neat periodisations” of history which produces a discontinuous approach to the subject matter (Loader and Sparks, 2004, p. 21). Ideally one would like to be able to employ time series which extend as far back as possible, in particular to 1945. However, reliable continuous data is difficult to obtain this far back in time (and where it can be found is often subject either to changes in recording practices or to infrequent observations). In our case, we consider that 1961 to 2006 is a sufficiently long time period. Further, this is the date from which annual time series data on income inequality are available.
additive, so are forgotten over time, and the process is mean reverting. On the other hand, ‘unit root’ processes possess perfect memory of past values. For these, effects of shocks are not discounted over time, and instead accumulate as the series wanders from its mean over time.

The data-generating processes for such aggregate level measures are, however, to be found in theorisation concerning the individual level, rather than just in debates over knife-edge statistical tests for stationarity. The aggregation of heterogeneous individual-level behaviour is a fundamental feature of measurement of national crime rates and, therefore, drives long-term trends in offending. Because individual-level behaviour is heterogeneous, macro-level measures of behaviour, such as offending, are ‘combined processes’ (Wlezien, 2000), in which the effects of shocks persist indefinitely for some individuals (those with strongly autoregressive tendencies) and dissipate for others. This is consistent with our theoretical expectations concerning offending behaviour. Shocks to the behavioural state of some individuals that lead them to commit criminal acts, such as offending, might not persist in the longer-term. Other individuals might, instead, continue to offend for far longer periods. Changes in offending behaviour that arise from cyclical or structural economic factors (which themselves are highly persistent, Nelson and Plosser, 1982) might, therefore, be expected to persist for some individuals even after contextual effects (e.g. Cantor and Land, 1985) or opportunity and motivation effects (e.g. Kleck and Chiricos, 2002) have long since dissipated. Such thinking about data-generation processes offers theoretical foundations for a general stochastic model of how shocks to heterogeneous individual-level behaviour produce trends and persistence in macro-level processes, i.e. crime rates. Whether or not it is possible to ascribe underlying causal mechanisms to aggregate level dynamics, these nevertheless capture the degree to which individuals remain in a defined behavioural state for a given period of time.

An important feature of such combined time series processes — which consist of both stationary and unit root processes at the individual level — is that these are unit root (nonstationary) when aggregated (Wlezien, 2000: 80). Even if the behaviour of just a small fraction of individuals is highly autoregressive, with shocks cumulating, this produces persistence in long-term trends, with expanding variance over time. This gives rise to the persistence in offending behaviour observed in national crime rates. Changes in the economic climate or income distribution lead to stochastic variation in individual-level circumstances, and therefore offending behaviour, with such effects persisting longer in some individuals’ behaviour than in others (Craine, 1997). In light of the economic shocks of the 1970s and 1980s, we hypothesise that the consequences were changes in a) some individuals’ immediate offending trajectories and, as a direct function of this, b) crime rates at the national level. The persistence of time series processes can, therefore, illuminate the nature of the data-generating process for both macroeconomic context and offending. We expect shocks to offending from macroeconomic outcomes to persist in future time periods, having long-term consequences that do not dissipate despite the subsequent improvement of economic conditions. This should be reflected in nonstationarity of macroeconomic outcomes and crime rates.

H1: National rates of offending exhibit persistence over time, giving rise to nonstationary processes.

2.2. The economy and property crime rates

Past studies associate numerous macro-level social and economic factors with increased incidence of burglary, theft and other forms of property crime — including variables such as
unemployment, consumption, income inequality, economic growth, consumer sentiment, demographics and welfare expenditure. Because studies are not direct tests of individual level behavioural theories of economic causation of criminal acts (e.g. Becker, 1968) there is a limited a priori basis for construction of macro-level models of the behavioural relationship between the economy and crime. Furthermore, effects that are weak — but nevertheless significant — can be lost in aggregation of both socio-economic and crime data. From the discussion above, however, it is possible to theorise a stochastic process through which economic shocks, observed at the macro-level, generate variations in individual-level behaviour, which persist for some while dissipating for others. This, in turn, gives rise to permanent shocks to the aggregate level of offending. Through adopting this theoretical approach, changes in macroeconomic outcomes can be viewed as influences that give rise to change at the individual level, which are ‘combined’ in trends of offending at the national level.

Drawing upon previous studies, we select two prominent measures of social and economic outcomes thought to have strong positive effects upon the national rate of property crime and which are also side-effects associated with the neoliberal and monetarist economics that emerged in the 1970s and became prevalent in the 1980s. In particular, the existing literature suggests coincident indicators of the economic cycle or economic conditions such as the unemployment rate (e.g. Cantor and Land, 1985; Hale and Sabbagh, 1991; Pyle and Deadman, 1994) and income inequality (e.g. Freeman, 1983; Chiricos, 1987; Land et al., 1990) contribute to increases in the rate of property crime as these produce economic need, inequalities and criminal motivation. For the purposes of these analyses we set to one side several other important social and economic variables — such as the positive effect of consumption (e.g. Beki et al., 1999) and, counter to this, the negative effect of welfare expenditure (e.g. Field, 1990). Overall, these literatures therefore inform our second and third hypotheses, focussing on unemployment, income inequality, welfare spending and the incarceration rate as features (or side-effects) associated with neoliberal policies and monetarist economics during the 1970s and 1980s. This suggests first that change in the unemployment rate and in income inequality have positive effect on the rate of property crime and that change in welfare spending and in incarceration rates have negative effects on the rate of property crime.

**H2:** Change in the unemployment rate and change in income inequality have positive effects on the recorded rate of property crime.

**H3:** Change in welfare expenditure and change in the rate of incarceration have negative effects on the recorded rate of property crime.

2.3. A conditional hypothesis of the economy and offending

Further to the importance of persistence in the economy-crime nexus, existing studies assume that effects of socio-economic variables on crime rates are constant across time. Yet it is quite conceivable that the link between economic conditions and crime could fluctuate over time. While the economic cycle might lead to variations in national crime rates the magnitude of impact of economic upturns or downturns could be dependent upon social context. For example, post-1945 western societies may have observed low levels of crime both because unemployment was low and because other social contextual factors — such as the post-war legacies of social cohesion and collectivism — restricted the effects of economic conditions on crime rates at that particular moment in time. We therefore test the hypothesis that the effect
of change in unemployment and the effect of change in income inequality on the rate of property crime rate change over time.

**H4:** The effect of change in the unemployment rate and the effect of change in income inequality on the rate of property crime is conditional upon time.

### 3. Data & analyses

To test these hypotheses, this paper uses longitudinal national level data on the per capita rate of recorded property crime in England and Wales and unemployment rates and income inequality — for the period between 1961 and 2006. The measure of property crime that is used in analysis is compiled from the official Home Office recorded statistics for England and Wales. This measure of property crime is an aggregate measure that is equal to the sum of crimes related to acquisition of property, goods, belongings or wealth. The composite measure from the Home Office statistics includes categories of offences that refer to theft and handling stolen goods, robbery, burglary, and fraud and forgery. The per capita transformation of the property crime data is calculated using mid-year population estimates of the Office for National Statistics. Property crime is the largest single category in the official recorded statistics. This ranges from between 95.0% in 1964 to 58.4% in 2006 of the total number of recorded crimes. The national rate of property crime per capita is plotted in Fig. 1. This reveals a steady rate of growth in the rate of crime from the 1960s up to the mid-1980s, after which there was a sudden increase that lasted up until 1992, and a decrease thereafter.

The introduction of revised counting rules in 1998 presents a challenge for longitudinal analysis of crime rates in England and Wales. The models that are estimated here use a multiplier transformation for post-1998 values to adjust for inflation in the number of recorded crimes due to the change. The value of this multiplier is equal to the ratio between the

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3Such a single-country study might be criticised for ‘methodological nationalism’ (Wimmer and Glick Schiller, 2002); that is the assumption that as a unit of analysis the nation state is an adequate reflection of modern society. While recognising that our analyses are restricted to national level data for a single case, we choose not to undertake a comparative analysis here for a number of reasons. First, such an approach might require us to pool data in a time series cross-sectional model, which would assume that there are similar data-generating processes for both changes and outcomes across countries and that the model intercept is the single point of difference between countries. Further, because different patterns of the conditional effect of economic factors on crime are expected at different points in time and in different social, political and economic settings, pooling data from multiple countries might cancel out significant determinants of crime rates. For example, the increasing effect of the unemployment rate on property crime in the UK might precede a similar dynamic in, say, the Netherlands by a decade or more, due to specific policy choices that affected patterns of offending. More detailed analyses of individual cases are therefore needed before one engages in comparative studies.

4Britain (and specifically here, England and Wales) represents a useful test case for several reasons. Firstly, it experienced trends in national crime rates that are comparable to other western countries. Britain also underwent a clear evolution of its prevailing macroeconomic consensus in the period after the Second World War: from the dominance of Keynesian policies during the post-1945 period to the emergence of monetarism in the 1970s and its ascendance in the 1980s and 1990s. Britain’s experience of political and economic modernisation was also interlinked with processes of social change — in its transformation of the settlement between policy elites, business and society (Moran, 2003). Secondly, macro-level data on recorded crime and a number of social and economic variables in England and Wales is available for this extended period — offering a sufficient number of observations for robust estimation and, in particular, for the rolling-window regressions considered later.

5See Appendix 1 for details of these and data on the national unemployment rate, income inequality, welfare expenditure and the incarceration rate used.
The number of property crimes recorded according to the old rules and the new counting rules in 1999. This creates an index of property crime based on relative change from year to year (which is possible without changes in the level due to counting changes). The difference between the new and adjusted series is illustrated in the appendix in Figure A1, along with the rate of self-reported property crime compiled from the British Crime Survey. These series exhibit similar, if not identical, trends. For time series purposes this data transformation is not considered a threat to inference because our dependent variable (property crime) is a first difference (i.e. change in property crime), whereas the adjustments in counting rules affect the level. This principle also applies to adjustment of the unemployment series to control for changes in counting rules. The robustness of results presented later was also checked through the inclusion of a dummy variable to account for this break in the series and the same substantive inferences were drawn from the results. We are unable to use British Crime Survey data for this analysis because its first wave was first conducted in 1982, but was conducted in biennial waves between 1992 and 1998 and only from 2000 was conducted on an annual basis. This would require the interpolation of a large proportion of missing data and would not facilitate analysis with the period before the 1980s.

The macroeconomic variables that are used in this analysis are presented in Fig. 2. These are income inequality (as measured with the Gini coefficient, after-housing costs) and the national rate of unemployment. Each of the measures exhibit trajectories that reveal particular aspects of long-term social and economic change in England and Wales. Cyclical fluctuations in unemployment (with slight upward drift) during the immediate post-war period preceded high unemployment during the 1980s, at a time when neoliberal and monetarist policies were used to dampen high inflation that had become so problematic during the 1970s. First under the IMF imposed reforms to the economic and social policy of the Callaghan government and later under the Thatcher governments, unemployment was part of the tough medicine — along with labour market reform and economic liberalisation — delivered as the cure for the inflation of the 1970s. The trend in the unemployment rate therefore reflects the timing of the shift of British government towards monetarist policies in economic management, as the breakdown of the
Phillips Curve\(^6\) forced a retreat from post-war Keynesian fiscal policies. In parallel with growth in unemployment, government spending on welfare increased throughout the 1970s and 1980s, falling briefly in the late 1980s at the same time as the drop in unemployment towards the end of the Thatcher government, but continuing to rise in the early 1990s, before levelling off under the Blair Government. With respect to criminal justice over the same period, the incarceration rate declined from the 1960s, reaching a low in 1982, and then rising at an increasing rate thereafter. This reflected the increasingly punitive nature of criminal justice policies after 1993.\(^7\) From the 1970s onwards, then, Britain encountered higher national rates of unemployment and income inequality, all at the same time as increasing crime rates. These trends all provide some insight into the nature of social and economic change in Britain over the post-war period.

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\(^6\)The Phillips Curve (now no longer used) describes the inverse relationship between unemployment and inflation (such that when unemployment is high inflation is low, and vice versa). The validity of the Phillips Curve diminished after the 1970s, when several prominent economies experienced both high levels of unemployment and high levels of inflation.

\(^7\)Within an aggregate-level framework some measures of policing, such as police numbers, are problematic because they are also lagging indicators of the crime rate as well as potentially acting as a deterrent to criminal behaviour. Police numbers are also subject to lagged effects from increases or decreases in public spending, which in the current context of austerity might reinforce the effects of economic variables on crime rates. We therefore do not test for deterrent effects of police numbers in our analysis.
3.1. Memory and persistence in social and economic change

Before examining the relationship between the unemployment rate, income inequality and property crime rates, over time, it is first important to determine the degree to which shocks persist and cumulate for these measures (H1). The Phillips and Perron (1988) rho test-statistics for the levels and first differences of unemployment, income inequality, welfare expenditure, the incarceration rate and the per capita rate of property crime suggest these are all integrated, I(1), processes — with the test statistic unable to reject the null hypothesis of the presence of unit root in each variable in level form but rejecting its presence in first differences. The results of these tests are presented in Table 1. This is consistent with previous claims about the long-memoried character of macroeconomic variables (Nelson and Plosser, 1982) as well as with the persistence of property crime rates, as illustrated in Fig. 1 and shown in previous studies (e.g. Hale and Sabbagh, 1991; Hale, 1998). We can be confident, then, that these socio-economic variables are nonstationary, with past shocks persisting into future time periods. At the aggregate level, stochastic shocks both to socio-economic variables and the rate of offending are carried forward, and are not quickly forgotten. Nonstationarity matters because the consequences of short-term fluctuations both in the economy and offending can be felt long after the event. This persistence means that the macroeconomic shocks and policies of the 1970s and 1980s continue to reverberate to the present, in the link between the economy and crime rates.

3.2. Time series regression models of property crime, the economy and time

Specification of time series models of the dynamic relationship between the economy and crime rates (e.g. Field, 1990; Hale and Sabbagh, 1991; Chamlin et al., 1992; Greenberg, 2001) requires careful attention to methodological details such as the stationarity of time series data (discussed above). We test both the effect of the unemployment rate and income inequality (H2) and the effect of welfare expenditure and the incarceration rate (H3) on the property crime rate using a time series regression model. We also test for the interaction of unemployment and inequality with time to determine how the effect of these variables changes over time (H4).

To consider the hypothesis that change in economic conditions, welfare expenditure and incarceration rates affect property crime rates (H2 and HH3) we model change (the first difference) in the dependent variable — i.e. the property crime rate — as a function of change in each of our independent variables — the unemployment rate, income inequality, welfare spending and the incarceration rate. It is necessary to use the first difference of each of these variables in order to avoid spurious inferences (Granger and Newbold, 1974) due to the nonstationarity of these variables in levels, as was shown in Table 1. Further, to consider the hypothesis that the economy-crime link is conditional upon time (H4) we interact a count variable (equal to 1 in 1961 and then adding 1 for each successive year thereafter) with the first difference of the unemployment rate and income inequality. These interactions are stationary in first differences, as also shown in Table 1. Inclusion of the constitutive term (time) along with

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8Interaction of the first difference of these variables with time does not introduce a second order unit root into the series as might be suspected, instead this interaction leads to a heteroscedastic series where the variance increases over time. Use of heteroscedastic errors in the regression analyses does not alter any inferences. Other methods for dealing with heteroscedastic errors such as weighted least squares are inappropriate in this case as the current weighting due to the interaction allows for the dynamic hypothesis to be tested.
unemployment and income inequality in the model allows for proper estimates and calculation of substantively meaningful marginal effects, conditional on time (see Brambor et al., 2006).

To consider the economy-crime link in its classic form (H2) we first estimate a model (model 1 in Table 2) that tests the effect of unemployment and inequality on the rate of property crime. Then, to determine whether these effects change over time (H2 and H4) we include the interaction of unemployment and income inequality with time (model 2 in Table 2). Finally, to control for the effect of other socio-economic factors that are known to exert downward pressure on crime rates, welfare spending and the incarceration rate (H3), we also include the first difference of these variables in our model (model 3 in Table 2). The fully specified model

Table 1
Tests for stationarity of macro-economic, macro-social and property crime indicators.

<table>
<thead>
<tr>
<th>Property crime rate (per capita)</th>
<th>Unemployment rate (%)</th>
<th>Time* Unemployment rate (%)</th>
<th>Income inequality</th>
<th>Time* Income inequality</th>
<th>Incarceration rate</th>
<th>Welfare spending (per capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips—Perron (levels)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Walk</td>
<td>−1.917</td>
<td>−3.693</td>
<td>−2.353</td>
<td>−0.137</td>
<td>0.643</td>
<td>2.328</td>
</tr>
<tr>
<td>Trend</td>
<td>−2.454</td>
<td>−4.334</td>
<td>−4.729</td>
<td>−5.755</td>
<td>−3.181</td>
<td>−0.618</td>
</tr>
<tr>
<td>Phillips—Perron (first difference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Walk</td>
<td>−28.138**</td>
<td>−26.048**</td>
<td>−17.795*</td>
<td>−47.933**</td>
<td>−20.515**</td>
<td>−26.192**</td>
</tr>
<tr>
<td>Observations</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
</tr>
</tbody>
</table>

1\( p \leq 0.10, \) \( ^* p \leq 0.05, \) \( ^** p \leq 0.01, \) \( ^*** p \leq 0.001, \) \( N = 46, \) Start = 1961, End = 2006.


Table 2
Time series regression models of change in the property crime rate.

<table>
<thead>
<tr>
<th>( \Delta )PROPERTY CRIME&lt;sub&gt;i&lt;/sub&gt;</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.31 (1.50)</td>
<td>2.15 (1.92)</td>
<td>0.92 (1.88)</td>
</tr>
<tr>
<td>PROPERTY CRIME&lt;sub&gt;i−1&lt;/sub&gt;</td>
<td>−0.04 (0.03)</td>
<td>−0.02 (0.06)</td>
<td>0.09 (0.06)</td>
</tr>
<tr>
<td>( \Delta )UNEMPLOYMENT&lt;sub&gt;i&lt;/sub&gt;</td>
<td>2.05** (0.64)</td>
<td>−1.65 (1.67)</td>
<td>−2.95† (1.65)</td>
</tr>
<tr>
<td>TIME( \ast )( \Delta )UNEMPLOYMENT&lt;sub&gt;i&lt;/sub&gt;</td>
<td>0.16* (0.07)</td>
<td>0.23** (0.07)</td>
<td></td>
</tr>
<tr>
<td>( \Delta )INEQUALITY&lt;sub&gt;i&lt;/sub&gt;</td>
<td>0.33 (0.66)</td>
<td>0.25 (0.96)</td>
<td>0.42 (0.88)</td>
</tr>
<tr>
<td>TIME( \ast )( \Delta )INEQUALITY&lt;sub&gt;i&lt;/sub&gt;</td>
<td>0.00 (0.05)</td>
<td>−0.02 (0.05)</td>
<td></td>
</tr>
<tr>
<td>( \Delta )BENEFITS&lt;sub&gt;i&lt;/sub&gt;</td>
<td></td>
<td>−0.28* (0.12)</td>
<td></td>
</tr>
<tr>
<td>( \Delta )PRISONPOP&lt;sub&gt;i&lt;/sub&gt; (per conviction)</td>
<td></td>
<td>−1.71† (0.76)</td>
<td></td>
</tr>
<tr>
<td>TIME</td>
<td>−0.07 (0.09)</td>
<td>−0.15 (0.09)</td>
<td></td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.21</td>
<td>0.28</td>
<td>0.39</td>
</tr>
<tr>
<td>Durbin—Watson ( h )-statistic</td>
<td>7.21**</td>
<td>5.63*</td>
<td>0.76</td>
</tr>
<tr>
<td>Breusch—Godfrey ( \chi^2 ) (1)</td>
<td>6.89**</td>
<td>3.75†</td>
<td>0.96</td>
</tr>
<tr>
<td>ARCH ( \chi^2 ) (1)</td>
<td>5.56*</td>
<td>5.95*</td>
<td>0.45</td>
</tr>
</tbody>
</table>

1\( p \leq 0.10, \) \( ^* p \leq 0.05, \) \( ^** p \leq 0.01, \) \( ^*** p \leq 0.001, \) \( N = 46, \) Start = 1961, End = 2006.
of property crime, unemployment, income inequality, welfare expenditure, the incarceration rate and time therefore takes the form:

\[
\Delta \text{PROPERTY CRIME}_t = \alpha_0 + \beta_1 \Delta \text{PROPERTY CRIME}_{t-1} + \beta_2 \Delta \text{UNEM}_t + \beta_3 \Delta \text{UNEM}_t \times \text{TIME}_t + \beta_4 \Delta \text{INEQUALITY}_t + \beta_5 \Delta \text{INEQUALITY}_t \times \text{TIME}_t + \beta_6 \Delta \text{BENEFITS}_t + \beta_7 \Delta \text{PRISONPOP}_t + \beta_8 \text{TIME}_t + \epsilon_t
\]

where change in the per capita rate of property crime (\(\Delta \text{PROPERTY CRIME}_t\)) is estimated as a function of change in the national unemployment rate (\(\Delta \text{UNEM}_t\)) and change in income inequality (\(\Delta \text{INEQUALITY}_t\)), and where an interaction term measures variation in the effects of both unemployment (\(\Delta \text{UNEM}_t \times \text{TIME}_t\)) and income inequality (\(\Delta \text{INEQUALITY}_t \times \text{TIME}_t\)) over time. Our count variable (\(\text{TIME}_t\)) also controls for the historical trend in property crime rates. The lagged value of the dependent variable (\(\text{PROPERTY CRIME}_{t-1}\)) measures the rate of correction in response to shocks to the long-run equilibrium. If there is a short-run deviation from that equilibrium, as the rate of property crime diverges from its long-run equilibrium, the parameter (\(\beta_1\)) measures the rate at which that relationship is restored to its status quo. This parameter should, by construction, be negative and between 0 and \(-1\). The closer it is to \(-1\), the stronger the rate of equilibration.

The results for the time series regression models are reported in Table 2. In model 1, testing the classic formulation of the economy-crime link (H2), we find that change in the unemployment rate has a positive and significant effect (2.05*) on the rate of property crime, consistent with past studies (e.g. Cantor and Land, 1985; Hale and Sabbagh, 1991; Pyle and Deadman, 1994) while change in income equality (0.33) is not significant at the 95% confidence level. If, however, we test for change in the economy-crime link over time (H4), in model 2, we find that the effect of change in the unemployment rate becomes negative and ceases to be significant at the 95% confidence level, while the effect of income inequality again is not significant. Instead, the interaction of change in unemployment with the count variable for time is positive and significant (0.16*). This provides some suggestion that the link between unemployment and crime has strengthened over time. (Note that both models 1 and 2 suffer from residual autocorrelation and should be treated with caution with regard to substantive inferences.) These results also hold, in model 3, when we control for the effect of variables thought to be associated with reductions in the rate of crime, welfare spending and the incarceration rate (H3). Here the effect of change in crime interacted with time (\(\Delta \text{CRIME}_t \times \text{TIME}_t\)) remains positive and significant (0.23*), while the effect of welfare expenditure (\(-0.28\)) and the incarceration rate (\(-1.71\)) are both negative and significant. Overall, these findings are consistent with theoretical expectations and past studies of the link between the economy and crime, in general and as advanced by Farrall and Hay (2010) specifically with regards to the impacts of certain socio-economic policies.

Tests for residual autocorrelation for the fully specified model (model 3) at the first lag generate acceptable values (i.e. insignificant at the 95% confidence level), using both the Durbin–Watson h-statistic (used here rather than Durbin’s d-statistic, because it is appropriate in the presence of a lagged dependent variable and in the absence of strict exogeneity) and Breusch–Godfrey chi-squared test statistic. Further, Engle’s Lagrange multiplier test for the presence of autoregressive conditional heteroskedasticity also generates acceptable values.
When presenting the results of aggregate-level models of the economy-crime link, it is important to reflect upon substantive interpretation of their effects in terms of actual values. For example, in model 1 a one point increase in the Gini coefficient (measured here on a scale between 0 and 100, rather than 0 and 1, to make the effect size more easily interpretable) is associated with a contemporaneous increase of 0.33 in the number of property crimes per thousand heads of population. Given that the Gini measure of income inequality tends to be more stable over time than the unemployment rate (as is illustrated in Fig. 2), this is quite a small effect in practice (and further is offset by its interaction with time, as discussed below).

For the effect of change in the unemployment rate in model 1 (2.05*), the coefficient indicates that a one-percentage point increase in the rate of unemployment is associated with an increase of 2.05 in the number of property crimes per thousand heads of population. For the population of England and Wales, the short-run interaction is therefore equal to an increase of 2.05 reported crimes. So, for a population of 50 million people, the effect would be equal to an increase of 102,500 reported crimes. The size of that effect can be compared with approximately 3 million reported property crimes in 2006. Further, the effect of an increase of £10 in welfare spending per capita is associated with a decrease of 0.28 in the number of property crimes per thousand heads of population, while a one-percentage point increase in the number of people incarcerated per conviction in England and Wales is equal to a decrease of 1.71 in the number of property crimes per thousand heads of population. For a population of 50 million, an increase of £10 in welfare spending per capita produces a drop of 14,000 in the total number of reported property crimes. In all the models, the effect of the lagged value of the rate of property crime is not significant at the 95% confidence level, indicating that shocks to the long-run equilibrium crime rate are not corrected.

While the results for the time series regression models provide confirmation that the link between the economy and property crime (H2) is structured in time (H4), to properly interpret these it is necessary to consider the marginal effects of change in each of the variables, unemployment and income inequality, on the property crime rate. The marginal effects are calculated as the linear combination of the effect of the first difference of each variable and its interaction with time. These are presented in Fig. 3. The marginal effects are plotted against the Y-axis using a solid line, with the corresponding 95% confidence intervals plotted with dashed lines. For change in the unemployment rate, for example, the marginal effect is equal to the combination of change in unemployment (ΔUNEMt) and interaction of that effect with time (ΔUNEMt*TIMEt). Through presenting the results in this manner it is possible to discuss variation in the relationship between the economy and property crime over time, as well as enabling the identification of points in time at which these become statically different from zero.

Taking the link between change in the unemployment rate and property crime first, it is evident this has strengthened over time, exceeding zero in the early 1970s, and first becoming significantly greater than zero (at the 95% confidence level) in 1980. In contrast to the estimates for change in unemployment, the marginal effects of change in income inequality are downward sloping, suggesting that the relationship between income inequality and the property crime rate has weakened over time. These effects are, however, not significant at the 95% confidence level. As noted above, this finding is perhaps due to the fact that the property crime rate fell while income inequality continued to rise (albeit more slowly) in the 1990s and 2000s.

\[ \text{MARGINAL EFFECT}(X_t) = \beta_1 X_t + \beta_2 (\text{TIME}_t \times X_t). \]
Our results therefore show a strengthening link between the unemployment rate and property crime, which emerged sometime in the late 1970s, and unfolded under the Thatcher, Major and Blair Governments. Such findings lend support to the idea that outcomes of neo-liberal and neo-conservative social and economic policies during this period altered not just the economic base but also the nature and strength of the relationship between the economy and other important areas of concern (Harvey 2005; Leys 2001; Offer 2006), in this case crime (Farrall and Hay, 2010). One of the advantages of testing the interaction of the unemployment rate and income inequality with time, and their marginal effects, is therefore that it enables exploration of how the relationship between the economy and crime varies over time.11

4. Discussion

These findings suggest there is a significant relationship between the state of the economy — in particular the unemployment rate — and the rate of property crime. The results are consistent with theoretical expectations and with previous studies (e.g. Freeman 1983; Cantor and Land, 1985; Chiricos, 1987; Land et al., 1990; Hale and Sabbagh, 1991; Pyle and Deadman, 1994).

This paper has presented methodological innovations along with quantitative analysis of the economy-crime link. In particular, it has used interaction of the effect of unemployment and income inequality with time, showing an increase in the size of marginal effects of unemployment on crime over time, revealing the more potential for parameter instabilities in aggregate-level models of crime rates. It is surprising, then, that past studies of the relationship between economic conditions and crime have tended to omit discussion of temporal variation. We have suggested, instead, that it is possible for the economic causes of crime to be time-variant.

We have explored the relationship between the economy and national crime rates, focussing on those aspects of macroeconomics and the distribution of wealth which were associated with

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11Note that the same substantive inferences are drawn through the use of ‘rolling window’ regressions with a fixed sample window of 25 years, which test the stability of the parameter estimates over time. These estimates also suggest there is a strengthening relationship between unemployment and the rate of property crime. The reduced N through use of the rolling window method increases the likelihood of non-robust results, however, so we prefer to test the interaction of time with the independent variables.
adoption of neoliberal and monetarist policies first under the Callaghan government, as a condition of the IMF loan to Britain, and most prominently under the Thatcher governments. Our findings suggest that increases in the unemployment rate are an important factor in explaining change in property crime rates. They also demonstrate that the link between the economy and crime has changed over time, with the effect of the unemployment rate strengthening.

The strength of the relationship between the economy and rates of property crime in Britain has increased over time and in particular after the 1970s and 1980s. This strengthening of the marginal effect of the unemployment rate on property crime coincided with breakdown in the post-war social and political consensus and the rise of monetarist policies in economic management, in particular the adoption of labour market reforms, financial deregulation and privatisation, restriction of the power of trade unions and retraction of state activities from direct intervention in social and economic life (inter alia, Moran, 2003). It also is consistent with the, to date unproven, claim that breakdowns in social control enable economic determinants of crime to become active (e.g. Field, 1990). The main methodological implication of our finding that the effect of unemployment on the crime rate is conditional on temporal context is that longitudinal studies of the economy-crime link should consider whether these relationships are, in fact, stable in time. This does not rule out the possibility of change over time in the nature of property crime, for example due to technological change (such as online fraud) and the growing availability of cheap consumer goods (c.f. Field, 1990).

The growing magnitude of the effect of the national rate of unemployment on criminal offending during the 1970s and 1980s notably coincided with the monetarist revolution and sharp increases in the unemployment rate in Britain (as well as in other countries such as the US). While monetarist policies brought inflation under control, subsequent upturns in unemployment were associated with increases in the national rate of property crime and the strengthening link between economic outcomes and offending. The rising level of crime in turn gave rise to a rightward shift of criminal and policing policies (Newburn, 2007).

These increases in crime throughout the 1980s, which reached alarming rates between 1991 and 1995, forced the Conservative governments of the time to address the issue of crime ‘head-on’ during the early-1990s (Newburn, 2007: 439). While we therefore agree with Newburn (2007: 452) that the crime policies pursued were a lagged response to rising crime, we also contend that the selection of these criminal justice policies were a consequence of the strengthening link between unemployment and crime in the aftermath of the social and economic policies of the 1970s and 1980s. In particular, the political view of unemployment as an acceptable price for getting inflation under control, and policies targeting the ‘feckless’ and ‘idle’ unemployed and the need to ‘get tough’ with them both via social and welfare policies and punitive crime policies (Bagguley and Mann, 1992). During this later period, the Labour opposition provided little resistance to the punitive criminal justice policies under the Conservative government of John Major, narrowing the range of policies that were ‘imaginable’ for all political parties (Newburn, 2007: 458). As a consequence, the lasting legacies of the social and economic policies of Thatcherism might be seen as: a) the foregrounding of crime as a political issue; b) the creation of a series of social and economic circumstances (in particular mass unemployment, the geographical concentration of the socially and economically disadvantaged through implementation of housing policies (Muri, 1997) and growth of inequalities coupled with real term reductions in social benefits) which were conducive to the production of crime at the aggregate level; c) the strengthening of the effect of unemployment on the national rate of property crime, and d) flowing from the new social and economic circumstances, widespread dominance of an
issue definition of the problem of crime which emphasised punitive policies in place of the social welfare model adopted by successive governments since 1945, as part of the post-war consensus on economic and social policies (Kavanagh and Morris, 1989).

5. Conclusion

This analysis has shown that socio-economic outcomes at the aggregate level are associated with effects on the national rate of crime. It has also demonstrated that these effects are not constant over time. Macroeconomic outcomes themselves are not wholly endogenous to the economy, and are affected by both long- and short-term political choices (Hibbs, 1977: 1487). Political parties in government, with substantial control over economic policy-making, make decisions about targets for economic growth, public spending and inflation as well as decisions about the tolerable — or politically “acceptable” — level of unemployment and income inequality and determine the appropriate solutions for the resolution of economic problems. It therefore follows that political choices about macroeconomic policies and outcomes are not exogenous to the rate of crime — even if the consequences of these decisions take sometime to bear fruit (Farrall and Hay, 2010).

From the 1970s onwards, the advocates of monetarism sent a clear political message on unemployment: the post-war aspiration of full employment was dead, and unemployment was a matter for labour market reform, in particular the weakening of the power of trade unions, rather than government intervention. If the evidence of the unemployment-crime link is correct, political choice of macroeconomic policies and outcomes was not exogenous to crime, but a driving force in the increased crime rates experienced during the 1980s. The upward trend in crime rates of course preceded the adoption of monetarism first by the Callaghan government and later by the Thatcher governments; however it is in the 1980s that the effects of unemployment on property crime hardened. These dynamics have, paradoxically, led to a decline in association of income inequality with crime rates, first as unemployment dominated upwards trends in offending during the 1970s and 1980s, and later as crime began to fall at a time when inequality was still rising. We cannot be sure, but these patterns might be informative of a historical shift from the effects of inequality on crime rates, during the 1960s, to the effects of unemployment, since the 1970s — as economic change has also wrought social change. Further, given that there is cross-national evidence of a link between unemployment and crime rates (e.g. Cantor and Land, 1985; Beki et al., 1999; Rosenfeld and Messner, 2009) these findings suggest the possibility of a similar shift in the economic conditioning of crime rates outside of England & Wales.

It is evident is that the growing magnitude of the effect of unemployment on the rate of property crime in Britain during the 1970s and 1980s coincided with the monetarist revolution, and the policies of successive British governments directed at economic liberalisation and labour market reform. While monetarist policies brought the inflation so problematic during the 1970s under control, subsequent upturns in the national level of unemployment were associated with increases in the rate of property crime and strengthening of the link between unemployment and property crime. These rising levels of crime also contributed to the rightward shift of criminal and policing policies that was noted in the introduction (Newburn, 2007; Farrall and Hay, 2010). As government enacts fiscal or monetary policies designed to adjust macroeconomic outcomes, increasing or reducing national levels of unemployment, income inequality, inflation and economic growth, this impacts on the overall degree of lawbreaking and victimisation in society.
Definitions of variables and sources of data

1. Official recorded statistics on property crime

Offences of property crime recorded in England and Wales: theft and handling stolen goods (Home Office categories 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 54, 126), robbery (34), burglary (28, 29, 30, 31, 32), and fraud and forgery (50, 51, 52, 53, 55, 58, 59, 60, 61, 814). Source: Recorded Crime Statistics 1898-2005/06, Home Office (http://www.homeoffice.gov.uk/rds/pdfs/100years.xls).

2. Unemployment

Data on the unemployment rate for the period from 1961 to 1998 is compiled from Mitchell’s (2003) International Historical Statistics: Europe, 1750—2000 and, post-1998, is completed with official Blue Book data from the Office for National Statistics (www.statistics.gov.uk). The unemployment rate is adjusted for a change in counting rules in 1970 (with 1961—1970 values transformed with a multiplier for calculated from the ratio between old and new values in 1971). While imperfect as absolute values, these series provide an indicator of longitudinal trends which is the principal interest of this analysis.

3. Income inequality

The Gini coefficient measures the degree of inequality for an observed income distribution (where a value of zero indicates perfect equality and a value of one indicates absolute inequality). The data was obtained from the Institute for Fiscal Studies (http://www.ifs.org.uk).

4. Benefits expenditure

Data on national government expenditure, in real terms (£), on welfare benefits is taken from the Institute of Fiscal Studies (1960/1961—2005/2006). The data refer to the fiscal year preceding and inclusive of the year in question. Thus, data for 1970 therefore refers to the fiscal year from April 1969 to March 1970. This avoids spurious effects where benefits expenditure is antecedent to the rate of acquisitive crime.

5. Incarceration rate (England & Wales)


Acknowledgements

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Appendix

References


Figure A1. Comparison of adjusted, official and self-reported crime statistics.


