

# Reform of ill-health retirement of police in England and Wales: impact on pension liabilities and the role of local finance

IFS Working Paper W13/06

Rowena Crawford  
Richard Disney

# **Reform of Ill-health Retirement of Police in England and Wales: Impact on pension liabilities and the role of local finance**

by

Rowena Crawford\* and Richard Disney†

## **Abstract**

We examine ill-health retirement of police officers in England and Wales between 2002-3 and 2009-10. Differences in ill-health retirement rates across forces are statistically related to area-specific stresses of policing and force-specific differences in human resources policies. Reforms to police pension plans – in particular a shift in the incidence of financing ill-health retirement from central government to local police authorities – impacted on the level of ill-health retirement, especially among forces with above-average rates of retirement. We find that residual differences in post-2006 ill-health retirement rates across forces are related to their differential capacities to raise revenue from local property taxes. We quantify the impact of these reforms on overall pension plan liabilities.

JEL Classifications: H75, J26, J45

Key words: Police pensions    Ill-health retirement    State and local finance

---

\* Institute for Fiscal Studies, London

† Institute for Fiscal Studies, London, and University College, London.

Corresponding author: Institute for Fiscal Studies, 7, Ridgmount Street, London WC1E 7AE; Tel: (+)44 20 7291 4800; email: [richard\\_d@ifs.org.uk](mailto:richard_d@ifs.org.uk)

# **Reform of Ill-health Retirement of Police in England and Wales: Impact on pension liabilities and the role of local finance**

## **1. Introduction**

This paper considers recent reforms to the pension arrangements of police in England and Wales. It utilises econometric methods to examine the effects of these reforms on early retirement on grounds of ill-health by police officers, and on the incidence of pension costs between national and local taxpayers. It calculates the effect of these reforms, both immediately and in ‘steady state’, on police pension plan liabilities by constructing a simulation model of the pension plan and by changing model parameters to reflect the various reforms. Given that there has been very little academic research into public pension plans in the United Kingdom and no research, to our knowledge, into police pensions or police labour markets in particular, these are new contributions to the literature.

Unlike the United States, most public sector pension plans in the United Kingdom (UK) are unfunded and operate explicitly on a pay-as-you-go (PAYG) basis.<sup>1</sup> The UK’s police pension plan is no exception. The combined projected pension liabilities of these UK public sector plans was calculated in 2010-11 to be £959.5 billion<sup>2</sup> (of which only £66.2 billion was funded) with the projected unfunded liabilities of the police pension plan alone estimated to be £93.8 billion, or around 10% of the total. Efforts to curtail these public pension liabilities in recent years have involved raising normal pension ages, reducing accrual rates, changing indexation provisions and reducing rates of early retirement on grounds of ill-health. This range of policies will be discussed where pertinent in this paper; however the paper’s primary focus is on efforts to reduce early retirement through ill-health among police officers over the past decade.

Another important feature of public pension plans in the United Kingdom (UK) – again in contrast to the United States – is that public sector plans in the UK are broadly nationwide plans, with common normal pension ages, accrual rates etc across local jurisdictions. Nevertheless many of these plans – those for police, local government employees, teachers

---

<sup>1</sup> That is, there has been no deliberate policy of attempting to pre-fund these plans. The most significant exception, in terms of size of plan, is the Local Government Pension Scheme which is notionally fully-funded but is in practice somewhat under-funded.

<sup>2</sup> In US dollars, this is a total liability of around 1.6 trillion. See HM Treasury (2011b).

and firefighters – are administered and managed at the local level.<sup>3</sup> Although pay and pensions are set nationally, all these groups of workers are employed and managed by local authorities. An important issue for these authorities is the management of discretionary workforce practices, and notably early retirement on grounds of ill-health. In the case of the police, for example, while there is a fixed nationwide normal age at which police can first retire, local discretion allows for early retirement on grounds of ill-health to vary across jurisdictions (there was no other ‘avenue’ to early retirement in the police pension plan in the period under consideration). This raises a tension as to ‘who pays’ for early retirement, the investigation of which lies at the heart of the present paper and which can be summarised as follows.

Local police services, in common with local government and fire services, are financed by a mixture of central government grant allocations and local taxes levied on domestic properties within each local jurisdiction. In the case of the police: until 2006, pension payments to police officers, whether they had retired under normal arrangements or through ill-health retirement, were in effect wholly financed by central government grant allocations. However local authorities had considerable discretion, within some rather broad government guidelines, as to how they managed ill-health retirement. Hence, given this discretion, local authorities had an incentive within the financing mechanism to utilise ill-health retirement as a vehicle for removing lower quality officers (for example, those with lower fitness or general aptitude and commitment) from their workforce, wholly at the expense of national government. This diffusion of costs across jurisdictions led to high rates of ill-health retirement of police officers in general, coupled with widespread variations in rates across police forces. For police officers, the incentive to utilise ill-health retirement as a workforce management tool was exacerbated by the unique peculiarity of the police officer’s terms of

---

<sup>3</sup> The term ‘nationwide’ in the United Kingdom takes account of the distinct arrangements for the four nations of the UK: England, Wales, Scotland and Northern Ireland. ‘Local’ jurisdictions in the UK are counties or large metropolitan areas such as Greater London and Merseyside. In what follows, we compare the ‘national’ level (of England and Wales, which have identical arrangements) with the ‘local’ level of counties or large metropolitan areas i.e. the second and third tiers of the UK’s jurisdictional disaggregation. Given the similar Federal-state-local tripartite jurisdictional separation in the United States, our discussion of ‘national’ v ‘county or metropolitan area’ in the UK parallels to a great extent the US’s distinction between ‘state level’ and ‘county or city level’ jurisdictions.

employment, under which a police officer cannot be made redundant before the first age at which he or she could normally retire (i.e. age 50).<sup>4</sup>

This discrepancy between the incidence of perceived local benefits and national costs arising from discretionary retirement was noted by central government and in 2006, among a plethora of reforms to the police pension plan, a cost-sharing policy was introduced by which part of the cost of ill-health retirement would be borne by the local employer. We examine the effect of these various reforms on overall pension liabilities of the police pension plan in the present paper; however we particularly focus on the cost-sharing reform in relation to ill-health retirement, estimating its effect both on the rate and costs of ill-health retirement. To do this, we construct a simulation model of the police pension plan as it existed prior to 2006 for a cohort of police officers, benchmarked on parameters obtained from a variety of official sources. The simulation model is described briefly in the text; a fuller description can be obtained from the authors on request.

We show that the overall package of reforms introduced in 2006 will, in steady-state, reduce discounted pension liabilities of the police pension plan by around 24%. The ill-health retirement reform probably accounted for a small fraction of this reduction, and increased the average working tenure (reduced the length of retirement) by around half a year across the cohort as a whole.<sup>5</sup> However, given the very gradual transition to the new terms of the police pension plan, only the changes to ill-health retirement provisions have an immediate impact on pension costs. Moreover the overall impact of the cost-sharing measure on the rate of ill-health retirement has been ameliorated to the extent that local police authorities can increase local taxes to offset the reduction in central government support for ill-health retirements.

We show that the tax-raising capacity of local police authorities varies widely, and that in jurisdictions where the elasticity of tax revenues to property tax rates is more elastic, local taxes are higher where ill-health retirement rates are higher. This has welfare as well as revenue implications: to the extent that national government was simply interested in shifting part of the burden of financing ill-health retirement on to those local jurisdictions which gain notional benefits, the policy may be considered a success. However if the object was to

---

<sup>4</sup> It should be noted, however, that high rates of ill-health retirement we also observed in the late 1990s among other groups such as firefighters and ambulance crews even though such workforces had conventional employment contracts: see HM Treasury (2000) Table 2.

<sup>5</sup> A considerably greater increase in working tenure (reduction in retirement tenure) is involved, of course, for those who would have taken ill-health retirement.

reduce rates of ill-health retirement of police officers *per se*, this last result represents a significant offset to the potential welfare gain.

The paper is structured as follows. Section 2 provides a brief background on institutions, and on pension and retirement policies in the police service. In particular, it discusses reforms implemented in 2006 to reduce ill-health retirement rates both by targeting ‘high ill health retirement rate’ forces and by transferring part of the burden of financing ill health retirement onto local forces themselves. The impact of these measures on ill health retirement rates and on pension liabilities is investigated statistically in Section 3 of the paper. In Section 4 we consider further the implications of the partial devolution of the funding of ill-health retirement to local police authorities and show that forces with higher ill-health retirement rates levy higher local property taxes. Section 5 provides a brief conclusion.

## **2. Background**

### *2.1 Institutions*

All policing in England and Wales is carried out at the local level by territorial police forces. Forces are normally organised at the county level, albeit with some county forces merged into larger ‘territorial areas’ (e.g. ‘Thames Valley’) or ‘joint forces’ covering larger municipal areas such as Greater Manchester and, for most of London, the Metropolitan Police. In all there are 43 police forces in England and Wales; the nations which are the focus of our analysis. A typical police force in England and Wales covers a population of around 1 million people, although the joint forces typically cover larger populations and, in the case of the Metropolitan Police, over 10 million people.<sup>6</sup> ‘Nationwide’ police activities, such as homeland security, serious crime, fraud etc. are devolved to specialised units in some of these forces, notably the Metropolitan Police.

Despite this decentralised territorial nature of policing in England and Wales, all police officers, irrespective of rank, are appointed to the national ‘Office of Constable’ – a procedure dating back to the year 1066 (but more recently and mundanely enshrined in the Police Acts of 1964 and 1996) – by which an officer is sworn into the office by their local police force and thereby gains powers of search and arrest that are not available to the general public, including, under certain conditions, the power to arrest outside their own territorial area. Police officers therefore do not have an ‘employment contract’ with an individual

---

<sup>6</sup> As is apparent a ‘county’ in England and Wales is typically a larger territorial jurisdiction in terms of population than a county in the United States.

police force, and thereby lack certain standard employment ‘rights’ such as the right to form a trade union and take industrial action. Equally, except under certain very specific conditions, a police officer cannot be made redundant, and will continue in the ‘office of constable’ (irrespective of actual rank) until he or she cannot undertake the full variety of tasks – both physical and mental – required by their office. For that reason, the age of ‘normal’ retirement for a police officer has traditionally been set at a relatively young age – either on attaining age 50 or after 30 years of service.

## *2.2 Pay and pensions*

In contrast also to the United States, the determination of police remuneration in the UK has become increasingly centralised over time. At the turn of the twentieth century – when there were many more local police forces in the UK – pay was set locally but in 1918 two important changes occurred: a 50% central exchequer grant was introduced to supplement finance of police forces from local property taxes, and local police authorities were required to place their police forces on one of two standard pay scales. These were broadly consolidated into a single scale (albeit with additional allowances especially for officers within the (London) Metropolitan Police) in 1962. Police pay (and increases thereof) is now set by the Home Secretary – a senior minister in national government – albeit after the operation of a statutory negotiating framework for changes to pay and conditions. Proposed reforms to police pay and conditions, most recently in the form of comprehensive proposals by an independent review (Winsor, 2011, 2012), are also dealt with through this negotiating machinery.<sup>7</sup>

Pension provisions of the police are as follows. Most current police officers – both active and retired – are members of the Police Pension Scheme (PPS), which is a national unfunded contributory final salary defined benefit pension plan dating from 1987, although key principles of the scheme date back to 1921 and to subsequent legislation. Since April 2006, this scheme has been closed to new members, and new entrants to the police force are offered membership of the New Police Pension Scheme (NPPS), introduced as part of the reform

---

<sup>7</sup> There are recent moves away from the long process of centralisation of police finances and remuneration in England and Wales. Newly elected police commissioners from November 2012 have been given greater discretion over how police budgets are allocated across tasks. Second, the Coalition government in power since 2010 has shown great interest in moving towards local pay variation – indeed possibly decentralised pay bargaining – although this has not so far been considered in the context of policing. See Winsor (2012), Chapter 7.6 and Appendix 3, Section 6 for a further discussion of mechanisms for varying local police pay.

process to public pension schemes that was initiated in the early 2000s (see Pensions Policy Institute, 2008).

Some more recent changes in police pension arrangements should be noted. First, in line with changes to all public sector pension plans proposed by HM Treasury (2011a), the government has raised employee contributions to both the PPS and the NPPS by, on average, 1 to 1.25% percentage points and changed the method of indexation of pensions in payment. Second, proposals stemming from both HM Treasury (2011a) and Winsor (2012) have led to a major pension reform announced in late 2012 to be implemented in 2015. This reform will raise normal pension age to 60 for serving police officers in 2015 and also shift the pension calculation to a revalued career-average rather than final salary basis. These changes will take place immediately for all new accruals by serving police officers bar those within a 10 year ‘window’ of the normal pension age; accrued rights are retained under the old formulae. This is in contrast to the NPPS reform, which only applied to new entrants to the police service. The main characteristics of the PPS, NPPS and the 2012 reform framework, are summarised in Table 1.

Finally, it should be noted that the average age at which police officers enter the service has tended to rise over the last few years, not least because of the excess supply of applicants and potential recruits. This has allowed forces to recruit candidates with greater experience (including experience in police staff roles) and enhanced educational qualifications. According to the NPIA (2010), the average age of successful police applicants at national assessment was almost 27 years; long gone are the days when a new entrant to the police service had left school at age 18, or even earlier.

### 2.3 Retirement

As shown in Table 1, normal retirement for police officers entering the police service before 2006 can currently take place after 30 years service or at age 50, with a retirement pension of up to two thirds of final salary. Although these terms are generally regarded as among the most generous on offer in public sector pension plans, especially in terms of normal retirement date,<sup>8</sup> police forces have also been characterised by high levels of *early* retirement on grounds of ill-health, especially in the late 1990s when medical retirements

---

<sup>8</sup> Even allowing for the higher contribution rate levied on police officers than in other public pension plans: see Pensions Policy Institute (2008). Nor is there evidence of lower life expectancy among police officers than the general population as a justification for these findings: see Government Actuary’s Department (2011).

were averaging almost half of all retirement across police forces (HM Treasury, 2000).<sup>9</sup> Ill-health retirement rates across forces varied from less than 20% of all retirements to over 75% in the same period; the high rates being seen as arising from a combination of generous enhancement provisions (*ibid*, Tables 1 and 2) and weak enforcement and monitoring of medical claims by individual police forces (Poole, 1997). Ill-health retirement rates have fallen since that time, partly due to tighter monitoring and to an increased willingness of forces to place officers on ‘restricted duties’.<sup>10</sup> There is no continuous time series available for the period from the late 1990s through to the present but, as a benchmark, the average annual ill-health retirement rate of officers in the late 1990s was around 12 per 1000 (HM Treasury, 2000), being halved by the early 2000s to around 6 per 1000 and falling again to around 2 per 1000 by the end of the period under consideration here.

There are two incentives for police officers to retire on grounds of ill-health, subject of course to the loss of welfare associated with the ill-health itself. First, officers can receive a pension before their normal date of retirement (30 years’ service or the earliest pension age); second, because the ill-health pension is normally enhanced by notional additional years of service. The conditions that determine ill-health retirement for officers are underpinned by police regulations. An individual may be required to retire on medical grounds if he or she is permanently disabled; for police officers this is defined as:

“disabled from performing the normal duties of a police officer, including operational duties, until compulsory retirement age...”

The criterion for ill-health retirement among police officers therefore stresses the officer’s inability to perform ‘operational duties’ – that is, limits on his or her potential full deployability such as in major public order situations and other physically and mentally stressful situations. This is a weaker criterion of ‘disability’ than in most public social insurance settings where ‘disability’ would be defined by reference to incapacity in *any* employment or to a specific set of disabling health conditions. In the context of police officers, this definition relating to ‘full deployability’ links back to the supposed

---

<sup>9</sup> By way of comparison, average medical retirement rates in the same period among firefighters were 68%, among teachers, 25%, and in the armed forces 6%. Private sector rates (for those companies with pension plans with similar provisions) typically averaged around 10%. See HM Treasury (2000), Table 2 and Figure 3.

<sup>10</sup> Officers on ‘restricted duties’ are constrained in the operational duties that they can undertake: see Winsor (2011) pp.201ff. There is no reduction in pay from being on ‘restricted duties’: Winsor (2012), Chapter 5, recommended that such officers should receive a pay reduction equivalent to the ‘premium’ in police officer pay arising from capability of full deployability.

omnicompetence associated with the ‘Office of Constable’. Consequently, many police officers who were unable to fulfil *specific* duties obtained full ill-health retirement even though they were perfectly capable of engaging in restricted activities.

In a separate but related development, the sizeable cost of ill-health retirements under the original Police Pension Scheme have induced many police authorities to encourage the possibility of alternative employment within the police service for those with restricted, but not completely disabling, injuries. The number of officers on ‘restricted duties’ has therefore risen quite sharply in the past decade (albeit at different rates for different forces), although it should be noted that there is at present no reduction in basic pay for an officer who is on ‘restricted duties’ (see footnote 10).

In addition, as noted by Poole (1997) and others, assessment procedures for ill-health retirement differed widely across police forces. In some cases, ill-health assessments would be made on an initial recommendation from a local line manager and/or evidence from the applicant’s doctor coupled with an in-house medical assessment, through to a much more stringent procedure based on several external medical assessments and more detailed consideration of alternative employment in the police service. Moreover, as noted by HM Treasury (2000), the police formula for ill-health retirement pension awards provides enhancement of years of service according to a non-linear formula depending on existing numbers of years’ service. There are distinct ‘spikes’ in awards at those years of service at which the rate of enhancement increases, such as after 10 and 13 years’ service. This suggests that financial incentives, as well as medical issues, played a major part in the process. Consequently, after the mid-2000s, efforts were made to implement standardised ‘best practice’ medical assessment procedures across forces.

#### *The 2006 reforms to police pensions*

As noted in Table 1, in 2006 new entrants among police officers were enrolled in the New Police Pension Scheme (NPPS). In respect of conditions of service, there was one important result of the reform: the NPPS distinguishes officers who are incapable of employment in general from those capable of regular employment elsewhere. In the 2006 scheme, the latter receive only an unenhanced pension. This change makes a sizeable difference to pension payouts in simulated cases (Winsor, 2012, pp. 281-2); however most serving police officers are still covered by the earlier pension scheme which makes no such distinction.

Other changes introduced in 2006 however impact more generally on police pensions, especially the *incidence* of the costs of ill-health retirement. The first was a change in the financing arrangements for pensions. Under the pre-2006 funding regime, all expenditures on police pensions, whether via normal or ill-health retirement, were transferred through the main central block grant to police authorities – the Police Main Grant – from the Home Office whilst contributions by serving police officers to the police pension plans were simply transferred back to the central government: in other words, the central government effectively financed all pension payments net of employee contributions.

Under the arrangements from 2006-07 onwards, each police authority established a pension account into which employee and employer contributions within that police force would be paid. This would then be used to pay the pensions of both new and existing retired police officers. Given the large stock of retired police officers relative to serving police officers, this account would generally be in deficit, and would be topped up by central government to remain in balance.<sup>11</sup> Under the new proposals, this ‘top-up’ would be done in full for ‘normal’ retirements. However, for ill-health retirements, the local police authority was required to pay an upfront charge of twice the average pensionable pay for the officer concerned into the pension account, with the ongoing pension award being financed from contributions or by central government subsidy (Home Office, 2005). For a realistic example, this would imply an upfront capital charge on the new pension account of three or four times the new pension award. For a plausible discount rate, and assuming life expectancy of ill-health retirees to be somewhat less than life expectancy of normal retirees, this upfront cost could constitute around one-quarter of the total projected pension cost over the remaining lifetime.<sup>12</sup> This capital charge on the local police authority would then have to be financed either from greater efficiency in spending the central grant or by raising revenue from local property taxes to rectify the shortfall in the pension account in relation to these retirements.<sup>13</sup>

---

<sup>11</sup> Home Office figures suggests that, in 2008, there were around 131,000 active members of the 1987 PPS and 12,000 active members of the 2006 NPPS. There were 104,000 retired members of the 1987 PPS as well as deferred members and survivors of members who were, or would, receive pensions.

<sup>12</sup> The calculation assumes retirement on a pensionable income of £40,000 at age 50, a pension of £24,000, a real discount rate of 4% and a life expectancy beyond retirement date of around 25 years. This would of course understate the relative burden on the pension account for those officers who entered the police service later or who died much earlier due to severe disablement.

<sup>13</sup> An alternative reform, of simply centralising all decisions concerning ill-health retirement, was apparently ruled out on the grounds that ‘deployability’ and workforce management are the concerns of local police forces rather than national government. As in the United States, the independence of police deployment and management from national government intervention is regarded as one of the

In addition, Home Office (2005) set a new current target maximum level of ill-health retirements of 6.5 per 1000 officers in service for every police force. Although there were no *direct* financial penalties as such for failing to achieve this target, clearly forces with high levels of ill-health retirement would face a proportionate higher burden on their pension accounts that would not be fully compensated from central block grants. Moreover, each police force as a whole received a series of performance targets, of which this was one, and failure to achieve these targets could invite pressure from central government and local police authorities on senior police officers, particularly Chief Constables, who are often appointed on limited tenures, to match up or leave. Combining these changes, therefore, it can be seen that central government, in the form of the Home Office, significantly altered the incentives to local police forces in relation to ill-health retirement.

### **3. Modelling Ill-health Retirement and impact of pension liabilities**

This section investigates variations in ill-health retirement across police forces and over time. It then estimates the effect of the ill-health retirement reforms and other pension changes on the total pension liabilities of the police pension plan.

#### *3.1 Factors associated with ill-health retirement*

The reforms to the ill-health retirement regime presumed that persistent variations in retirement rates across police forces arose in large part from inadequate workforce management and lax assessment of disability in a sub-set of forces. These factors could be susceptible to reforms introduced at the national level. However, in modelling ill-health retirement, we should also take account of other factors: first, that officers in some forces face disproportionately stressful environments with an associated persistent higher incidence of ill-health and second, in contrast, that variations in ill-health retirement rates from year to year are essentially random so that any statistical effects of a reform on retirement rates are essentially spurious. We investigate both these possibilities.

We now describe the variables used in the analysis of ill-health retirement rates across police forces over time in England and Wales. We then use simple reduced form econometric models to examine factors underlying differences in ill-health retirement rates and also the impact of the 2006 reforms on retirement rates. To set the scene, Figure 1 graphs the

---

bedrocks of political and jurisdictional independence. However given the much greater involvement of the UK national governments in the financing of local police activities, the rebalancing of existing incentives that diffused the costs of local workforce practices was arguably long overdue.

distribution of ill-health retirement rates across police force in England and Wales for fiscal year 2005-06, just before the various reforms to the retirement regime described in the previous section were implemented. The range of ill-health retirement rates is large in Figure 1, but this may reflect transitory circumstances across police forces, especially among smaller forces where the numerator of the ratio is relatively small.

To handle this transitory aspect, Figure 2 uses panel data on ill-health retirement rates by police force to examine which police forces have systematically higher (or lower) rates than the average for the period 2002-03 to 2005-06. Running a simple fixed effects police force-level regression to control for year-on-year variability demonstrates that there are several police forces with statistically significantly higher ill-health retirement rates than the average over that period (those with significant coefficients at 5% or above are indicated by the darker bars in Figure 2).

Given these systematic disparities in ill-health retirement rates, and in order to examine the effects of the previously described 2006 reform, a reduced form regression model is estimated to explain the determinants of the ill-health retirement rates for 42 police forces in England and Wales over the period 2002-03 to 2009-10.<sup>14</sup> The dependent variable is the (ill-health retirement rate per 1000 police officers)<sub>it</sub> for the *it*h police force at time *t*. This rate is assumed to depend on several broad categories of factors:

- *Characteristics of police officers.* Ill-health may correlate with personal characteristics such as age, gender, ethnicity and underlying health. Given that we are working with force-level data rather than individual data, this implies that forces with, for example, a higher proportion of older police officers might have a higher ill-health retirement rate. In this data set, evidence on force-level characteristics are limited, and we use *normal retirements per 1000 officers* as a proxy for age structure, since there is clearly a strong correlation between having older police officers and the incidence of normal retirement through the pension scheme.<sup>15</sup>

---

<sup>14</sup> We exclude the (small) police force of ‘City of London’ from among the 43 England and Wales forces as we have no local area control variables.

<sup>15</sup> Measures of the health status of police officers would obviously be a good predictors of ill-health and therefore, presumably, ill-health retirement. However Winsor (2012) noted: “The physical fitness of police officers, and some staff, are tested as part of the recruitment and probation process but, unless they undertake certain specialist roles, never again thereafter”, (*ibid*, p.211). Extraordinarily, no data derived from fitness or health tests on police officers therefore exist.

- *Stress and intensity of work across police forces.* The argument here is that police officers working in more stressful settings (for example, inner city areas) face higher levels of risk of disability and ill-health. Several variables are used to proxy aspects of local policing, mostly taken from CIPFA (2011) and from Office of National Statistics data. The covariates utilised are:
  - *Local crime rate:* number of notified offences per 1000 population,
  - *Population density per officer.* This is a good proxy for operating in urban areas, but also for police force strength in the local area,
  - *Local crime clear-up rate* as % of recorded offences. This would clearly be an endogenous variable in a structural analysis of policing, but may capture any residual intensity of policing.
  - *The local area unemployment rate,* using Office of National Statistics data matched into police areas. We assume that a higher rate is associated with greater deprivation and therefore potentially more stressful policing.
  - *The local area wage relative to the average wage* for England and Wales, obtained by mapping data from the Annual Survey of Hours and Earnings (ASHE) to police authority areas.<sup>16</sup> Again, we hypothesise that a lower local real wage in the area, relative to national wages, is associated with greater deprivation. This variable is likely to be (negatively) collinear with local unemployment (the data appendix contains summary statistics for these variables and a correlation matrix). The effects of both variables may also be confounded by any effect of local unemployment rates and earnings on the *outside options* available to retiring police officers.<sup>17</sup>
- *Police force early retirement policy.* As already described, police forces have differed widely in their monitoring of ill-health and disability claims and therefore in their levels of ill-health retirement. We simply proxy this by an area force dummy variable.

---

<sup>16</sup> It should be noted that ASHE data are the most comprehensive sources of earnings data in England and Wales, being a 1% survey of social insurance records, but that ONS applies some *caveats* to the employment weightings. The matching uses local authority employment weights to aggregate the pay data into police force areas.

<sup>17</sup> Given that police wage rates are set nationally, the relative wage variable also effectively captures the ratio of local wages to local *police* wages. The mapping of local earnings into local police earnings across police forces is illustrated graphically in Winsor (2012) Volume 2, Appendix 3, pp.686-689. However it is unlikely that the average local wage fully reflects the job opportunities available to retiring police officers. In future work, we intend to use the ASHE panel on earnings to investigate where retiring police officers find work if they choose not to retire fully.

- *Policy changes.* These involve the policy changes introduced in 2006 and described in the previous section. Since ill-health is trended downwards for much of the period, we utilise a trend in the specification but allow this trend to diverge between ‘high’ ill-health retirement rate and other forces after the policy intervention. We utilise two definitions of ‘high ill-health retirement rate’ forces, one based on ‘observables’ and one based on our own method of identification:
  - *Definition 1:* those forces which had an ill-health retirement rate in excess of 6.5 per 1000 in *any* financial year in the period from 2003-04 to 2005-06.
  - *Definition 2:* those forces which have a significant above average ill-health retirement rate pre-2006-07 (i.e. those with a positive and significant fixed effect as depicted in Figure 2).
  - These interaction variables can be treated as a quasi-*differences-in-differences estimator*, insofar as we interpret the coefficients as the differential responses in ill-health retirement rates of the ‘high rate’ forces after the policy change, relative to other forces. These differential impacts across forces are the lower bound estimates of the effect of the 2006 reform; it may however be that the trend decline in ill-health retirement since the late 1990s would have levelled out without the 2006 measures (clearly, the rate of ill-health retirement would never reach zero) and for our higher bound estimates of the effects of the reforms on pension liabilities, we simply compare average levels of ill-health retirement over the data period before and after the reforms.

### 3.2 Results: interpretation and sensitivity tests

The results of this exercise are described in Table 2. It shows an insignificant association of ill-health retirement rates with age structure as proxied by the rate of ordinary retirements. However, we might not anticipate strong associations in the data between personal characteristics and ill-health retirement, except perhaps with underlying measures of health status that are not available for the reasons described earlier (see footnote 15).

Local variations in ‘stressfulness’ of policing are a more promising avenue and indeed there is statistical evidence that variation over forces and time in some of these indicators are correlated with ill-health retirement rates: in particular there is a significant positive association with population density and with high unemployment as predicted *a priori*. There is therefore evidence that variations in ill-health retirement rates across forces are not simply

the result of lax administrative procedures in relation to the monitoring of poor health and disability in some forces.

Variations in stress of policing are not, however, the whole story as demonstrated when we model the policy reforms. Table 2, columns (1) and (2) confirm that the data are consistent with a negative time trend of 1 in 1000 *per year* over this period, reflecting the particularly high rate of ill-health retirement in 2002-03. Some of this fall post-2006 may be attributable to the 2006 reforms but of more interest is the coefficient on the interaction terms of the trend post-2006 with our two measures of pre-2006 ‘high ill-health retirement rate force’. Although Definition 1 is an easily observable measure to central authorities, it is contaminated by year-on-year variance in rates of ill-health retirement, and we prefer Definition 2 as characterising forces with *persistent and statistically significant* above-average ill-health retirement rates in the pre-2006 period. And the results in Table 2 suggest that the rate of reduction of ill health retirement rates slowed down significantly post-2006 except among the forces identified as having above-average rates before the reform, where the rate of reduction increased, as might be expected.

At first sight, therefore, these results suggest a continuing but slower rate of decline of ill-health retirement among ‘average’ forces coupled with a faster rate of decline in the ‘high’ ill-health retirement forces after the reforms were implemented. Both results might be attributable to the policy but it is also possible, especially using Definition 1 of the ‘high ill-health retirement rate forces’, that there is some degree of ‘regression to the mean’ taking place in the dispersion of retirement rates over time. We therefore undertook placebo tests which shifted the structural break from 2006-07 to other years – if the coefficient was equally significant, it suggests that we are more likely to be observing a statistical process than a policy-driven process. To summarise the results of this sensitivity analysis, we cannot rule out that the shift among high retirement rate forces took place as early as 2004-05 – though no later than 2006-07.<sup>18</sup> This may derive from a response to early indications of the imminent policy change (Home Office, 2004, Annex B) or simply suggest that, in our relatively short data window, we cannot separately identify policy effects from statistical processes with great precision.

---

<sup>18</sup> Results of these and other sensitivity tests are available on request from the authors.

### *3.3 Impact on pension liabilities: the simulation model*

The ill-health retirement reforms were only part of the package of police pension reforms introduced during 2006, as depicted in Table 1. They were, however, the only part of the package that would have an immediate impact on pensions costs, because the other changes to the pension regime (primarily, a less generous accrual rate structure and a later normal pension age) were only introduced for new entrants to the police pension plan and would not impact on pension finances until some of these later cohorts started to retire. (In contrast, the 2012 package of reforms affects prospective pension accruals on extra years of service immediately). It is nevertheless of interest to calculate the impact of the 2006 reforms – both the immediate impact of change in the ill-health retirement regime and the longer term impact of the package as a whole. Unfortunately, no existing sources provide any evidence on this question and we have therefore constructed a simulation model of the police pension plan to obtain some magnitude of the various components of the reform package.

Our simulation model is a representative agent model. The agent joins the police force in the first period with certain demographic characteristics (age and sex). Each subsequent year is then modelled in turn, with the agent able to take one of 5 possible states: working in the police force, withdrawing from the police force with retained rights in the police pension plan (PPS), retired from the police force and drawing a pension from the PPS, retired from the police force on ill-health grounds and drawing a (potentially enhanced) pension from the PPS, or dead.

The transitions between these states are governed by assumed probabilities, which are derived from various sources but primarily Government Actuary's Department (2009), which is based on detailed membership data of the PPS as at March 2003, which are not publically available. Earnings progression over the lifetime depends on pay scales, probability of promotion, and assumed real earnings growth derived from external pay uplifts. The pay scales are derived from Winsor (2011); the promotion probabilities are calculated by the authors such as to give a distribution of ranks consistent with Home Office data and with promotion procedures as described in Winsor (2011); the real pay uplift is assumed to be 2% per annum.

There are two aspects to the retirement modelling in the simulation. First, 'normal' retirement allows the individual to retire either at the first age permitted (e.g. age 50 in the Police Pension Scheme) or when the individual has acquired a certain number of years'

contributions (see Table 1). We assume a plausible allocation of retirees between these exit strategies in the PPS. Second, we simulate ill-health retirement using the distribution of ill-health retirement rates by tenure, obtained from HM Treasury (2000) Chart 2. We simply assume that changing levels of ill-health retirement rates over time and across police forces involve scaling these tenure distributions of retirement rates proportionally. To compute the enhancement of pension benefits arising from early ill-health retirement we apply the non-linear enhancement rules described in HM Treasury (2000), Table 1.

The final step is to compute the overall liability to the police pension plan. For the representative agent, this is calculated as the sum of the stream of pension income that an individual receives in retirement, discounted back to the year at which the individual joins the force at a real rate of 2% per annum.

The model is simulated 10,000 times to compute an average discounted pension liability arising from a representative agent given the assumptions of the model. The distribution of demographic characteristics on enlisting is weighted to reflect the profile of entrants to the police force described in Government Actuary's Department (2009). The entry rate is weighted such that a steady state police force of 120,000 is obtained; this has the interesting feature that an indirect cost of early retirement is that more officers have to be hired (and, of course, accrue pension entitlements) where there are provisions to retire earlier within the pension plan. This computation is then done for alternative average rates of ill-health retirement, to capture the different average levels of retirement prevailing in the late 1990s, the early 2000s and after the 2006 reform, and then for the changes to the other parameters of the pension plan arising from the introduction of the New Police Pension Scheme in 2006 and the new framework as proposed in Table 1. All the assumptions, methods and data underlying this simulation are available on request from the authors.

### *3.4 Impact on pension liabilities: the results*

Table 3 describes the key results of the simulation model. The first column simulates the Police Pension Scheme without any ill-health retirement, computing the total liability of this cohort and the number of entrants needed to generate a steady-state police force of 120,000. The total liability is not easy to compare with the projected liabilities described in the Introduction to this paper, because the latter is the sum of projected rights of a snapshot of employees, retired pensioners and deferred rights at a point in time; we have no way of knowing, for example, whether and how ill-health retirement is built into that aggregate

figure. Nevertheless, it can be seen that if the discounted rights of one cohort or ‘generation’ of police officers total around £2.2 billion, then the aggregate liability will depend on the number of cohorts alive at any one time and the stage of the life-cycle at which they observed.

Table 3 then shows that an ill-health retirement rate of 12 per 1000 officers – the rate prevailing in the late 1990s – using the tenure incidence of ill-health retirement of HM Treasury (2000), increases the discounted pension liabilities by 4% - for this single cohort, by around £88 million. It also increases the average tenure of retirement (reduces the tenure of employment as a police officer) by around one and a half years. This does not simply arise from the shorter employment histories impacting on pension costs for a given individual, but because more police officers need to be employed to achieve a target employment level. The reduction in ill-health retirement in the early 2000s, perhaps consequent upon guidance in the HM Treasury document, reduces this value by 2%; the reduction observed around the 2006 reforms analysed here by a further 1.3%. Thus, if we take our ‘upper bound’ estimate of the reforms described in the previous sub-section, the reform of ill-health retirement reduced average retirement tenure by just under 6 months. The lower bound effect would suggest that reductions of this magnitude were only achieved in those forces with significantly higher-than-average ill-health retirement rates, as described previously.

The other columns of Table 3 are our calculations of the total savings both from the remainder of the 2006 reform package and the subsequent 2012 reforms. The 2006 reforms to accrual rates, pension age and ill-health retirement together, in steady state, reduce discounted pension liabilities by almost a quarter. This is a large number, but it needs reiterating that very little of this reduction occurs ‘up front’ given that the reform only applies to new entrants to the police forces. The unsatisfactory nature of this reform, which delayed any major change until long in the future, plus the belief that the normal age of retirement was still too low, precipitated the 2012 reforms which reduce the value of pension liabilities still further. These reforms will kick in more quickly but accrued rights are preserved under the existing plans and, moreover, there is a ten year basic ‘window, plus other concessions, by which those nearing retirement are exempt from these reforms. Thus, in the short run, the relatively modest effects of the reduction in ill-health retirement rates on discounted pension liabilities are the only reduction that will show up in the data for some time to come.

#### **4. The role of local finance**

##### *4.1 Police finances: a brief introduction*

We next analyse the further factor which comes to the fore in the post-2006 period and which may explain the relatively limited impact of the reforms of ill-health retirement rates. Since police forces now have to finance part of their ill-health retirement from local sources (see Section 2), residual variance in ill-health retirement rates could arise post-2006 from differences in the local ‘taxable capacity’ of local police forces. This general argument – that components of the remuneration of public sector workers can be affected by local taxable capacity – has been discussed in a small but interesting literature in the United States; it has not, to our knowledge, been discussed in *any* public sector labour market context in Britain.

As described in Section 2.2, for much of the previous century there was a trend towards greater central funding of local police authorities in England and Wales. This reflected, in part, the slower historic growth of the local tax base, almost wholly derived from taxes on property. However, it also highlights a trend towards greater central control of police spending as a means by which central government influences the allocation of police resources and activities and also in order to limit increases in property tax rates. Central government, rightly or wrongly, has tended to believe that budgetary controls on spending at the local level are laxer than those enforced by HM Treasury on central spending.

The largest bulk grant for policing for England and Wales (accounting for, on average, 35% of police funding in 2010-11) comes from the Home Office through the Police Main (or block) grant. A further, 11% comes through specific grants for particular activities and priorities (e.g. for ‘neighbourhood policing’ and for counter terrorism), and around 30% from the Department of Communities and Local Government (DCLG) and the Welsh Assembly. The remaining funds are raised locally, through a precept levied on local residential properties.<sup>19</sup>

The Home Office main grant is allocated to local police forces by a complicated mechanism known as the Police Funding Formula (PFF) (Home Office, 2012). The basic Home Office grant is not just population-weighted but adjusted by the socio-economic characteristics of the population (such as measures of employment, unemployment and receipt of welfare benefits), density of population, type of housing, the spatial density of bars serving alcohol, and so on. There are further adjustments for the costs of local police (since there are some local differences in pay rates, especially for staff other than officers). The

---

<sup>19</sup> Small additional sums are raised locally from fines and fees, from some charges for policing (e.g. for certain sports events) and, for individual police forces, from lending police officers to other forces (‘mutual aid’) or from revenue from the loan of specialist units (e.g. underwater recovery teams) between forces. The DCLG is responsible for financing other local government activities in England; again with Council Tax and also the ‘business rate’ as the main sources of local finance.

DLCG grant uses somewhat similar weighting measures through the Standard Spending Assessment (SSA); other discretionary grants have yet further mechanisms. To complicate the position further: to avoid excessive volatility in grant allocations from year-to-year by application of the PFF or SSA, there is a ‘damping mechanism’ which allows for annual deviations in the grant from the underlying formula. These additional criteria and the ‘damping mechanism’ give a degree of exogeneity to central funding to police forces since, as we shall see, the capacity of police forces to raise funds from local sources depends on somewhat similar characteristics to those determining central allocations.<sup>20</sup>

Although most financing of police forces comes through block grant funding provided by national government, a significant component – varying from 12% to 45% of total budget across forces in 2011 – is raised from local property taxes. The dominant source of local financing of police activities is the ‘precept’; levied as part of Council Tax on local residential property. This tax was introduced in 1993 replacing previous property taxes, and allocates each residential property to one of eight bands assessed in 1991 in England (2003 in Wales) depending on size of the property and other features. Newly constructed properties are assigned a band and properties with major reconstruction may be rebanded. Each local authority sets a Council tax (and police precept rate) as an annual levy on a middle-banded property (Band ‘D’); a nationally fixed formula then sets the rate of tax on each band as a fixed multiple or fraction of that levy. The tax base is therefore the number of ‘Band D-equivalised properties’ and the revenue that can be collected by a local police force from the precept depends on the total number and composition of properties in the area times the rate of precept set by the local police authority. It is therefore apparent that the elasticity of revenues from changing the precept depends on this original banding assessment of residential property in the area, as well as any new construction.

Note also that the multiple of banding rates from lowest to highest band is much more limited than the range of property values in any given area and, second, that house price increases (or falls) do not *per se* increase property tax revenues since the formula relating residential property type to band has remained fixed since the inception of the Council Tax. Revenues rise when the rate of precept on properties is increased, not because house values rise (other than compositional effects arising from new builds and any rebanding based on

---

<sup>20</sup> For further discussion, see Universities Police Science Institute (2011). This paper remarks that the current government is committed to reforming and simplifying the grant allocation procedure but notes that: ‘Such is its complexity it may even be beyond significant change’ (*ibid*, p.3)

home improvements). Moreover, central government has at various times attempted to cap increases in the precept of specific police forces if these are seen to be ‘excessive’.

Figure 3 shows how the share of financing raised from the local precept varies across local police forces in 2005-06. As we model shortly, these differences partly depend on the nature of residential property, but they also depend indirectly on the formula allocating central grants, on any ‘capping’ procedures, and also on the expenditure needs of individual police forces. Figure 4 shows that revenue obtained from local sources by police forces tended to increase as a share of total income, especially in the first part of the period. This increase slowed in the second party of the period, in part reflecting ‘capped’ precept increases as part of a general attempt to limit Council tax increases by DCLG.

#### *4.2 Local finance and public sector remuneration: previous evidence*

The idea that the generosity of components of public sector remuneration – whether in the form of current or deferred pay – is related to local revenue-raising capacity has received little attention in the literature in Britain, both because many key public sector groups have their pay set nationally but also because public grants to local authorities are the dominant form of finance of local authorities. There is however a small but interesting published literature in the United States on the topic, but it has not focused on retirement provisions.

Inman (1982) examines the willingness of local jurisdictions in the United States to finance public pensions, in a context in which taxpayers have an option of funding public pensions through current taxes or by running deficits. He contrasts a ‘stayer’ model, in which the decision depends on borrowing costs and other factors, and a ‘mover’ model in which taxpayers may exit the jurisdiction before the obligation to repay unfunded public pension deficits arise. In the latter model, however, the obvious incentive to move in the face of pension deficits may be capitalised into lower property values or into lower current wages. Inman’s statistical results imply a trade-off between pension (under)funding and lower current wages of police officers, and several other public sector groups; the implicit property value capitalisation hypothesis has been tested by Epple and Schipper (1981), Leeds (1985) and Gyourko and Tracy (1989).

Gyourko and Tracy (1991) directly test whether public sector remuneration is higher, *ceteris paribus*, where local taxes are higher, contrasting the incidence of local sales taxes and property taxes. The nuance of the paper is that property taxes are borne more explicitly by local residents of the jurisdiction than sales taxes; therefore, where jurisdictions rely more

heavily on sales taxes, then for a given tax burden public remuneration is higher. They find that police officers in jurisdictions with access to non-property taxes are able to increase their current remuneration by 7-9%. However Poterba and Rueben (1995) note that some US states have imposed limits on property tax rates. These tax limits should therefore reduce public sector remuneration in affected jurisdictions, and such a finding is confirmed by those authors. Neither of these papers discuss the potential endogeneity of such limits, nor the interaction of property taxes (and other local taxes) with either public pensions or employment of public sector workers (e.g. financing of early retirement). In that sense, our analysis is closer to that of Inman's in terms of the financing of public pension obligations and the employment of public sector workers, but closer in methodological approach to the work of the other cited authors.

#### *4.3 Local finance and ill-health retirement in police: a statistical analysis*

In this final section, we examine the determinants of the 'precept' – the property tax which provides the locally-funded component of police funding. We show that the average real value of the precept levied per property in general depends on area characteristics (notably the quality and density of housing) and on the demand for police officers' services. Our primary hypothesis is twofold: first, that the level of ill-health retirement should have no effect on the precept rate pre-2006, since the costs of ill-health retirement were wholly covered from central block grant funding in that period. This turns out to be the case. Second, however, there is evidence of a positive relationship post-2006, when police forces became responsible for part-funding ill-health retirement of police officers.

Our dependent variable is the *real police precept levied per property (in £)* by each police authority in every year. In our reduced form specification, we assume that this variable is affected by a number of factors that broadly affect the elasticity of the supply of funds and the demand for policing. We then test for any association with the rate of ill-health retirement, primarily in the financial year 2006-07 onwards, when local police authorities became responsible for part-funding ill-health retirement. Summary statistics for both this variable and the covariates are given in the Appendix.

The supply of funds is driven by the density and banding of properties in the police authority area. We use two variables derived from CIPFA data to capture this: the number of

Band-D equivalent properties and the size of the population.<sup>21</sup> We predict that the coefficients on these variables will be of opposite sign and that, overall, ability to raise funds is positively related to the ratio of properties per head. We also test a proposition advanced by Glaeser and Ponzetto (2012) in the context of public pensions. Since there are several billing authorities for property taxes (which incorporates the police precept) within each police authority area (because police authorities are larger administrative units than local public authorities), it may be argued that the link between local police services and the level of precept is less transparent than it is for other public services; hence the costs of the police service are partially ‘shrouded’ in multiple jurisdictions.

The demand for additional funds for policing is driven by the type of indicators described earlier in the context of ill-health retirement, such as the reported crime rate, clear-up rate, and measures of local deprivation. We also include the number of officers in the local police force. This variable is, strictly speaking, endogenous to a structural model of the police precept (as is, potentially, the notified crime rate). In our reduced form approach, this variable is present to capture any differential local community preferences for hiring police officers over and above those provided for from central funding.

Table 4 describes the results from various specifications. These are fixed effect models with year dummies, with the inclusion of various combinations of covariates. In general, the level of precept per property is positively associated with the number of equivalised properties and negatively associated with the size of the population, though these results are sensitive to choice of covariates. The ‘shrouding’ variable – number of billing authorities – is correctly signed but not significant. In some specifications, our ‘demand’ variables are also significant, but the reduced form nature of the specifications limits the interpretation. Clearly there is scope for fruitful further research on a more structured model of local police funding.

In the present context, however, it is the last two variables that are of primary interest. The first is ‘ill health retirements per 1000 officers’. This has no effect on revenues raised locally over the period as a whole, as indeed should be the case since, until 2006, these retirements were wholly financed from central sources. However the interaction of this variable with the post-2006 period is highly significant, irrespective of the combination of

---

<sup>21</sup> To reiterate: the number of properties utilises a normalisation, like ‘equivalent income’, by which higher (lower) value properties are treated as a multiple (fraction) of average band properties in calculating the base. Thus an area with a high proportion of high-banded properties will be treated as if it has many more properties per head than a poorer neighbourhood with low banded residential housing (CIPFA, 2012).

covariates. This is the period when local police authorities *did* become partially responsible for the funding of ill-health retirement. This result is strongly consistent with the idea that some authorities were prepared to use their capacity to raise local precept in order to finance higher rates of ill-health retirement, so offsetting in part the curbs on such policies originating from central government.<sup>22</sup>

Whilst this is an interesting result in the context of the present paper, caution must be exercised before asserting that the higher precept simply paid for the higher ill-health retirement. This is because the coefficient implies that, at the mean, the amount of money raised from the precept with each extra ill-health retirement significantly exceeded the direct costs of financing that ill-health retirement for a representative pension value. Even if we allow for fixed costs of replacement and training, the figure is probably at least double the required sum. We would therefore suggest that this is an *association* in the data – police authorities for which it was easier to raise precept used the extra revenue for a number of activities including, *inter alia*, a higher level of ill-health retirement.

## 5 Conclusion

This paper has investigated the determinants of ill-health retirement across police forces over time in England and Wales. Given the somewhat different institutional features of police forces in Britain from those in the United States – notably central bargaining over pay and pensions – the scope for local differentiation of remuneration is currently limited. Nevertheless local police authorities in Britain have a degree of autonomy in the fraction of police funds that is raised from local sources, in the levels and deployment of police officers and staff, and in the extent of discretionary early retirement through the route of ill-health. Consequently ill-health retirement rates, and the degree of local funding of police activities, have varied widely over police forces. We investigate whether these variations are connected, exploiting in particular a reform of the system of police funding of pensions in 2006, which place greater financial burdens on local forces in relation to ill-health retirement by introducing a cost-sharing formula.

---

<sup>22</sup> The lack of significance of ill-health retirement for the whole period is effectively a placebo test that we are not observing some overall spurious association between ill-health retirement and precept per property. Among our sensitivity tests, we excluded the London Metropolitan Police from the sample, since their scale of operations is so much larger than any other police force – see the statistical appendix. This exclusion made no significant difference to the findings – a result which is available on request from the authors.

We show using administrative data for England and Wales that police ill-health retirements are related to reasonable proxies for the stress of local policing. We show that the 2006 reform of police pensions, which contained a number of features, reduced significantly the rate of ill-health retirement, specifically among those forces that had been targeted as having ‘high’ rates of ill-health retirement by the Home Office. The estimated changes in rates are statistically large (relative to average ill-health retirement rates) and robust but may be in part subject to the effect of ‘regression to the mean’ in retirement rates.

We then compute a model of discounted pension liabilities for a cohort of police officers with representative characteristics, examine the impact on liabilities of different levels of ill-health retirement and the provisions of both the original and subsequently reformed pension plans. We show that, although the magnitude of the effect of the reduction in ill-health retirement rates on pension liabilities is relatively small, it occurs upfront whereas (as is the nature of pension reform) , the big gains from changes in accrual rates and normal pension ages will occur some distance into the future. Since the police pension plans are unfunded, these prospective future reductions in liabilities do little to alleviate the budgetary position of the police authorities in the short run.

Nevertheless, variations in ill-health retirement rates across police forces remained even after the 2006 reform. We test the hypothesis that forces that wished to have higher-than-average ill-health retirement rates after this date were prepared to finance these rates by levying a higher ‘precept’ (tax) on local household properties. We derive a simple reduced form model to ‘explain’ the determinants of local real precept per head in each police authority. We show that the level of ill-health retirement was *only* associated positively with the precept rate from 2006-07 onwards. This strongly fits our prior hypothesis, insofar as there should have been no relationship between precept and ill-health retirement rates pre-2006 when all retirements were centrally funded.

The principles of cost-sharing in relation to ill-health retirement and the establishment of pension accounts for individual police forces have little impact on pension liabilities in the short run. However they may preface further reforms in the future. Whilst it is unlikely that national governments in the UK will embark on decentralised pay and pension arrangements in the future, there have already been some moves to greater decentralisation in the form of local elected police commissioners in 2012. Further moves toward cost-sharing, for example in relation to pension costs more generally, and not just ill-health retirement, could be envisaged in the future whereby a significant component of pension costs over and above

employee contributions could be raised from local taxation. However such reforms are not yet on the agenda.

### **Acknowledgements**

This paper was prepared for the NBER Conference on ‘Retirement benefits for state and local employees: Designing pension plans for the twenty-first century’, held at Jackson Lake Lodge Wyoming in August 2012. We are grateful to seminar participants at the Institute for Fiscal Studies, and at this NBER conference for detailed and helpful suggestions on an earlier draft. We thank the editors and two referees for additional comments on this paper. We thank the Chartered Institute of Public Finance and Accountancy (CIPFA) and the Home Office for making available some of the data used here. The views expressed here are entirely those of the authors and do not reflect either of these bodies, nor any organisation or review team of which the authors have been part.

## References

- CIPFA, 2011. Police Actuals. London: Chartered Institute of Public Finance and Accountancy. [www.cipfastats.net/publicprotection/policeactuals/default.asp](http://www.cipfastats.net/publicprotection/policeactuals/default.asp)
- CIPFA, 2012. Understanding the Council Tax. London: Chartered Institute of Public Finance and Accountancy. [http://www.cipfa.org.uk/press/download/UCT\\_1213.pdf](http://www.cipfa.org.uk/press/download/UCT_1213.pdf)
- Epple, D. and Schipper, K., 1981. Municipal pension funding: A theory and some evidence. *Public Choice*. 37, 1, 141-178.
- Glaeser, E. and Ponzetto, G., 2012. Shrouded costs of government: the political economy of state and local public pensions. Presented at NBER Conference: Retirement benefits for state and local employees – designing pension plans for the twenty-first century, August 2012 Jackson Hole, WY.
- Government Actuary's Department, 2009. Pay-As-You-Go Public Service Pension Schemes December 2009: Cashflow projections. Methodology, data and assumptions, [http://www.gad.gov.uk/Documents/Occupational%20Pensions/December\\_2009\\_Cashflow\\_Projections\\_Methodology\\_data\\_and\\_assumptions.pdf](http://www.gad.gov.uk/Documents/Occupational%20Pensions/December_2009_Cashflow_Projections_Methodology_data_and_assumptions.pdf)
- Government Actuary's Department, 2011. Police Pension Scheme and New Police Pension Scheme in England and Wales, Actuarial Review as at 31 March 2008 – Valuation data and demographic assumptions. November, London.
- Gyourko, J. and Tracy, J., 1989. Local public sector rent-seeking and its impact on local land values. *Regional Science and Urban Economics*. 19, 3, 493-516.
- Gyourko, J. and Tracy, J., 1991. Public sector bargaining and the local budgetary process, in R. G. Ehrenberg (ed) *Research in Labor Economics*. 12, 117-136: Greenwich CT: JAI Press.
- HM Treasury, 2000. Review of ill health retirement in the public sector. London, [http://archive.treasury.gov.uk/pdf/2000/ill\\_health110700.pdf](http://archive.treasury.gov.uk/pdf/2000/ill_health110700.pdf)
- HM Treasury, 2011a. Independent Public Sector Pensions Commission: Final Report. March: [http://cdn.hm-treasury.gov.uk/hutton\\_final\\_100311.pdf](http://cdn.hm-treasury.gov.uk/hutton_final_100311.pdf)
- HM Treasury, 2011b. Whole of Government Accounts: Year ended 31 March 2011. HC 687. London: The Stationery Office, October. <http://www.official-documents.gov.uk/document/hc1213/hc06/0687/0687.pdf>.
- Home Office, 2004. National policing plan, 2005-08: Safer, stronger communities. London.
- Home Office, 2005. The Police Pension Scheme – new police pensions financing arrangements: Home Office circular 54/2005, London.
- Home Office, 2012. Police Grant (England and Wales), 2012-13. HC 1797. London: The Stationery Office.
- Inman, R.P., 1982. Public employee pensions and the local labor budget. *Journal of Public Economics*. 19, 49-71.
- Leeds, M., 1985. Property values and pension underfunding in the public sector. *Journal of Urban Economics*. 18, July, 34-46.
- NPIA, 2010. Annual Results Report 2008-09, National Policing Improvement Agency. London.
- Pensions Policy Institute, 2008. An assessment of the government's reforms to public sector pensions. London.

Poole, C.J.M.,1997. Retirement on grounds of ill-health: cross sectional survey in six organisations in the United Kingdom. *British Medical Journal*. 314, 929-932.

Poterba, J.M. and Rueben, K.S., 1995. The effect of property-tax limits on wages and employment in the local public sector. *American Economic Review*. 85, 2, Papers and Proceedings, 384-389.

Universities Police Science Institute, 2011. Police funding (England and Wales) 2011-12: Police Briefing Paper No 1(author: T. Brain). Cardiff University School of Social Sciences, Cardiff.

Winsor, T., 2011. Independent review of police officer and staff Remuneration and Conditions, Part 1 Report. Cm 8024. March. TSO: London.

Winsor, T., 2012. Independent review of police officer and staff Remuneration and Conditions, Final Report. Cm 8325. March. TSO: London.

**Table 1: Summary of Police Pension Plans and Reforms**

| <b>Pension plans</b>         | <b>Police Pension Scheme (PPS) 1987</b>                       | <b>New Police Pension Scheme (NPPS) 2006</b> | <b>'Reform Design Framework' 2012</b>  |
|------------------------------|---|--|--|
| Eligibility                  | Joined force up to 05-04-06                                   | Joined force from 06-04-06                   | All officers but transition provisions   |
| Employee contribution rate   | 11% of salary   | 9.5% of salary                               | 13.7% of salary  |
| Maximum pension              | 2/3 final salary  | ½ final salary + 4×lump sum                  | Career average revalued at CPI+1.25%pa   |
| Accrual rate                 | 1/60 <sup>th</sup> 20 years+1/30 <sup>th</sup> after 20 years | 1/70 <sup>th</sup>                           | 1/55.3 <sup>th</sup>   |
| Maximum service full pension | 30 years  | 35 years                                     | No cap   |
| Earliest pension             | 48.5 (as early as 46 if transferred in service); deferred 60  | 55; deferred 65                              | Normal age 60 with transition provisions; 55 early retirement with actuarial reduction; deferred SPA |
| Indexation of pension        | Was to RPI (2010 onwards to CPI)                              | Was to RPI (2010 onwards to CPI)             | CPI  |
| Survivor's pension           | 50% of member's pension                                       | 50% of member's pension                      | 50% of member's pension  |
| Ill-health benefit           | One level of benefit  | Two tier benefit based on severity           | Two tier benefit based on severity   |

Notes: RPI = retail price index; CPI = consumer price index, SPA=state pension age (currently 65 for men, 62 for women, rising for both sexes to 66 by 2020 and 68 by 2046). Under UK provisions, pension lump sums are generally treated by the tax system more favourably than annuities (pensions) up to a ceiling, therefore commutation to lump sum payments are generally favoured; in PPS and 2012 reform, therefore, police officers could also have part of the pension taken as a lump sum (as in other pension plans).

**Table 2: Modelling ill-health retirement rates across police forces**

| <b>Explanatory variables:</b>                      | (1)<br>Definition 1       | (2)<br>Definition 2       |
|--|---------------------------|---------------------------|
| <i>Employee characteristics</i>                    |                           |                           |
| Normal retirements per 1000 officers               | 0.04<br>(0.02)            | 0.04<br>(0.02)            |
| <i>Stress factors</i>                              |                           |                           |
| Crime rate (notified offences per 1000 population) | 0.01<br>(0.02)            | 0.01<br>(0.02)            |
| Clear-up rate (per cent of recorded offences)      | 0.04<br>(0.04)            | 0.03<br>(0.04)            |
| Population per officer                             | <b>0.02*</b><br>(0.01)    | <b>0.02*</b><br>(0.01)    |
| Local area unemployment rate (%)                   | <b>0.41*</b><br>(0.18)    | <b>0.46*</b><br>(0.18)    |
| Local area wage relative to average wage (%)       | -4.11<br>(2.79)           | -3.73<br>(2.77)           |
| <b>Time trend</b>                                  | <b>-1.09***</b><br>(0.16) | <b>-1.11***</b><br>(0.16) |
| <b>Time trend × post-2006</b>                      | <b>0.35***</b><br>(0.10)  | <b>0.36***</b><br>(0.10)  |
| <b>Time trend × post-2006 × “high” IHR force</b>   | <b>-0.33**</b><br>(0.10)  | <b>-0.45***</b><br>(0.12) |
| Force dummies                                      | Yes                       | Yes                       |
| R <sup>2</sup>                                     | 0.7893                    | 0.7930                    |
| Number of observations                             | 336                       | 336                       |
| F = (.)  | F(50, 286)<br>=26.18      | F(50, 286)<br>=26.74      |

Notes: ‘definitions’ and variables as defined in text. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level from a 1-sided test.

**Table 3: Reductions in police pension liabilities arising from various reforms**

| <b>Results:</b>                                 | <b>PPS</b>  |   |   | <b>NPPS</b>   | <b>2012 Reform</b>                  |                               |
|---|---|---|---|---|-------------------------------------|-------------------------------|
|   | <b>IHRR0</b>  | <b>IHRR12</b>   | <b>IHHR6</b>  | <b>IHRR 2</b>   | <b>IHRR 2</b>                       |                               |
| Ill health retirement per 1000 officers         | 0   | 12  | 6   | 2   | 2                                   |                               |
| Accrual rate                                    | $1/60^{\text{th}}$<br>( $2/60^{\text{th}}$ after<br>20 years) | $1/70^{\text{th}}$ + 4x<br>lump sum | $1/55.3$<br>career<br>average |
| Desired steady state force size                 | 120000  | 120000  | 120000  | 120000  | 120000                              | 120000                        |
| Intake needed for force size of 120000          | 5837  | 6288  | 6061  | 5912  | 5304                                | 5498                          |
| Average pension liability per officer (£)       | 374837  | 362588  | 368508  | 372707  | 325174                              | 256165                        |
| <b>Pension liability of intake (£ billion)</b>  | <b>2.19</b>   | <b>2.28</b>   | <b>2.23</b>   | <b>2.20</b>   | <b>1.72</b>                         | <b>1.41</b>                   |
| % +/- of pension liability from previous column | -   | +4.0%   | -2.0%   | -1.3%   | -22.9%                              | -18.0%                        |
|   |   |   |   | -24.2%  |                                     |                               |

**Notes:**

All values discounted to age of entry at 2% per annum, at constant prices and 2012 parameter values. For construction of values: see text.

IHHRX=Assumed Ill health retirement rate per 1000 officers. PPS=Police Pension Scheme (1987); NPPS=New Police Pension Scheme (2006).

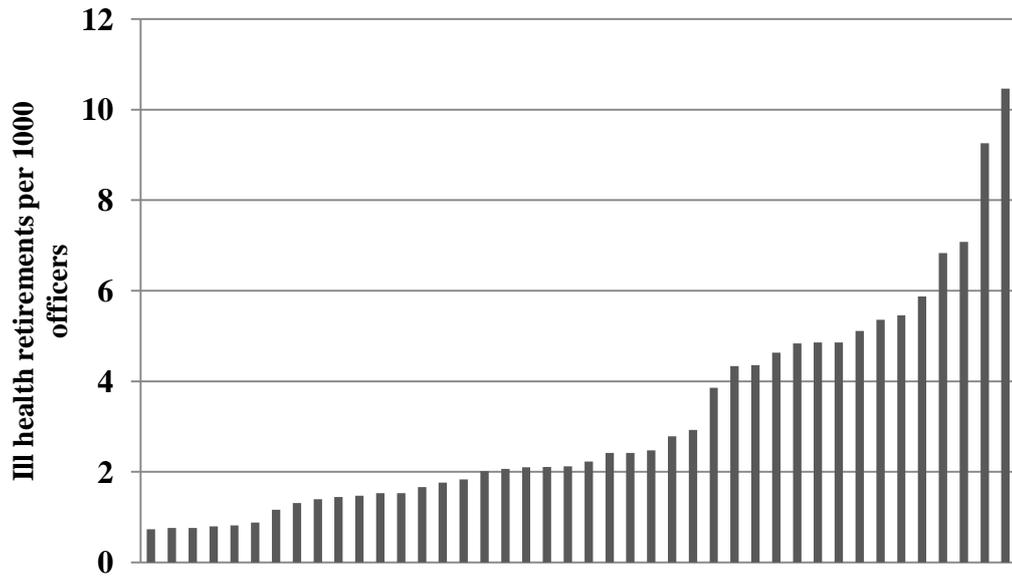
‘Average pension liability per officer’ × ‘Intake needed’ gives ‘Pension liability of intake’.

**Table 4: Modelling real police precept levied per property (£)**

| <b>Explanatory variables:</b>   | (1)                       | (2)                       | (3)                      |
|---|---------------------------|---------------------------|--------------------------|
| Number of Band D-equivalent properties (000s)                           | <b>0.59***</b><br>(0.08)  | <b>0.54***</b><br>(0.08)  | 0.04<br>(0.11)           |
| Population (000s)   | <b>-0.11***</b><br>(0.02) | <b>-0.10***</b><br>(0.02) | <b>-0.06**</b><br>(0.02) |
| Number of billing authorities in police authority area                  | 0.22<br>(1.08)            | 0.09<br>(1.12)            | 0.37<br>(1.02)           |
| Local area unemployment rate (%)  | -                         | 0.30<br>(1.54)            | 0.97<br>(1.44)           |
| Local area wage relative to average wage (%)                            | -                         | -17.71<br>(39.88)         | 5.60<br>(36.78)          |
| Number of officers in force   | -                         | -                         | <b>0.02***</b><br>(0.03) |
| Crime rate (notified offences per 1000 population)                      | -                         | 0.04<br>(0.09)            | <b>0.26**</b><br>(0.09)  |
| Clear-up rate (per cent of recorded offences)                           | -                         | -                         | <b>0.34*</b><br>(0.17)   |
| <b>Ill health retirements per 1000 officers</b>                         | -0.16<br>(0.37)           | -0.18<br>(0.38)           | -0.36<br>(0.35)          |
| <b>Interaction Post-2006 × ill health retirements per 1000 officers</b> | <b>1.21*</b><br>(0.51)    | <b>1.20*</b><br>(0.51)    | <b>1.28**</b><br>(0.47)  |
| Force dummies   | Yes                       | Yes                       | Yes                      |
| Year dummies  | Yes                       | Yes                       | Yes                      |
| Adjusted R <sup>2</sup>   | 0.8896                    | 0.8886                    | 0.9061                   |
| Number of observations  | 334                       | 334                       | 334                      |
| F = (.)   | F(53, 280)<br>=51.61      | F(56, 277)<br>=48.43      | F( 58, 275)<br>= 56.38   |

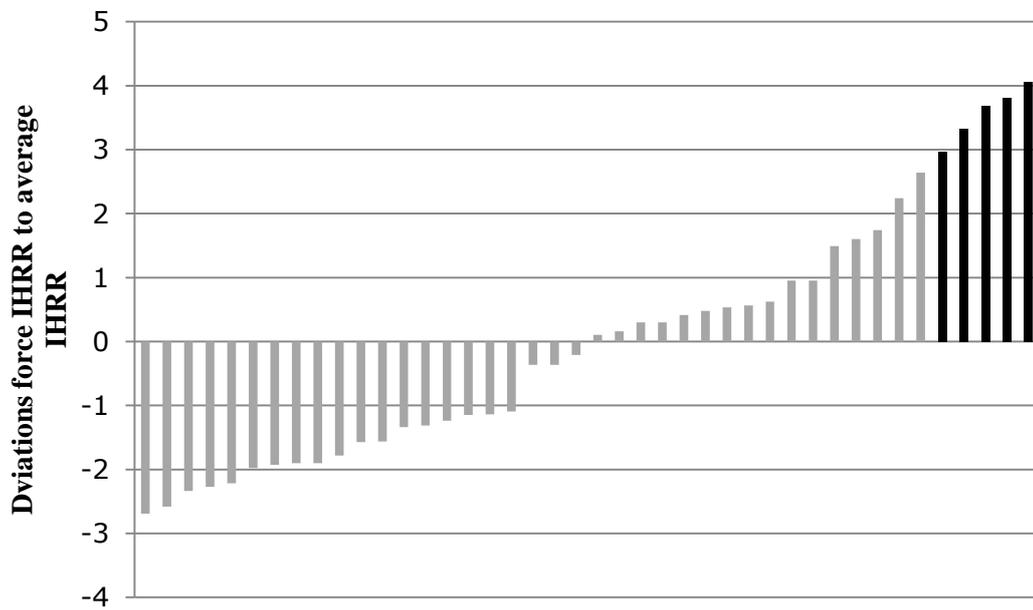
Note: Variables as defined in text. \*, \*\* and \*\*\* indicate significance at the 10%, 5% and 1% level from a 1-sided test.

**Figure 1: Ill-health retirement rates by police force, England and Wales, 2005-2006.**



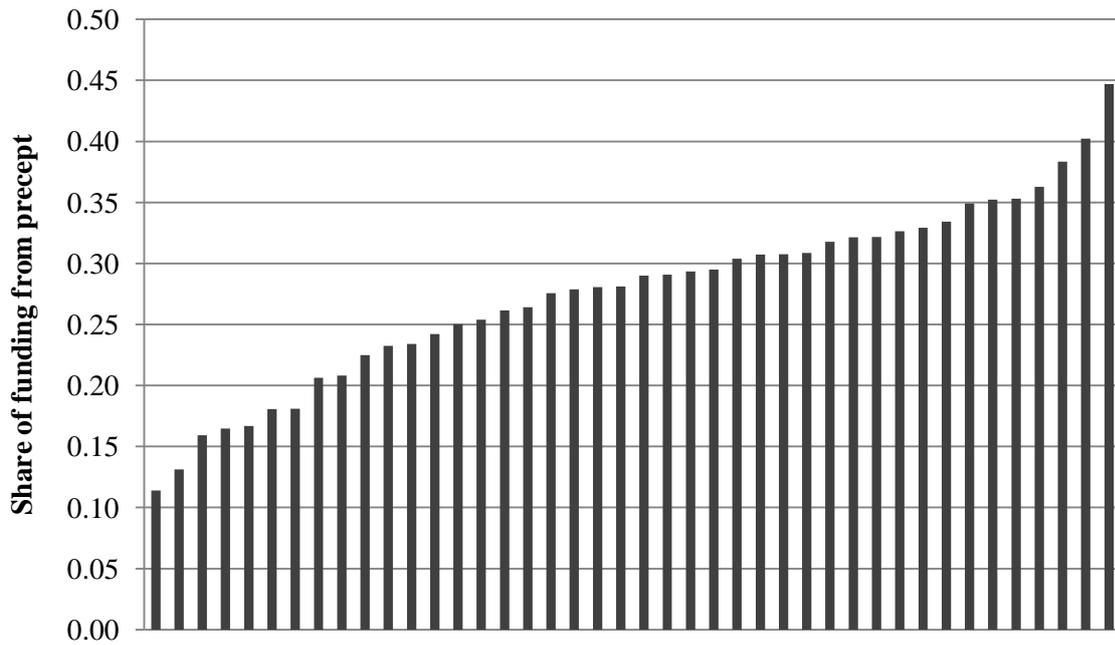
Source: Home Office returns and CIPFA *Police Actuals* 2005-06.

**Figure 2: Differences of ill-health retirement rates (IHRRs) from average, 2002-03 to 2005-06**



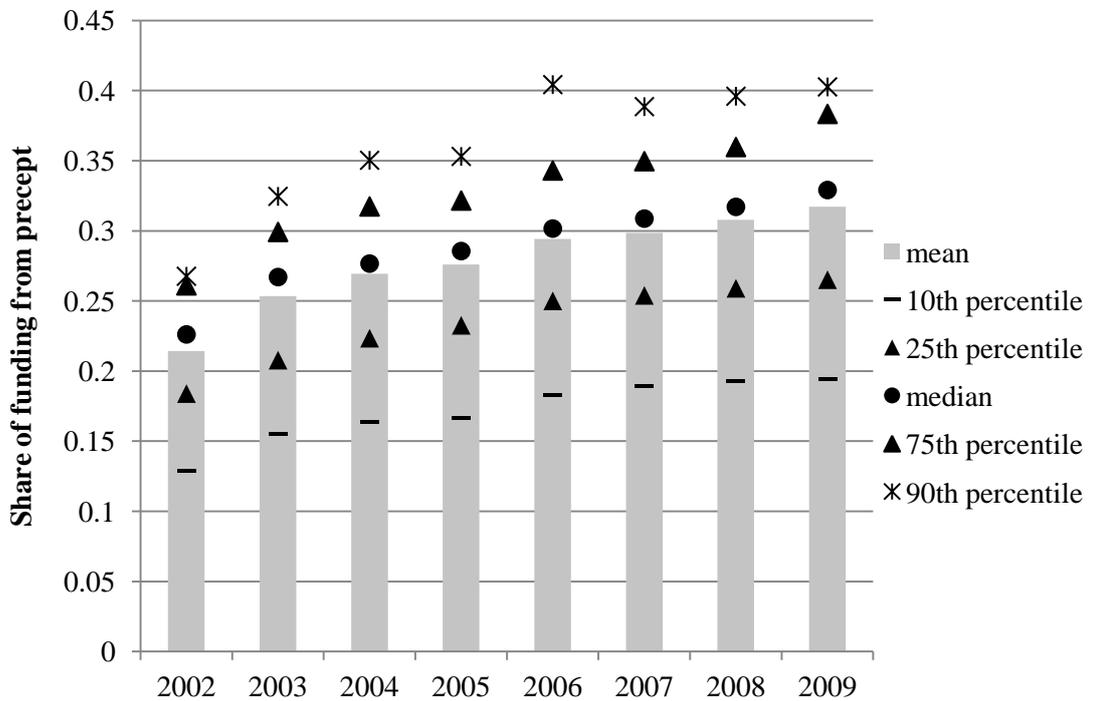
*Note to Figure 2.* Source: as Figure 1, various years. Estimated by regression of police area fixed effects on IHRRs for the period. Dark shaded bars are those significantly positive at 1% or 5% level.

**Figure 3: Share of funding by police force raised from local precept, 2005-06**



Source: CIPFA *Police Actuals*, 2005-06

**Figure 4: Changes in the share of funding raised from local precept, 2002-03 to 2009-10**



Source: CIPFA *Police Actuals*, various years.

**Appendix Table: Summary Statistics**

| <i>Variable</i>   | <i>Min value</i> | <i>Median</i> | <i>Mean</i> | <i>Max value</i> | <i>SD</i> |
|---|------------------|---------------|-------------|------------------|-----------|
| Ill-health retirements per 1000 police officers by force/year | 0                | 2.58          | 3.40        | 17.2             | 2.81      |
| Normal retirements per 1000 officers                          | 0                | 27.1          | 27.0        | 47.4             | 7.0       |
| Crime rate (notified offences per 1000 population)            | 44.0             | 88.1          | 91.5        | 160.7            | 22.7      |
| Clear-up rate for recorded crimes (%)                         | 14.0             | 27.0          | 28.4        | 68.0             | 6.40      |
| Population per officer  | 235              | 462           | 447         | 592              | 76        |
| Local area unemployment rate (%)                              | 2.2              | 4.6           | 5.0         | 11.6             | 1.6       |
| Local area wage relative to average wage (%)                  | 0.76             | 0.91          | 0.95        | 1.38             | 0.13      |
| <i>Precept variables</i>                                      |                  |               |             |                  |           |
| Real police precept levied per property (£)                   | 0                | 139           | 140         | 218              | 30        |
| Share of funding raised by local precept (%)                  | 0                | 0.27          | 0.27        | 0.48             | 0.08      |
| Number of Band D-equivalent properties (000s)                 | 162              | 333           | 458         | 3495             | 497       |
| Population (000s)   | 484              | 1012          | 1355        | 11448            | 1649      |
| Number of billing authorities in police authority area        | 2                | 6             | 8.7         | 32               | 5.2       |
| Number of officers in force (FTEs)                            | 948              | 2170          | 3266        | 32988            | 4507      |

| <b>Correlation matrix</b> | Precept as % funding | Total real precept raised | Real precept per dwelling | Population | Total value of taxbase | Number Band D dwellings | No of officers | Rate of IHR | Crime rate | Clear up rate | Population per officer | Rate of OHR | Unemployment rate | Local wage: national wage |
|---------------------------|----------------------|---------------------------|---------------------------|------------|------------------------|-------------------------|----------------|-------------|------------|---------------|------------------------|-------------|-------------------|---------------------------|
| Precept as % funding      | 1                    |                           |                           |            |                        |                         |                |             |            |               |                        |             |                   |                           |
| Total real precept raised | -0.0639              | 1                         |                           |            |                        |                         |                |             |            |               |                        |             |                   |                           |
| Real precept per dwelling | 0.7751               | 0.2063                    | 1                         |            |                        |                         |                |             |            |               |                        |             |                   |                           |
| Population                | -0.3144              | 0.8898                    | -0.0872                   | 1          |                        |                         |                |             |            |               |                        |             |                   |                           |
| Total value of taxbase    | -0.2589              | 0.9012                    | -0.0719                   | 0.9944     | 1                      |                         |                |             |            |               |                        |             |                   |                           |
| Number Band D dwellings   | -0.0681              | 0.7236                    | -0.0709                   | 0.7739     | 0.8112                 | 1                       |                |             |            |               |                        |             |                   |                           |
| No of officers            | -0.3679              | 0.8906                    | -0.0872                   | 0.9905     | 0.977                  | 0.7184                  | 1              |             |            |               |                        |             |                   |                           |
| Rate of IHR               | -0.0655              | -0.1809                   | -0.11                     | -0.1543    | -0.1722                | -0.1746                 | -0.162         | 1           |            |               |                        |             |                   |                           |
| Crime rate                | -0.6562              | 0.1891                    | -0.3656                   | 0.3434     | 0.2969                 | 0.0589                  | 0.3757         | 0.1199      | 1          |               |                        |             |                   |                           |
| Clear up rate             | 0.1867               | -0.1879                   | 0.2206                    | -0.2742    | -0.2739                | -0.1646                 | -0.2479        | 0.0749      | -0.4848    | 1             |                        |             |                   |                           |
| Population per officer    | 0.6803               | -0.336                    | 0.1931                    | -0.4592    | -0.4051                | -0.1149                 | -0.5483        | 0.0934      | -0.5159    | -0.0695       | 1                      |             |                   |                           |
| Rate of OHR               | 0.1073               | -0.0601                   | 0.1287                    | -0.0925    | -0.0967                | -0.113                  | -0.0911        | -0.0127     | -0.1128    | 0.0443        | 0.0574                 | 1           |                   |                           |
| Unemployment rate         | -0.3783              | 0.1768                    | 0.0172                    | 0.2401     | 0.2013                 | -0.0385                 | 0.3015         | -0.1151     | 0.1376     | 0.0529        | -0.5829                | 0.1011      | 1                 |                           |
| Local wage: national wage | 0.2562               | 0.4323                    | 0.0448                    | 0.409      | 0.4679                 | 0.461                   | 0.3454         | -0.1822     | -0.0965    | -0.3103       | 0.2746                 | -0.1381     | -0.2633           | 1                         |