Ministry of JUSTICE

Prison Population Projections 2008–2015

Ministry of Justice
Statistics bulletin

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Key Points

- This bulletin presents projections of the prison population in England and Wales from September 2008 to June 2015. The projections are based on assumptions about future criminal justice trends (e.g. sentencing) and incorporate the anticipated impacts of policy and process initiatives that have agreed implementation timetables.

- Three scenarios (High, Medium and Low) have been projected based on assumptions about future sentencing trends. The Medium scenario assumes no increases or decreases in custody rates or determinate sentence lengths. The High/Low scenarios reflect a 1% per annum increase/decrease in custody rates and a 0.5% per annum increase/decrease in the average (determinate) custodial sentence lengths. Other impacts included in the projections, such as those of legislation and processes, are applied equally to all scenarios.

- Projected prison populations for the three scenarios are given in Table 1. By the end of June 2015 the demand for prison spaces is projected to increase to between 83,400 and 95,800.

Table 1: Projected prison population (end June figures)

Year	High	Medium	Low
2009	85,100	84,300	83,300
2010	88,100	86,400	84,400
2011	90,500	87,900	85,100
2012	92,100	88,700	85,000
2013	93,000	88,600	84,100
2014	94,200	89,000	83,600
2015	95,800	89,700	83,400

- The assumptions informing the projection, and therefore the projections themselves, are subject to considerable uncertainty. This is represented by the three scenarios, with each scenario being only as likely as the assumptions that inform it. While these assumptions are based on extensive consultation, and emerging data on them are being monitored, the department does not know yet which one is most likely to occur in future. They do not include impacts for any future measures for which implementation timetables are not yet known, or measures for which the effect cannot be projected with reasonable confidence.

1. Introduction

This bulletin presents prison population projections for England and Wales from September 2008 to June 2015. The projections are produced to aid policy development, capacity planning and resource bidding and allocation within the Criminal Justice System (CJS) and the National Offender Management Service (NOMS).

Three possible future scenarios (High, Medium and Low) are presented that have been agreed through cross-CJS stakeholder consultation. These scenarios take into account a number of drivers, including:

- views of future sentencing trends, i.e. changes in custody rates[1], average custodial sentence lengths (ACSLs) for determinate sentences and tariffs for indeterminate sentences;
- impacts of measures introduced by the Criminal Justice and Immigration Act (CJIA) 2008;
- measures to increase offences brought to justice contributing to PSA 24[2] resulting from crime trends, police detections and arrest activities;
- impacts of Simple, Speedy, Summary Justice (CJSSS) influencing the speed of trials at the courts;
- other legislative, CJS process, and administrative measures that have a bearing on the levels and trends of the prison population, such as new motoring offences[3] .

The impacts of legislative measures and policies without an agreed implementation timetable are not included in the projections. Appendix B provides details of the assumptions underlying the projections.

The High, Medium and Low projections are produced through an intricate modelling exercise using several models spanning the CJS. Appendix C gives a description of the modelling methodology used to generate the prison population projections. This also includes an assessment of modelling errors and caveats.

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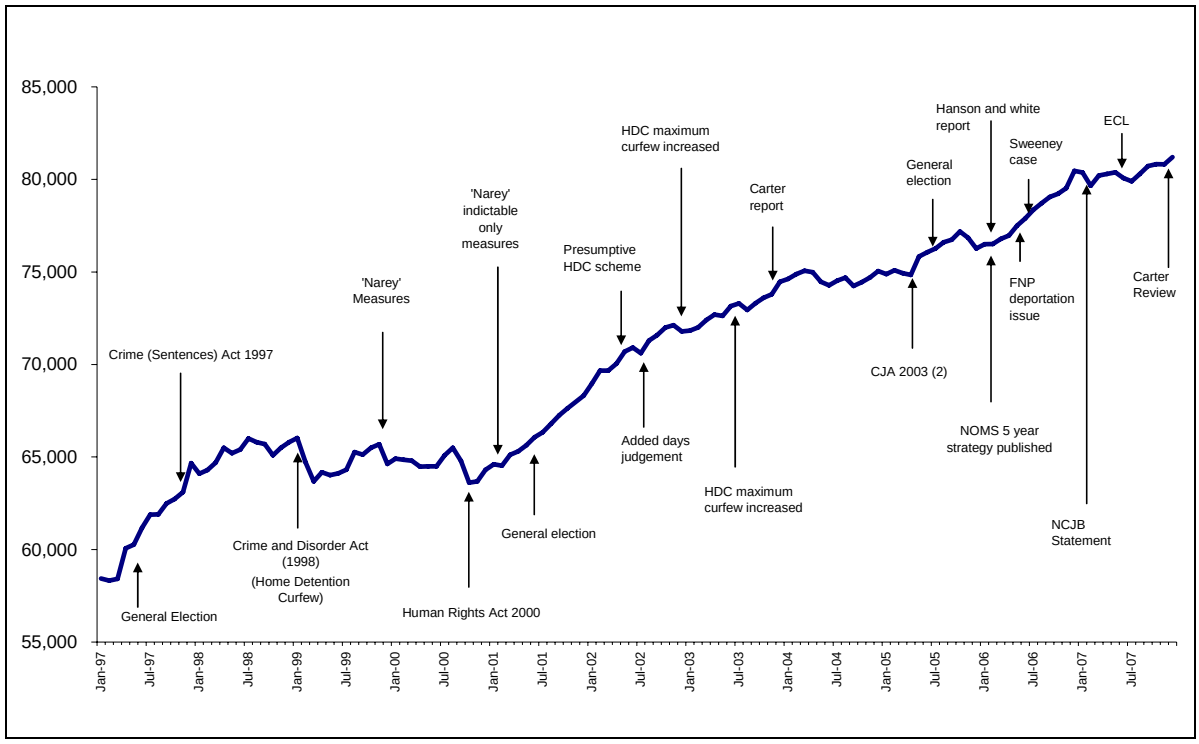
[1] The custody rate is the proportion of those sentenced at court given a custodial sentence.
[2] PSA 24 is to deliver a more effective, transparent, and responsive Criminal Justice System for victims and the public.
[3] Causing death by careless, or inconsiderate, driving; Causing death by driving: unlicensed, disqualified or uninsured drivers; Road Safety Act 2006, SS20, 21.

2. Recent Trends

The total prison population has increased significantly since the mid-1990s, rising from 61,470[4] in June 1997 to 79,730 in June 2007 (see Chart 1). The population has continued to grow over the last 12 months reaching 83,190 on 30th June 2008. This represents a net increase of 3,460 (or 4%) since June 2007, with the sentenced population increasing by 4% and the remand population increasing by 5%. Over the same period, the male population climbed by 4% to 78,690 and the female population climbed by 5% to 4,510.

Chart 1: Actual prison population[5] since 1997 with policy interventions and other key events.



Custody rates and average custodial sentence lengths[6] (ACSLs) for indictable offences increased significantly between 1997 and 2004, climbing from 22.6% and 15.7 months to 25.3% and 16.1 months respectively. Over the same period, the numbers of offenders sentenced for indictable offences remained relatively constant, fluctuating between 317,530 and 340,300 per year. These data are consistent with sentencing behaviour (i.e. custody rates and ACSLs) being the dominant driver behind the observed growth in the prison population (rather than an increase in the number of offenders sentenced).

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[4] Prison population figures given in this section have been rounded to the nearest 10.
[5] Seasonally adjusted time series.
[6] Refers to determinate custodial sentence lengths.

After the introduction of Indeterminate sentences for Public Protection (IPPs) in 2005, a direct comparison cannot be made with previous trends of ACSLs.[7] However, custody rates have experienced slight year-on-year decreases from 2004 to 2007. Provisional data for 2007 indicate a custody rate of 23.7% for all indictable offences and a determinate ACSL of 15.2 months for indictable offences where a determinate sentence was imposed.[8]

Beyond sentencing behaviour for determinate sentences of immediate custody, a number of other factors have also contributed to the growth in the prison population over the past decade including:

- offenders breaking the conditions of their licence are being recalled in greater numbers and for longer periods, reflecting legislative changes in 1998 and 2003;
- increased use of indeterminate sentences following the introduction of Indeterminate sentences for Public Protection (IPPs) in April 2005;
- the introduction of Suspended Sentence Orders in April 2005 for which offenders in breach can be taken into custody; and
- increases in the time certain types of offender remain in prison (particularly in recent years) as the use of Home Detention Curfew for the early release of offenders has diminished and the parole rate has fallen. This has been countered to some extent by the End of Custody Licence (ECL) scheme, introduced at the end of June 2007.

Projecting the prison population therefore requires an understanding of how sentencing behaviour changes together with knowledge of how legislative and process changes are likely to influence the prison population in the future.

3. Modelling Methodology and Scenario Assumptions

The 2008-2015 prison population projections represent the outputs of a complex modelling exercise using several models spanning the CJS (see Appendix C). These models use various data sources including sentencing trends; prison receptions, discharges and populations; demographics; crime trend trajectories; and criminal histories of offending by offence type. The models also incorporate upstream constraints within the CJS (e.g. capacity of courts to process cases) and

[7] Offenders receiving an IPP would previously have received a lengthy determinate sentence that would have been included in the ACSL measure prior to the introduction of IPPs. These longer sentences are now effectively excluded from the calculation as the length of IPPs are indeterminate in nature. Therefore this will result in a decrease in average custodial sentence lengths for more serious offences sentenced at the Crown Court.

[8] Sentencing statistics quoted for 2007 are **provisional** and may change prior to finalisation. Final 2007 data will be published in the annual bulletin of sentencing statistics later in the year.

assumptions on how these factors are anticipated to change in the future to construct projections for the demand for prison places.

The High, Medium and Low scenarios (see Chart 2) represent three alternative views of the possible future prison population. These have been agreed in consultation with key stakeholders including the National Offender Management Service (NOMS), the Parole Board, the Office for Criminal Justice Reform (OCJR), and related Ministry of Justice entities.

The scenarios include only measures where an implementation timetable has been agreed (see Appendix B) and represent the current view of the future by CJS stakeholders. Whilst the stakeholder consultation endeavours to capture all possible factors that significantly impact the future prison population (including sentencing behaviour, changes in legislation and administrative practice) not all influencing factors can be foreseen. For instance, high profile media coverage of events and statements related to the CJS can induce subtle behavioural changes in sentencing practice and/or CJS processes that can have a significant effect on the prison population (e.g. the murder of James Bulger in 1993[9]). Such events are often impossible to predict. The scenarios therefore represent possible futures based on assumed sentencing trends and the realisation of legislative and procedural changes; they are not predictions of what will happen to the prison population.

The assumptions underlying the three scenarios include sentencing trend assumptions, legislative impacts and process changes as outlined below. Specific legislative and process impacts are equally applied to each scenario.

Sentencing trend assumptions

Historically, the main factors driving the growth in the prison population have been the custody rate and average custodial sentence length given to offenders by the courts. The Crown Court has the greatest long-term impact on the prison population, while magistrates' courts also make a contribution in the short term and to the churn of the population.

Based on observed trends in sentencing over the period 2000–2007[10], High, Medium and Low sentencing trend assumptions have been agreed by stakeholders (see Table 2). Given that trends in sentencing are difficult to predict (particularly in the medium to long term), it is assumed that these sentencing trend scenarios are equally likely to happen.

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[9] See 'Figure 1.3 Prison population – policy interventions and other key events' in Offender Management Caseload Statistics 2005, HOSB 18/06, December 2006, p6.

[10] There is a time lag in receiving sentencing data from the courts and police, particularly for data from magistrates' courts. Therefore if significant deviations from the long-term trend occur in the months immediately before the projection, these will not be captured.

Table 2: Sentencing assumptions

	Year-on-year changes		
	High scenario	Medium scenario	Low scenario
Custody rate	1.0%	0.0%	-1.0%
Average custodial sentence length (determinate)	0.5%	0.0%	-0.5%

Legislative impacts

The legislative impacts included in these projections are primarily due to measures introduced by the CJIA 2008 (see Appendix B).

The impacts of two new driving offences have been included in the projections. These were introduced in the Road Safety Act 2006, and were commenced for offences committed after 1st August 2008.

Process impacts

The impacts of activities that occur in the various agencies of the CJS, such as the police and courts, are captured by the Criminal Justice System Model, e.g., crime trend trajectories, detection and arrest rates, processing times at courts, etc. The projections include the impact of CJS activity relating to bringing more offences to justice (PSA 24) and CJSSS which have agreed measures that are expected to be implemented in 2008 and 2009.

End of Custody Licence (ECL) was introduced on 29th June 2007. This allows certain non-violent offenders to be released on this special licence up to 18 days early. As there is currently no set end date for the scheme, these projections show the effect of it continuing indefinitely. (This is consistent with projections in Lord Carter's Report on Prisons[11].)

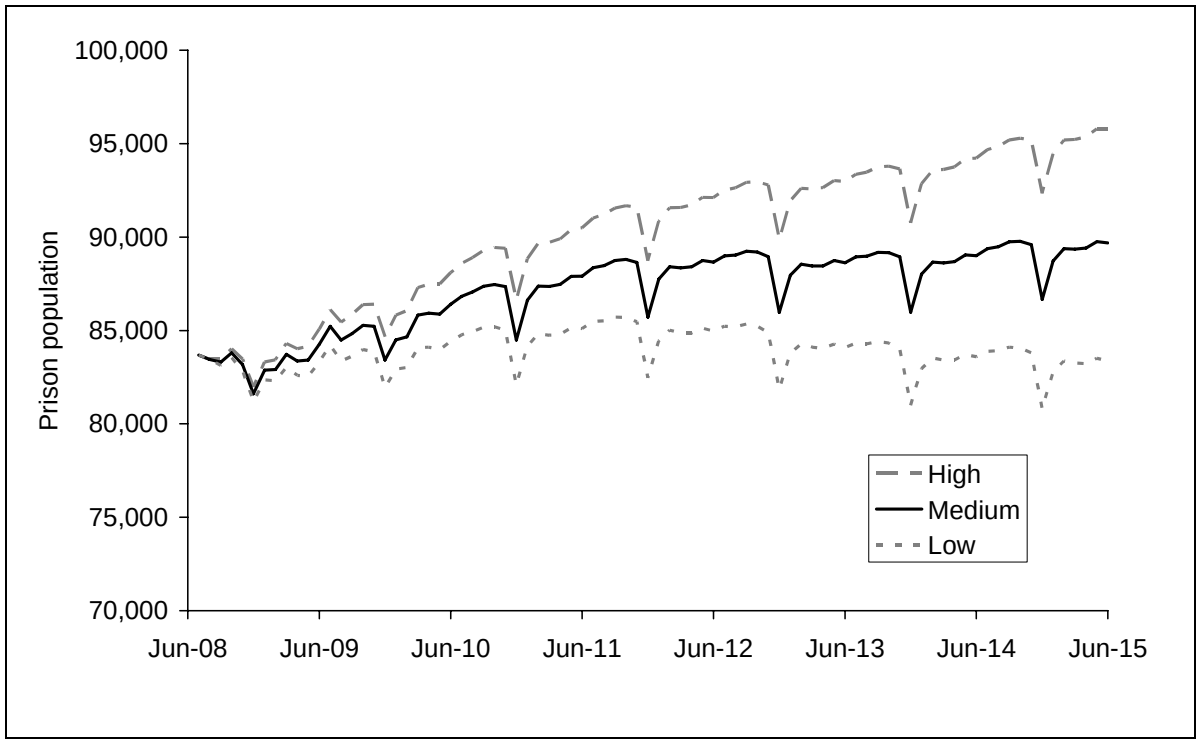
The Bail Accommodation Support Scheme, which was introduced in June 2007, gives support to some prisoners held on remand, to enable them to meet their conditions to be bailed. It is assumed to continue indefinitely, and its effect on the number of prisoners held on remand is assumed to increase as the scheme matures.

[11] Securing the future: Proposals for the efficient and sustainable use of custody in England and Wales; December 2007 (www.justice.gov.uk/publications/securing-the-future.htm)

4. Results

The three scenarios give rise to a projected prison population of between 83,300 and 85,100 by the end of June 2009, between 85,100 and 90,500 by the end of June 2011 and between 83,400 and 95,800 by the end of June 2015 (see Chart 2). Appendix A presents the annual projected end June populations and average financial year populations from 2009–2015 together with further breakdowns of the projected population by gender and the sub-populations of remand, sentenced and non-criminal categories. Monthly projections for each scenario are also presented in this appendix.

Chart 2: Projected monthly population (all scenarios)



5. Discussion

As Chart 2 illustrates, the prison population projections increase between 2008 and 2011 for all three scenarios. Subsequently, during 2012 and 2013, the Medium projection stays level, while the High and Low projections increase and decrease respectively. In 2014 and 2015, the medium projection starts to increase again, while the high projection increases more rapidly, and the low projection declines more slowly. These trends reflect the cumulative impacts of the various sentencing, legislative and procedural assumptions that are used to generate the projections.

This section discusses how specific modelling assumptions have contributed to the overall projections. Please note the individual impacts discussed will not sum to the total prison population projections. This is because the overall projections take

account of interactions within the CJS that are absent when individual assumptions are considered in isolation.

Sentencing trends

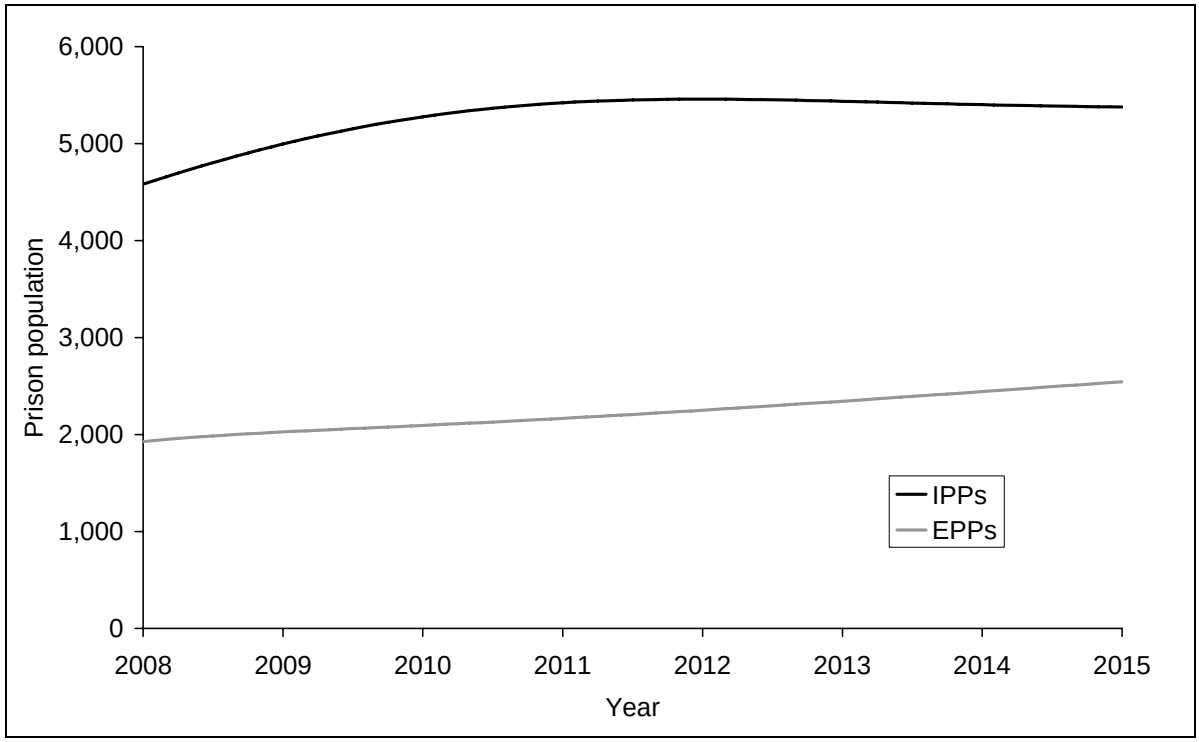
For the Medium scenario, the custody rate and average custodial sentence length for determinate sentences are assumed to be constant going forward. As such, the change in growth (from current population levels) in this scenario stems from the legislative and process impacts included. The difference between the High, Medium and Low scenarios directly reflects the different sentencing trend assumptions used in these scenarios to generate the projections.

Indeterminate sentences for Public Protection (IPPs)

Indeterminate sentences for Public Protection (IPPs) came into effect in April 2005 as part of the Criminal Justice Act 2003. Those who are now getting an IPP would previously have received a relatively long determinate sentence. IPP sentences are expected to increase the prison population over the period of the projections, as those receiving these sentences are assumed to serve longer in prison than they would have done with standard determinate sentences.

Currently, the rate at which IPP sentences are issued has stabilised at around 140 per month. However, changes made in the Criminal Justice and Immigration Act (CJIA) 2008 are expected to reduce that number to 45 per month. The changes will restrict the use of IPP sentences to the most dangerous offenders. The measure will also affect the use of Extended Public Protection (EPP) sentences, and relatively long (over four year) sentences for less dangerous, but otherwise serious, offenders. These changes reduce the impact of IPPs on the prison population, though they still account for a significant number of prison places (see Chart 3).

Chart 3: Populations of EPPs and IPPs



Criminal Justice and Immigration Act (CJIA) 2008

As well as the changes to IPPs noted in the previous section, the Criminal Justice and Immigration Act 2008 introduced a number of other measures which are expected to have the effect of reducing the prison population. These measures include:

- the presumption of a 28 day fixed-term recall for breach of licence (rather than recall until the end of sentence or release by the Parole Board);

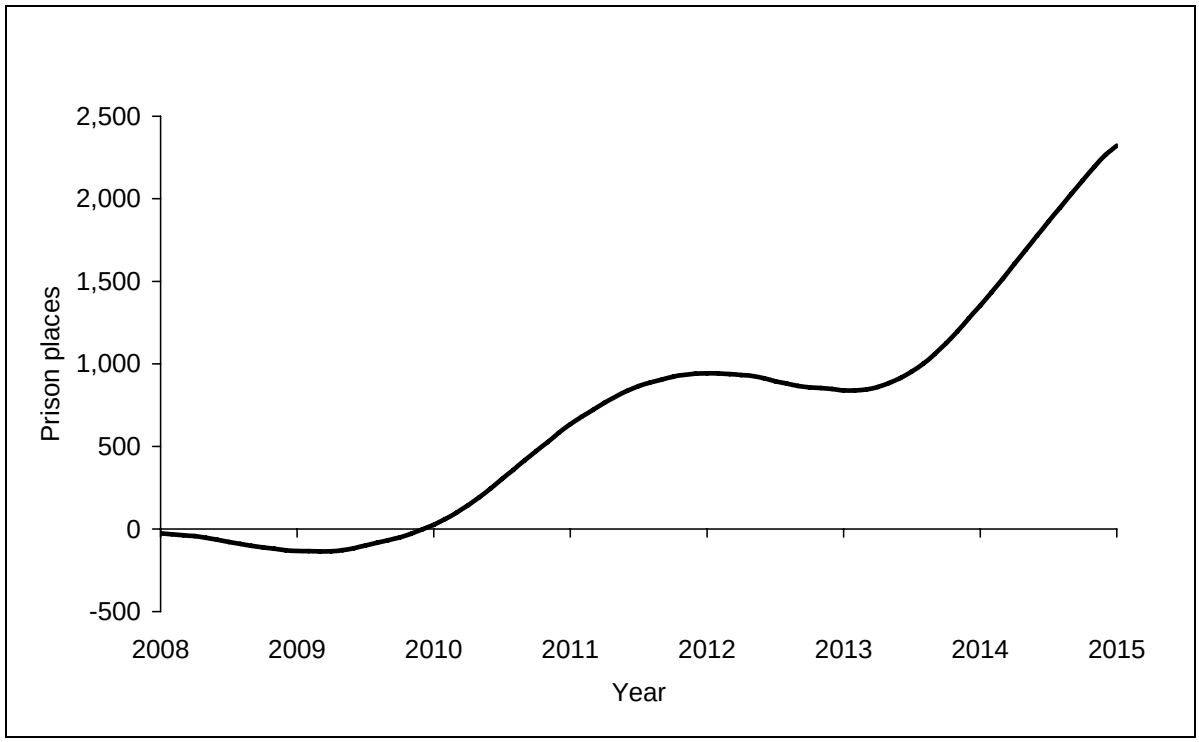
- restricting the grounds on which a person charged with an imprisonable summary offence or a relevant low-level criminal damage offence may be refused bail;

- allowing those who have spent some of their time on remand on tagged curfew to have part of this time credited against the amount of time served in custody;

- treating some prisoners sentenced under the Criminal Justice Act 1991 as if they were sentenced under the Criminal Justice Act 2003 (with the effect of them becoming eligible for automatic release at the halfway, rather than two-thirds, point of their sentence).

These measures are being commenced at various points between mid and late 2008. Because of the timing, it is yet to be seen how the CJS will react to these changes; therefore calculations of the total magnitude rely on assumptions about its behaviour. These result in the measures (excluding IPP reform) giving a maximum effect of around 1,600 prison places in late 2009; this subsequently drops to around 1,300 for the rest of the projection period. (While most of the measures will result in a steady build of extra places, the effect of converting Criminal Justice Act 1991 cases has its largest impact twelve months after it is put into effect; after this point, its effect of the prison population slowly falls, as there will be fewer offenders sentenced under the Criminal Justice Act 1991 for it to affect.)

Chart 4: Impacts of PSA 24 initiatives on the prison population[12]



Improving the efficiency and effectiveness of the Criminal Justice System

There are several initiatives in place to improve the efficiency and effectiveness of the CJS and the combined effect of these is shown in Chart 4. The projected increase is around 500 places by 2011 and around 1500 places by 2014.

The reasons for this increase are complex, and are the result of several conflicting pressures on the CJS. There is a projected decrease in the overall crime rate, but also an increase in the proportion of serious offences being brought to justice, possibly because of an increase in the serious crime sanction detection rate. This leads to more pressure on the Crown Court system, and hence an increase in the remand population.

Also included in the projection is the effect of Simple, Speedy, Summary Justice (CJSSS), a new way of working that encompasses a simpler set of processes in the courts. It aims to improve the way courts are managed. The backlog at magistrates' courts reduces because of fewer preliminary hearings, more early guilty pleas and more guilty pleas dealt with in a single hearing. However, the Crown Court backlog is slightly higher because of a faster flow from magistrates' courts.

Other policy and process impacts

End of Custody Licence (ECL) was introduced on 29th June 2007. Because there is no agreed timetable for its conclusion, its effect is included throughout the

[12] This chart shows the impact on the total population of PSA 24 initiatives and CJSSS, compared to not continuing the implementation of these measures after June 2008.

projection period. It reduces the prison population by around 1,300 places while it is operational.

6. Caveats on Modelling the Prison Population

The prison population is influenced by diverse factors that can mean that the actual future prison population may not be the same as that projected:

- changes in sentencer behaviour, policy decisions and the criminal justice process, which can respond to a multitude of environmental factors such as high profile criminal cases and public debate;
- implementation of new policies and processes that are currently being considered but as yet do not have an agreed implementation timetable;
- measures for which a quantitative assessment of the impact is currently not possible;
- unknown future policy, process and political changes.

Known factors which are expected to have an impact on the prison population, but which have not been modelled because of a lack of agreed timetables, or because a firm quantitative assessment of the impact is not yet possible include:

- recently revised sentencing guidelines around knife possession, and the "Tackling Knives Action Plan" implemented by some police forces;
- implementing provision in the Borders Act 2007 for the automatic deportation of certain offenders sentenced to less than 12 months in prison;
- additional prison places needed as a result of an increase in the number of European Arrest Warrants due to the UK's involvement with Schengen Information System 2.

The impacts of such factors can vary significantly, and contribute to the uncertainty associated with the projections.

The assumptions underlying these projections have been captured through a consultative process that included all major stakeholders. The assumptions are based on analysis (where reliable data are available) and 'expert judgment' from policy makers, key deliverers and system influencers. The assumptions are therefore likely to be more robust for those measures and processes that have a well-defined boundary than those that do not.

The projections can fluctuate between $\pm$ 2% and $\pm$ 3% of estimated figures due to statistical modelling variation. The margins of error on any 'expert judgment' assumptions cannot be computed and will add to this variation. A discussion of the accuracy of the modelling and related caveats is presented in Appendix C.

Appendix A: Additional Tables

Table A1: Tables of overall projected prison population

Projected prison population (at the end of June)

Year	High	Medium	Low
2009	85,100	84,300	83,300
2010	88,100	86,400	84,400
2011	90,500	87,900	85,100
2012	92,100	88,700	85,000
2013	93,000	88,600	84,100
2014	94,200	89,000	83,600
2015	95,800	89,700	83,400

Average projected prison population (financial year)

Year	High	Medium	Low
2009/10	85,600	84,500	83,300
2010/11	88,600	86,700	84,500
2011/12	90,900	88,000	85,000
2012/13	92,200	88,500	84,600
2013/14	93,100	88,500	83,700
2014/15	94,500	89,100	83,400

Notes: all numbers rounded to the nearest hundred.

Table A2: Breakdown of projected prison population for high, medium and low scenarios

	High scenario									
	Remand			Sentenced			Non-criminal	Total		
	Male	Female	Total	Male	Female	Total	Total	Male	Female	Total
2008	12,566	874	13,440	64,699	3,535	68,234	1,520	78,689	4,505	83,194
2009	12,700	900	13,600	66,400	3,500	70,000	1,500	80,600	4,500	85,100
2010	12,900	900	13,900	69,000	3,700	72,700	1,500	83,400	4,700	88,100
2011	13,000	900	13,900	71,200	3,800	75,000	1,500	85,700	4,800	90,500
2012	13,100	900	14,000	72,700	3,900	76,600	1,500	87,200	4,900	92,100
2013	13,100	900	14,000	73,500	3,900	77,400	1,500	88,000	5,000	93,000
2014	13,100	900	14,100	74,600	4,000	78,600	1,500	89,200	5,000	94,200
2015	13,200	900	14,100	76,100	4,100	80,200	1,500	90,700	5,100	95,800

	Medium scenario									
	Remand			Sentenced			Non-criminal	Total		
	Male	Female	Total	Male	Female	Total	Total	Male	Female	Total
2008	12,566	874	13,440	64,699	3,535	68,234	1,520	78,689	4,505	83,194
2009	12,600	900	13,500	65,800	3,500	69,200	1,500	79,800	4,500	84,300
2010	12,700	900	13,600	67,600	3,600	71,200	1,500	81,800	4,600	86,400
2011	12,700	900	13,600	69,100	3,700	72,800	1,500	83,300	4,600	87,900
2012	12,700	900	13,600	69,800	3,700	73,500	1,500	84,000	4,700	88,700
2013	12,700	900	13,600	69,800	3,700	73,500	1,500	84,000	4,700	88,600
2014	12,700	900	13,600	70,200	3,700	73,900	1,500	84,300	4,700	89,000
2015	12,700	900	13,500	70,900	3,700	74,600	1,500	85,000	4,700	89,700

	Low scenario									
	Remand			Sentenced			Non-criminal	Total		
	Male	Female	Total	Male	Female	Total	Total	Male	Female	Total
2008	12,566	874	13,440	64,699	3,535	68,234	1,520	78,689	4,505	83,194
2009	12,500	900	13,400	65,000	3,400	68,400	1,500	79,000	4,300	83,300
2010	12,600	900	13,400	66,100	3,400	69,500	1,500	80,100	4,300	84,400
2011	12,500	900	13,400	66,900	3,300	70,200	1,500	80,800	4,300	85,100
2012	12,500	800	13,300	66,800	3,300	70,200	1,500	80,700	4,300	85,000
2013	12,400	800	13,200	66,100	3,300	69,300	1,500	79,900	4,200	84,100
2014	12,300	800	13,100	65,700	3,300	69,000	1,500	79,400	4,200	83,600
2015	12,200	800	13,000	65,600	3,200	68,800	1,500	79,200	4,100	83,400

Notes: Data are given for the end of June in each year. Figures for 2008 are actual data. All other figures are rounded to the nearest hundred. Components may not sum due to rounding.

Table A3: Monthly values of projected prison population for high, medium and low scenarios

	High	Medium	Low
Jul 2008	83,679	83,679	83,679
Aug 2008	83,445	83,445	83,445
Sep 2008	83,400	83,300	83,100
Oct 2008	84,000	83,800	83,500
Nov 2008	83,500	83,200	82,800
Dec 2008	82,000	81,600	81,200
Jan 2009	83,300	82,900	82,400
Feb 2009	83,400	82,900	82,300
Mar 2009	84,300	83,700	83,000
Apr 2009	84,000	83,400	82,600
May 2009	84,200	83,400	82,600
Jun 2009	85,100	84,300	83,300
Jul 2009	86,100	85,200	84,200
Aug 2009	85,400	84,500	83,400
Sep 2009	85,900	84,800	83,600
Oct 2009	86,400	85,300	84,000
Nov 2009	86,400	85,200	83,800
Dec 2009	84,700	83,400	81,900
Jan 2010	85,800	84,500	82,900
Feb 2010	86,100	84,700	83,000
Mar 2010	87,300	85,800	84,100
Apr 2010	87,500	85,900	84,100
May 2010	87,500	85,900	84,000
Jun 2010	88,100	86,400	84,400
Jul 2010	88,600	86,800	84,800
Aug 2010	88,900	87,100	84,900
Sep 2010	89,300	87,400	85,200
Oct 2010	89,400	87,500	85,200
Nov 2010	89,400	87,300	85,000
Dec 2010	86,600	84,500	82,100
Jan 2011	88,800	86,600	84,200
Feb 2011	89,700	87,400	84,800
Mar 2011	89,700	87,400	84,700
Apr 2011	89,900	87,500	84,800
May 2011	90,400	87,900	85,100
Jun 2011	90,500	87,900	85,100
Jul 2011	91,000	88,400	85,500
Aug 2011	91,200	88,500	85,500
Sep 2011	91,500	88,700	85,700
Oct 2011	91,700	88,800	85,700
Nov 2011	91,600	88,600	85,500
Dec 2011	88,700	85,700	82,500

	High	Medium	Low
Jan 2012	90,800	87,800	84,400
Feb 2012	91,600	88,400	85,000
Mar 2012	91,600	88,300	84,900
Apr 2012	91,700	88,400	84,900
May 2012	92,100	88,700	85,100
Jun 2012	92,100	88,700	85,000
Jul 2012	92,500	89,000	85,200
Aug 2012	92,600	89,000	85,200
Sep 2012	92,900	89,200	85,300
Oct 2012	93,000	89,200	85,200
Nov 2012	92,800	89,000	84,900
Dec 2012	89,900	86,000	81,800
Jan 2013	91,900	88,000	83,800
Feb 2013	92,600	88,500	84,300
Mar 2013	92,600	88,400	84,100
Apr 2013	92,600	88,400	84,000
May 2013	93,000	88,700	84,300
Jun 2013	93,000	88,600	84,100
Jul 2013	93,400	88,900	84,300
Aug 2013	93,500	89,000	84,300
Sep 2013	93,700	89,200	84,400
Oct 2013	93,800	89,200	84,300
Nov 2013	93,600	88,900	84,000
Dec 2013	90,800	86,000	81,000
Jan 2014	92,900	88,000	83,000
Feb 2014	93,600	88,700	83,500
Mar 2014	93,600	88,600	83,400
Apr 2014	93,800	88,700	83,400
May 2014	94,200	89,000	83,700
Jun 2014	94,200	89,000	83,600
Jul 2014	94,700	89,400	83,900
Aug 2014	94,800	89,500	83,900
Sep 2014	95,200	89,700	84,100
Oct 2014	95,300	89,800	84,100
Nov 2014	95,200	89,600	83,800
Dec 2014	92,300	86,700	80,800
Jan 2015	94,500	88,700	82,800
Feb 2015	95,200	89,400	83,400
Mar 2015	95,200	89,300	83,300
Apr 2015	95,400	89,400	83,200
May 2015	95,800	89,800	83,500
Jun 2015	95,800	89,700	83,400

Notes: Figures for July 2008 are actual population data. Figures for August 2008 are provisional population data. Other data are rounded to the nearest hundred.

Appendix B: Stakeholder Assumptions

The following assumptions have been agreed by stakeholders representing the following entities:

- NOMS Estate Planning and Development Unit
- NOMS Planning and Finance Unit
- NOMS Prison Population Task Force
- Ministry of Justice Sentencing Policy and Penalties Unit
- Ministry of Justice Dangerous and Severe Personality Disorder (DSPD) Programme
- The Parole Board
- Office for Criminal Justice Reform (OCJR), Evidence and Analysis Unit
- Her Majesty's Court Service

B1. Sentencing trends and scenarios

The sentencing trend assumptions reflect the underlying year-on-year percentage changes in custody rates and average custodial sentence lengths. Three scenarios are used (High, Medium and Low):

- The Medium Scenario assumes that both custody rates and average sentence lengths remain unchanged, i.e., there is no year-on-year change in custody rates and average custodial sentence length throughout the whole period (2008 to 2015).
- The High Scenario assumes that there will be a year-on-year increase in custody rates of 1% and a year-on-year increase in average custodial sentence lengths of 0.5%.
- The Low Scenario assumes that there will be a year-on-year decrease in custody rates of 1% and a year-on-year decrease in average custodial sentence lengths of 0.5%.

These assumptions hold for each of the gender and offence groups used in generating the prison population projections.

B2. Legislative and procedural assumptions

The legislative and procedural assumptions incorporated into these projections apply to legislation which either has a fixed implementation date

in the future, or is already currently implemented but the effect on the prison population has yet to be fully realised.

Criminal Justice Act 2003

Assumptions on length of stay of IPP sentences are set out in Table B1.

Table B1: Assumptions of time served for IPP offenders

	IPPs pre-CJIA 2008	IPPs post-CJIA 2008
Average number of receptions per month	140	45
Average tariff (months)	38	60
Average time served post tariff (months)	54	54
Average time on community supervision (months)	120	120
Breach rate (% of those under supervision in the community per year)	14	14

Criminal Justice System – Simple, Speedy, Summary Justice (CJSSS)

CJSSS assumptions have been agreed through a separate consultation carried out by the Office for Criminal Justice Reform (OCJR) and are assumed to be implemented in April 2008. CJSSS assumptions included in these projections were those agreed in April 2007.

- Number of pre-trial reviews and hearings reduced to two in magistrates' courts and Crown courts.
- More early guilty pleas: 10% of late guilty pleas changed to early guilty pleas in the magistrates' courts.

Initiatives to bring more offences to justice (PSA 24)

The continued implementation of measures to bring more offences to justice requires assumptions on future crime trends and sanctioned detection rates.

Sanctioned detection rates (including charges, summons and cautions) for violence, sexual offences, burglary and robbery are assumed to increase by one third of a percent per year through the projection period while the remaining sanctioned detection rates are assumed to remain constant.

Crime trends are taken from v06.00 of the Crime Trajectory Model.

End of Custody Licence (ECL)

The projections assume that ECL is in operation throughout the period covered by the projections.

UKBA policies and legislation

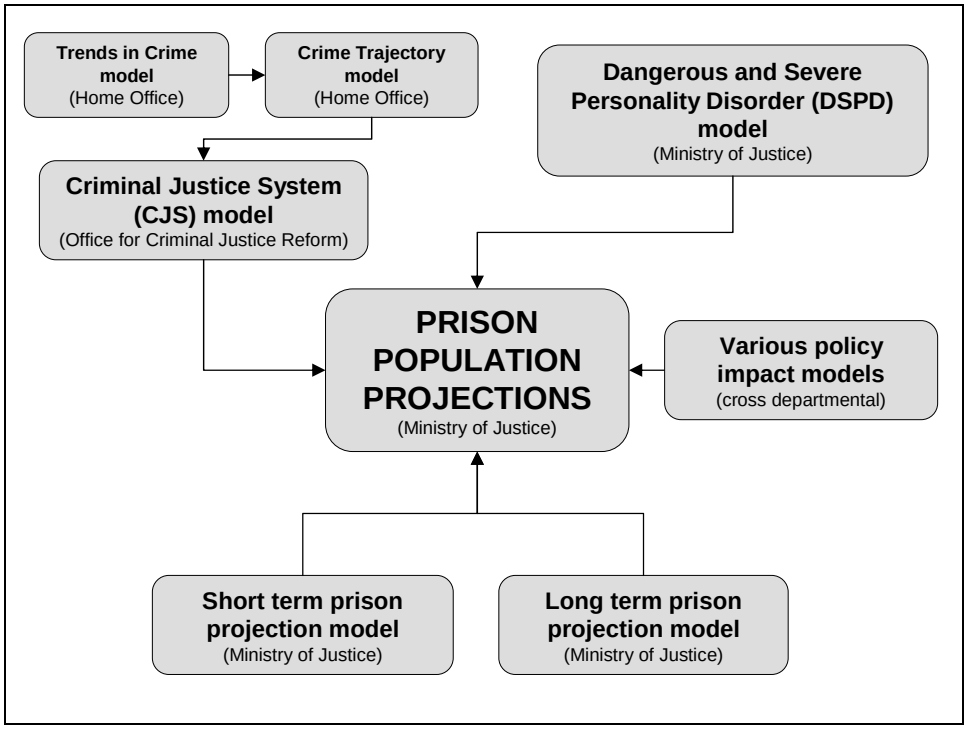
No specific legislation included in projections. It has been assumed that the number of non-criminal prisoners will remain constant at around 1,500.

Appendix C: Models, model specific assumptions, and modelling caveats

C1. Overview of the modelling approach

The outputs of four models – the Short Term Prison Projections (STPP), Long Term Prison Projections (LTPP), Dangerous and Severe Personality Disorder (DSPD) and Criminal Justice System (CJS) models – have been used to generate the 2008–2015 prison population projections (see Figure C1). This appendix presents an overview of these models and demonstrates how the model outputs have been combined to create the final prison population projections.

Figure C1: Prison projections modelling system



C2. Short Term Prison Projections model

Monthly prison population projections from June 2008 to June 2010 are generated using the Short Term Prison Projections (STPP) Model. This is a trend-based model that takes into account the current prison population, distributions of time served, projected numbers of receptions and projected rates of discharge from those receptions. The model provides end of month projections for up to two years ahead.

Within the STPP model the prison population in subdivided into 44 subpopulations based on the following criteria[1]:

- Custody type (Remand, Sentenced, Recall and Non-criminal)
- Gender (Male and Female)
- Age (Under 21, 21 to 24, 25 and over)
- Sentence length (Less than 6 months, 6 months to less than 1 year, 1 year to less than 4 years, 4 years to less than life, Life sentences, Indeterminate sentences for Public Protection (IPP))

The total prison population projection represents the sum of the individual population segment projections.

Three methodologies are used within the STPP model to generate the projections:

Receptions/Discharge Distributions Method

This methodology is based on measuring the difference between the inflow (receptions) and outflow (discharges) from prisons each month to assess the net change in the prison population through time. It uses an X-12 ARIMA time series approach[2] to generate reception projections from historic data. In turn, historic time-served distributions are used to estimate future monthly outflows. The difference between inflows and outflows through time gives the net change in the prison population. This approach is suitable for population segments where complete historic time-served distributions are available (e.g. those with relatively short custodial sentences).

Population X-12 ARIMA Method

This method is based on predicting the future population based on historic population data. It uses an X-12 ARIMA time series approach to generate projections. This approach has been adopted where time-served distribution information is incomplete. This makes it a more suitable approach for population segments with longer custodial sentences (4 years or more).

User Defined Method

For a small number of sub-populations neither the Receptions/Discharge Distributions method nor the Populations ARIMA method is satisfactory owing to a lack of suitable historic time series data. In such cases

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[1] Not all combinations are possible. For example sentence length bands are not applicable to the remand population.

[2] X-12 ARIMA is a seasonal adjustment program that generates forecasts from monthly time series data. It has been developed by the US Census Bureau and is approved for government use by the Office of National Statistics. Further information can be found at www.census.gov/srd/www/x12a

population projections have been defined outside the STPP model in collaboration with stakeholders.

For the 2008-2015 prison population projections user profiles have been used for:

- *Non-criminals* – Prison populations are small and have historically been volatile. In consultation with stakeholders it was assumed the non-criminal population will remain unchanged at around 1,500 per month throughout the period of the projections.

- *Indeterminate sentences for Public Protection (IPPs) and Life sentences* – No reliable data are currently available for IPP discharges as this sub population has only existed for three years. IPP projections have therefore been taken from the DSPD model, which has been designed specifically to model this sub population (see Section C4). Life sentences have also been taken from the DSPD model, as these projections are considered more robust than those generated using the Populations X-12 ARIMA method.

For consistency the same methodology has been used for each group of population segments (see Table C1). The STPP model projections do not explicitly incorporate assumptions about custody rate trends and sentencing trends. However, with the Receptions/Discharge Distribution method and the Population ARIMA method historic trends in sentencing behaviour are used to build projections. Therefore the short-term projections may be considered to incorporate implicitly recent trends in sentencing.

Table C1: Overview of the modelling methodologies used in the STPP model by prison population segment

Receptions/Discharge Distributions Methodology	Population ARIMA Methodology	User Defined Profiles
Recalled prisoners	Prisoners sentenced to determinate sentences of four years or more	IPP prisoners (From DSPD model[3])
Remand prisoners		Life sentence prisoners (From DSPD model[3])
Prisoners sentenced to less than four years		Non Criminals

[3] The DSPD model projects total numbers of offenders with IPP and life sentences who are held in the prison estate. The STPP model has been used to apportion these projections by gender and age groups.

C3. Long-Term Prison Projections model

The Long-term Prison Projections (LTPP) model projects annual prison populations (at the end of June each year) split by sex and sentenced and remand categories. From the numbers born each year since 1928[4], it estimates the number of first-time offenders sentenced each year since 1965. Similarly, it estimates the number of those released from prison that re-offend and are sentenced (and when they are sentenced). Using known historic custody rates and custodial sentence lengths and the sentencing trend assumptions for the future, each quarter the newly sentenced prisoners are added to the prison population. Those that have come to the end of their sentences are subtracted.

The LTPP model has been used to generate three future scenarios (high, medium and low) by changing the custody rates and average custodial sentence lengths (see Appendix B). These annual projections have been converted into monthly projections by interpolating between June estimates and applying seasonal factors taken from X-12 ARIMA projections of the total prison population for males and females separately based on published prison population data.

C4. The Dangerous and Severe Personality Disorder Model

The Dangerous and Severe Personality Disorder (DSPD) model was initially developed to assess the impact of the DSPD Programme on the wider prison, hospital and community provision. The model uses a system dynamics approach by taking account of stocks and flows through the prison system and covers the following four categories of prisoners:

- Indeterminate sentences for Public Protection (IPPs)
- Extended sentences for Public Protection (EPPs)
- Lifers
- Determinate Sentence Prisoners on sentences of four years or more.

The model is informed by the best available research and statistical data regarding a number of variables (including sentence rates, sentence lengths, lengths of stay in custody, length of community supervision, breach and reconviction rates) and can be used to project the future prison population on a month by month basis for the above categories of offenders. Key assumptions underlying this model have been agreed with relevant stakeholders across the Criminal Justice System.

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[4] Demographic information for live births is taken from the Office for National Statistics data.

C5. The Criminal Justice System (CJS) Model

The CJS model is a discrete event simulation model that has been designed to assess the impact of policy initiatives on the Criminal Justice System of England and Wales. As an input it takes the projections for the numbers of imprisonable offences committed each year from the Crime Trajectory Model[5] and simulates how these offenders flow through the CJS. The model includes capacity and resource constraints. It defines limited CJS resources (people and facilities). These are drawn upon to perform timed activities. Where there is more than one possible course of action there is a definable likelihood of the defendant following one route over another. Thus a defendant's progress is determined by the capacity of resources, the duration of activities and the chances of progressing by a given route. It enables assessment of the combined impact of multiple CJS policy initiatives that may impact on the prison population on a monthly basis.

The stochastic nature of the simulation model means that two runs of the model will not produce identical results (though they will be close). By performing several runs confidence can be placed on the results obtained. For the 2008-2015 prison population projections, 10 runs of the CJS model were performed for a scenario combining two key pieces of legislation:

- The effect of measures to bring more offences to justice (PSA 24)
- The impact of implementing the Simple, Speedy, Summary justice (CJSSS) programme

Details of the assumptions used in the combined scenario are described in Appendix B. This scenario has been compared with a baseline run that excludes these measures to give the net impact of the timetabled legislative changes. The net impact has subsequently been smoothed.

C6. Combining the STPP, LTPP, DSPD and CJS model projections

To generate the final prison population projections, selected outputs from the STPP, LTPP, DSPD and CJS models have been combined as follows:

Normalising the short-term projections

For the first two years of the prison population projections (2008-2010) the STPP model has been used to project the remand, recall (excluding IPPs) and determinate sentenced populations including EPPs. The DSPD model has been used to estimate the IPP recall and IPP sentenced populations. Due to slight differences in the datasets upon which the STPP and DSPD

[5] The Crime Trajectory Model estimates the numbers of imprisonable offences committed per year taking account of legislation that is anticipated to impact crime levels in the future. This model is fed by the Trends in Crime Model that estimates overall crime levels based on socio-economic factors.

models are based and published prison population data, the combined results have been normalised to align them with published prison population data for July 2008. This correction is small (less than 1.5%) and does not affect the projected trends.

Aligning the short-term and long-term results

For the final five years of the prison population projections (2010-2015) the LTPP model has been used to project the remand, recall and sentenced populations excluding IPPs. The DSPD model has been used to estimate the IPP (sentenced plus recalls) and EPP populations. The combined long-term results for the medium scenario have been adjusted to match the June 2010 normalised short-term results. This assumes the short-term projections are more accurate than the long-term projections in the short-to-medium term and preserves trends from the LTPP projections in the long term.

The same adjustment factor is applied to the high, medium and low scenario from the LTPP projections for July 2010 onwards. Prior to this date, the short-term projections have been realigned to meet the high and low scenarios assuming that sentencing behaviour changes at a constant rate over the two-year period for which the short-term model is used.

Incorporating the impact of legislation

The combined short- and long-term projections represent the baseline case without the impact of legislative and/or operational changes that have yet to affect demand for prison places. The anticipated impacts of policy changes with known implementation timetables have therefore been summed to this baseline to generate the final prison population projections as follows:

- Outputs of the CJS model: the net impact of the continuing implementation of measures to bring more offences to justice (PSA 24) and the CJSSS programme have been taken from the CJS model and added to the baseline projections.

- Additional legislative impacts: the net impact of the Criminal Justice and Immigration Act 2008 (excluding the effects on IPPs and EPPs) and changes in the death by careless driving legislation have been individually calculated in consultation with stakeholders and factored into the baseline (see Appendix B for the underlying assumptions).

Legislative impacts have been assigned to the high, low and medium scenarios equally.

C7. Assessment of modelling uncertainties and caveats

The prison population projections for 2008-2015 represent an amalgamation of projections from a variety of models. As several of the models incorporate predictive assumptions based on the expert knowledge of stakeholders (e.g., future sentencing trends), assigning an overall analytical error to the

projections is difficult. However, it is possible to estimate reasonably the errors associated with individual models.

Uncertainties associated with the STPP model projections

An empirical estimate of accuracy of the short-term projections has been made by comparing results generated using historic data from January 2000 to June 2005 with actual prison population data from July 2005 until June 2007. The average absolute deviation of the total modelled prison population relative to the actual prison population over the two year period falls below 1%. This level of accuracy is comparable to the estimated statistical error associated with the model[6] (equivalent to around 0.7%). Therefore assuming recent trends in prisoner receptions, discharges and, where appropriate, populations, continue in the short to medium term, the STPP projections may be expected to yield a similar level of accuracy for the next two years.

Uncertainties associated with the LTPP model projections

If sentencing behaviour changes are known in certainty through time, the LTPP model can accurately reproduce the actual prison population. The observed accuracy of the model for the period 1990 to 2006 is 1.4%.

There are several sources of uncertainty, of which only some are quantifiable. It is impossible to quantify uncertainties in the model caused by offending or sentencing behaviour not included implicitly or explicitly in the model. This could mean that assumptions that do not accurately reflect future CJS trend behaviour can result in an error in the projected prison population.

There are two kinds of uncertainty that can be estimated:

- the effects of random error in the estimation of the parameters of the model; and
- statistical fluctuation inherent in the nature of the processes being considered.

The values of the parameters were refined so that the model accurately reproduced historical data as well as could be expected (if not better) from statistical fluctuations. Thus, on the assumption that the structure of the model accurately reflects the way people end up in prison, this source of uncertainty may be ignored. The only source of uncertainty to consider is the variation caused by statistical fluctuations.

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[6] Assuming the net change in the prison population through time conforms to a Poisson process, it is possible to estimate the theoretical variability in the population using $\pm 2\sqrt{N}$ where N is the size of the prison population. This yields a statistical error interval of ±0.7% (95% confidence level).

There is an uncertainty in the proportion born each year that will at some time be found guilty. This is assumed to be normally distributed with a standard deviation 3% of the mean. This results in an uncertainty in the new arrivals to prison of a little more than 40% of this level. Taking this as an upper estimate of the fluctuation in the prison population gives an uncertainty of around 1% to 1.5%.

A second source of fluctuation is an observed fluctuation in remand receptions of around 5%. This turns into a fluctuation in the total population of ±0.5% to ±1.0%. Note that this is not actually a fluctuation inherent in the nature of the processes of the model, but an observed fluctuation in the observations. As such, it may change over time.

The expected fluctuation in the total population for any one year is around ±2%. This uncertainty should be expected to increase in proportion to the size of any sub-population being examined.

Uncertainties associated with the DSPD Model

Validation of the model is essential and on-going. The model has been informed by the latest research and statistical data drawn from across the Ministry of Justice and consultation with stakeholders. It also has a built in 'warm up' period (starting in 1965) to test how it performs over time by comparing against existing data, particularly regarding lifers.

Compared to actual prison population data between July 2007 and June 2008, results produced by the DSPD model differ by an average of about 1% for lifers, 2% for EPPs and <1% for IPPs.

Uncertainties associated with the CJS model

The average variation for the difference between the baseline and scenario CJS model runs used for the projections corresponds to a 95% confidence interval of approximately ±1,000 prison places, or around ±1.5%. As with any simulation model the accuracy of the CJS model output also depends on the number of simulated runs considered, with increasing number of runs producing greater certainty on the aggregate impacts generated.

It is important to note that the CJS model is a simplified picture of the CJS. It is based on probabilities calculated from historical data, corrected data (where data from across the CJS is not consistent), and 'best estimates' where data is not available. As a result, the model gives an indication of likely future CJS performance but there is some scope for uncertainty.

Explanatory notes

1. This is a National Statistics publication produced by the Ministry of Justice. National Statistics are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference.

Contact points for further information

Current and previous editions of this publication are available for download at http://www.justice.gov.uk/publications/prisonpopulation.htm.

Spreadsheet files of the tables contained in this document are also available for download from this address.

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