# Methodology for the PbR re-offending baselines

### Introduction

This document describes the process that was followed to calculate the reoffending baselines to be used when measuring the results of the Payment by Results (PbR) cohorts; it addresses the point estimation of the baselines and the intervals and the thresholds that will be used to increase/reduce payment or terminate the contracts. It is meant to allow a non-technical understanding of the process.

### High level process

The steps followed were:

1. Cohort definition and selection
2. Index offence match to the PNC
3. Reoffences counting
4. Risk scores calculation & CRC/NPS allocation based on the risk scores
5. Exclusions, de-duplications, weighting and scaling.
6. CPA and quarterly data aggregation
7. Thresholds and termination points calculation

### Data Sources

* + - * 1. **Prison cohort**: The starts from prison sentences came from PNOMIS (the current prison data system).
				2. **Probation cohort**: The CO/SSOs (Community Orders and Suspended Sentence Orders) commencements came from Form 20 (the current probation data system).
				3. **Criminal history**: The previous offences and reoffences were taken from the Police National Computer (PNC).

*Note: Extra information to identify Foreign National Offenders (FNOs) was added to the final set of starts using the original PNOMIS source. Reoffences for this group were recalculated with slightly different rules.*

* + - * 1. a, b and c had already been linked together in order to produce the Quarterly Reoffending National Statistics for 2011, which were published in October 2013. For the computation of the baselines we started off from these already quality assured sets of data.

PNC snapshots: Since we took the National Statistics cohort matching process the PNC Snapshot used was the one taken at the start September 2013 (i.e. the 21st month after the end of the cohort).

* + - * 1. The dynamic risk assessments came from OASys (the Offender Assessment System) and were provided by NOMS, which is the owner of this data.

*Note: This data was the best available information at this point in time. By the time the first PbR re-offending outcomes are measured the data source for the offender starts in each PbR cohort (and the associated details used to match them to the PNC) will be nDelius rather than sources a) and b) above, but this information will not be available from nDelius until the introduction of system changes later this year.*

### Cohorts definition

The cohorts were specified in terms of the following variables:

* **Scope**: All records corresponded to either releases from prison convictions or sentences from Community Orders (CO) or Suspended Sentence Orders (SSO), from 1January 2011 to 31 December 2011.
* **Age**: based on the date of birth recorded in prison and probation data systems (a) and b) above). All offenders with an index age <18 years old were excluded.
* **Sex**: based on the value recorded in prison and probation data systems (a) and b) above). Index offences for offenders where this value was unknown were excluded.
* **Territory**: Index offences were only included if committed in England and Wales – this restriction was based on the Home Office Offence code.

Offender starts were split by Contract Package Area (CPA) as follows:

* Prison: Based on the Local Authority Area allocated for the 2011 National Statistics publication.
* Probation: Based on the Probation Trust.
* **Police Forces**: Index offences were only included if prosecuted by Home Office Police Forces or British Transport Police.
* **Breaches**: Index offences that were breaches were only included if they were criminal offences in their own right.
* **Offender in the PNC**: Index offences were only included if offenders could be matched to a PNCId.
* **Index offence in the PNC:** Index offences were only included if they could be matched to a PNC offence.
* **Sentence date data quality**: Cases where (discharge date – sentence date) > sentence length were excluded.
* **De-duplication**: Only the earliest index offence for each offender was counted in each quarter. *Note that de-duplication is applied before allocating to CRCs or NPS, therefore no offender appears twice in the same cohort regardless of its allocation.*
* **Probation exclusions:** Offenders with the following three requirements situations were excluded from the PbR cohort:
	+ Standalone Unpaid Work/Community Payback (CP)
	+ Standalone Electronic Monitoring (EM)/Curfew (All “M” only requirements were excluded).
	+ Standalone ‘CP + EM’
* **Suspended Sentence Orders (SSO) with no requirements:** Offender starts with this sentence are not eligible for the PbR cohorts. As such, an adjustment was made to exclude these offenders from the baselines. As this sentence was not introduced until after 2011, the volume of these starts was estimated based on data from Q3 2013. A weight was then applied to the probation offenders with a standalone supervision requirement to account for the proportion of these that may have received an SSO with no requirements had this sentence been available.
* **Foreign National Offenders (FNO):** Offenders that were subject to deportation were excluded. Since there was no available information of the specific status of the offenders initially included in the cohort, this exclusion was conducted through a reduction weighting by year and quarter to those offenders coming from a custodial sentence of 12 months or more. These figures do not take account of two changes to the allocation of FNOs. The first is that all FNOs sentenced to a custodial sentence of 12 months or more will be allocated to the NPS. The second is that where the Home Office confirms at least 3 months prior to an offender’s release from custody that they are definitely not subject to deportation the offender will be re-allocated from the NPS to a CRC (and therefore a PbR cohort). These changes are likely to affect only a small number of offender starts.
* **Scaling:** The start cohort volumes differ from the actual quantities from prison and probation because we can measure only those offenders who can be matched to the PNC and only those starts for which the index offence can be matched to the PNC.

To account for this gap we scaled both probation and prison offenders to their totals:

* Probation: The scaling was calculated comparing the total probation volumes by CPA excluding standalone Unpaid Work and standalone Electronic Monitoring to the probation totals.
* Prison: The scaling was calculated comparing the total prison figures without sentences fully served on remand to the actual prison data by quarter and sentence length band (<12m, 12m+).

*Note: Totals from Prison were de-duplicated using the prison number to identify duplications.*

* **Remands:** Discharges from custodial sentences fully served on remand were included into the baselines. These offenders were not in the source data, therefore a scaling of the total was applied to account for this group of custodial offenders.
* **Risk**: High risk of recidivism offenders were excluded from the PbR cohort. The measures used to identify them were MAPPA, 2 year RSR (dynamic if available and static otherwise) and RoSH (when dynamic data was available), through the following rules:

### MAPPA

All MAPPA > 0 were excluded

### RSR and RoSH

|  |  |  |  |
| --- | --- | --- | --- |
|  | **6.9% < RSR** | **3% < RSR** ≤  **6.9%** | **RSR** ≤  **3%** |
| **RoSH low, medium or absent** {0, 1, 2} | excluded | in | in |
| **RoSH high** {3} | excluded | excluded | 50%(\*) |
| **RoSH very high** {4} | excluded | excluded | excluded |

(\*) Those offenders with an RSR at 3% or lower but with a high RoSH will be allocated to either a CRC or the NPS depending on a subjective assessment; the assumption made for modelling purposes was that half of these cases will be allocated to CRCs. Therefore, a 50% weight was applied to them.

* **Missing data**: Offenders that had missing information in key fields (e.g. CPA, RSR) were excluded from the analysis (this affected approximately 0.1% of the total).

### Reoffending counts

Both binary and frequency measures include the following cases

* All proven offences that happened within 12 months from the index date, with a court or caution date within 18 months from that same date;
* committed in England and Wales;
* prosecuted by Home Office police forces or British Transport Police;

However they do not include the following cases

* breaches that are not criminal offences in their own right;
* offences that had the same conviction date as the index offence.

### Sequence of calculations and data manipulation

Selection, exclusions and weightings were applied in the following order:

1. Selection of cohort based on demographics from the National Statistics Quarterly information.
2. Selection of criminal records from the PNC.
3. Count of previous offences and reoffences.
4. Addition of OASys assessments.
5. Risk measurements calculation.
6. Allocation of offender starts to CRC, NPS or Unknown based on MAPPA, RSR, RoSH and Subject to Deportation status.
7. Exclusion of standalone Unpaid Work.
8. Exclusion of standalone Electronic Monitoring.
9. De-duplication of offender starts by quarter.
10. Calculation of the probation scaling – by CPA.
11. Exclusion of offender starts with unknown CPA
12. Exclusion of combined Electronic Monitoring and Unpaid Work requirements.
13. Calculation of the prison scaling – by quarter and sentence length band (<12 months, 12 months +)
14. Exclusion of FNO Subject to Deportation.
15. Exclusion of starts allocated to NPS and those with unknown risk.
16. Assignment of Remands weight – by sentence length band
17. Assignment of SSO with supervision only weight – by CPA
18. Assignment of Unknown Risk weight
19. Application of all weights and scaling to starts, reoffenders, reoffences and OGRS.

Figures for years 2005 – 2010 were also calculated using the same methodology\*.

*\*The process for 2010 differed slightly because the sentence length recorded in the prison data system (PNOMIS) was not reliable in that year and the sentence length band was used instead. All long sentences were assumed to be in the highest range for MAPPA calculations which could somewhat skew the data.*

### Outputs

### Aggregation by CPA

The outputs included three main values for each CPA:

1. Binary reoffending rate (weighted reoffenders/weighted starts)
2. Frequency reoffending rate (weighted reoffences/weighted reoffenders)
3. Average OGRS4/G score (weighted average of the OGRS4/G score)

plus three supporting values:

1. Weighted starts
2. Weighted reoffenders
3. Weighted reoffences

### Thresholds and Termination

The thresholds for payment increase/reduction and for contract termination were calculated based on the methodology described in Schedule 11 (Payment Mechanism) of the draft Amended and Restated Services Agreement.

The following lines are just a summary. The same methodology was applied for every CPA.

**Binary reoffending measure**

The upper and lower thresholds for quarterly binary PbR payments were calculated as an 80% confidence interval around the mean value for 2011. The variability was calculated from the 28 quarters of data from Q1 2005 to Q4 2011, subtracting the effect of any linear trend.

The equivalent thresholds for annual PbR top-up payments are simply half the size of the quarterly thresholds.

The annual termination point was calculated as the upper bound of a 94.5% interval.

**Frequency reoffending measure**

The annual termination threshold for the frequency measure was calculated as the upper limit of the two sided 99% confidence interval.

*Note: all confidence intervals were calculated assuming normality of the data.*