Can 'big data' help us understand criminal justice challenges?

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June 2017

What is 'big data'?

- In our area of interest, this refers to information captured by the many agencies that have a role in the criminal justice system

- HO/MoJ publish lots of it – generally in the form of spreadsheets, over the past 10 years there are hundreds of files

- Local CJS agencies, LAs also use the internet to publish crime related statistics

- Other organisations also publish many study/project reports, case reviews, etc.,

- **But, to what does all this information amount? How could we make sense of it all**?

Will cover…

- Rationale for using simulation in Criminal Justice helping to understand the 'big data' and as an aid to policy analysis and performance measurement

- A brief explanation on the structure of the simulation engine

- Three illustrative policy examples, where using simulation can help elucidate & quantify

- What is next in the development time line

- Q&A

- More detail at: www.justice-episteme.com

Why is a simulational approach needed?

- **Criminal justice systems are complex**: they involve many organisations playing different roles, with multiple stages.

- **They are non-linear**. This means there are multiple feedbacks that affect different parts of the system at different times. Not straightforward to work out where the impact will hit and when.

- Lots of statistics – but **lack a framework** within which to interpret the data and draw robust conclusions. Need a better longitudinal perspective.

- The politics and the exigencies of service containment/management create pressure to make improvements. But planning **struggles to understand what will work**, and what the impact of changes will be.

Possible to do better?

- Simulations used extensively in other fields – e.g. Simulations forecasting climate change influence policy on a global scale!

- Possible to devise a model that captures the dynamics of the CJS, with a wide scope and sufficient detail for it to be a useful tool in developing sentencing, other policy or practice

- Computer simulations can play a role in forecasting the impact of various policy and practice changes on the criminal justice system.

Potential Benefits …

- Can provide a **transparent, quantitative**, <u>**whole system**</u> view, incorporating key policy or practice levers

- Explore scenarios and answer what-if questions: identify relative effectiveness of different approaches; assess different options and the timescales when benefits might accrue, and in which part of the system

- Helps formulate performance measurement and a focus on what data should be collected

- Helps Identify resource and capacity implications (caseloads, prison spaces)

- Identify costs across the system, attributing them to different parts

The Simulation Engine -Modelling layers

Prison, probation parole, breach processes, covering different stages of management of sentences

Sentencing outcomes: sentence types; prison lengths,

Offences: all, reported, detected, out of court disposals, tried, convicted. Parameters control the performance and outcomes from the police and courts

Offending Hazard Representation, maps risk of offending or re-offending to personal attributes e.g. age, criminal history, etc.

Population

- <u>Sentencing guidelines & practice</u> - sentencing rules and processes
- <u>Political & policy activity</u> – influences resources, recording/detection rates
- <u>Behaviour</u> and impact of 'interventions' (viz sentence types, treatment programmes)
- <u>Base population</u> tracked in one year intervals – informed by ONS published data on birth/death rates & migration

Simulation challenges …

- The system is not constant! Many changes introduced over the past 15 years, some reversing earlier attempts to 'reform', e.g. IPP sentences

- Grappling with the published statistics – both in volume and changes of format and sometimes definitions

- The simulation layers are controlled via a range of 'parameters'; some are easily obtained from published data, e.g. average length of custodial sentences; others need to be inferred, directly or indirectly

- Validation – the fidelity of the simulation compared to the real system

- Visualising the results – like the published statistics simulations can produce enormous amounts of data
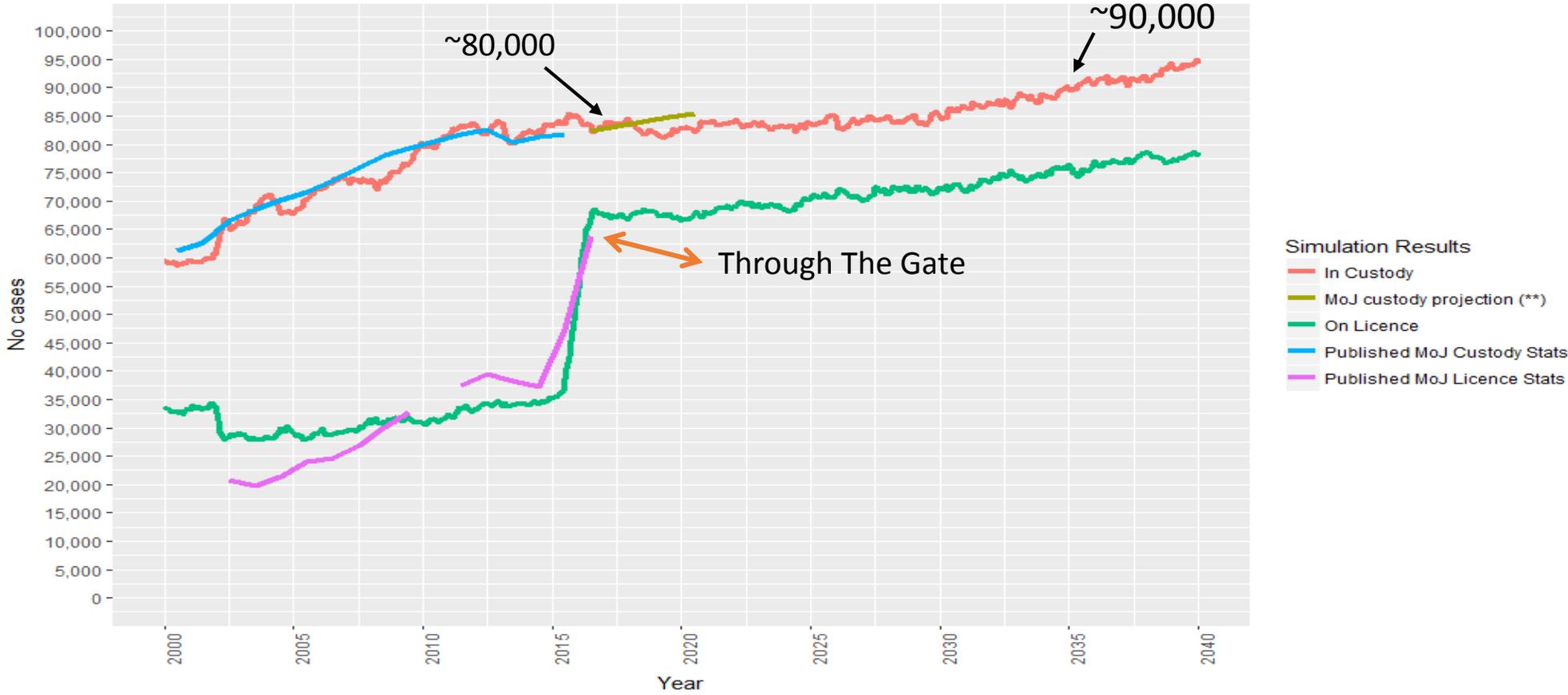
Will look at three policy cases …

NB:

- These results are for males, all ages, indictable and summary offences

- The baseline – a no change projection based on current trends continuing. This also acts as a comparison for other scenarios.

- Diversion from short custody to suspended sentences

- Changing proportion of custody spent in prison, with electronic monitoring enhanced community supervision

Baseline projection – *male prison population and community post-release supervision*


Baseline Projections of case levels - Males In custody & supervised licence

~80,000

~90,000

Through The Gate

Simulation Results
- In Custody
- MoJ custody projection (**)
- On Licence
- Published MoJ Custody Stats
- Published MoJ Licence Stats

No cases

Year

(**) adjusted by excluding female offenders

Baseline projection – *male community sentences and suspended prison sentences*

Baseline Projections of case levels - Male Community Sentences & suspended sentences
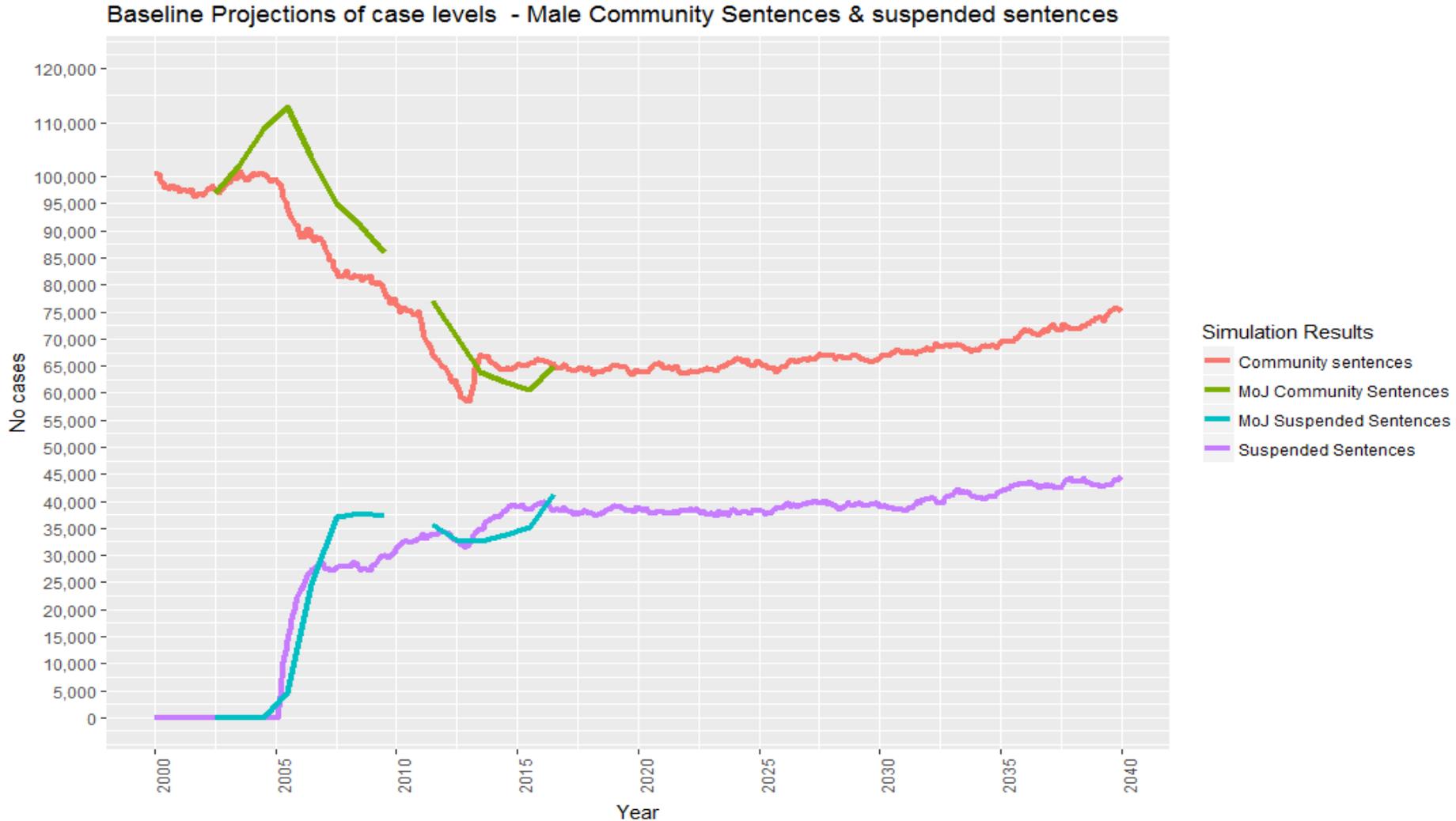
Diversion from short custody to suspended sentence

- The scenario

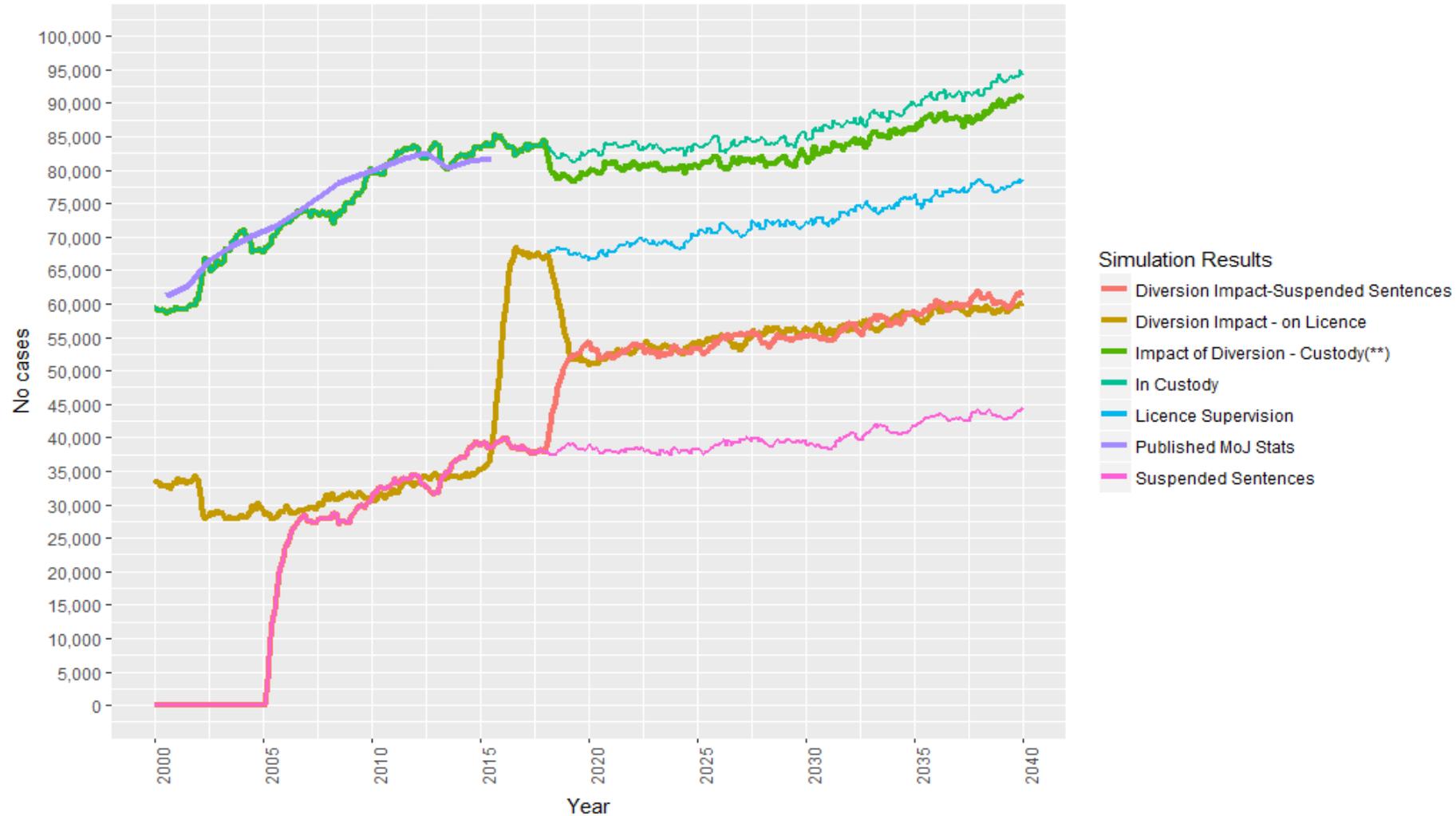 (1) Must be short sentences under 12 months.

  (2) To be eligible for diversion away from short custody on offender needs also to be low risk.   In this simulation previous custodial sentences of over 12 months will exclude an individual from such a scheme.

  (3) Judicial discretion is also applied, i.e. not every case that would be eligible under (1) and (2) would result in such a diversion. In this example half of the cases would be diverted.

  the change is introduced from Jan 2018
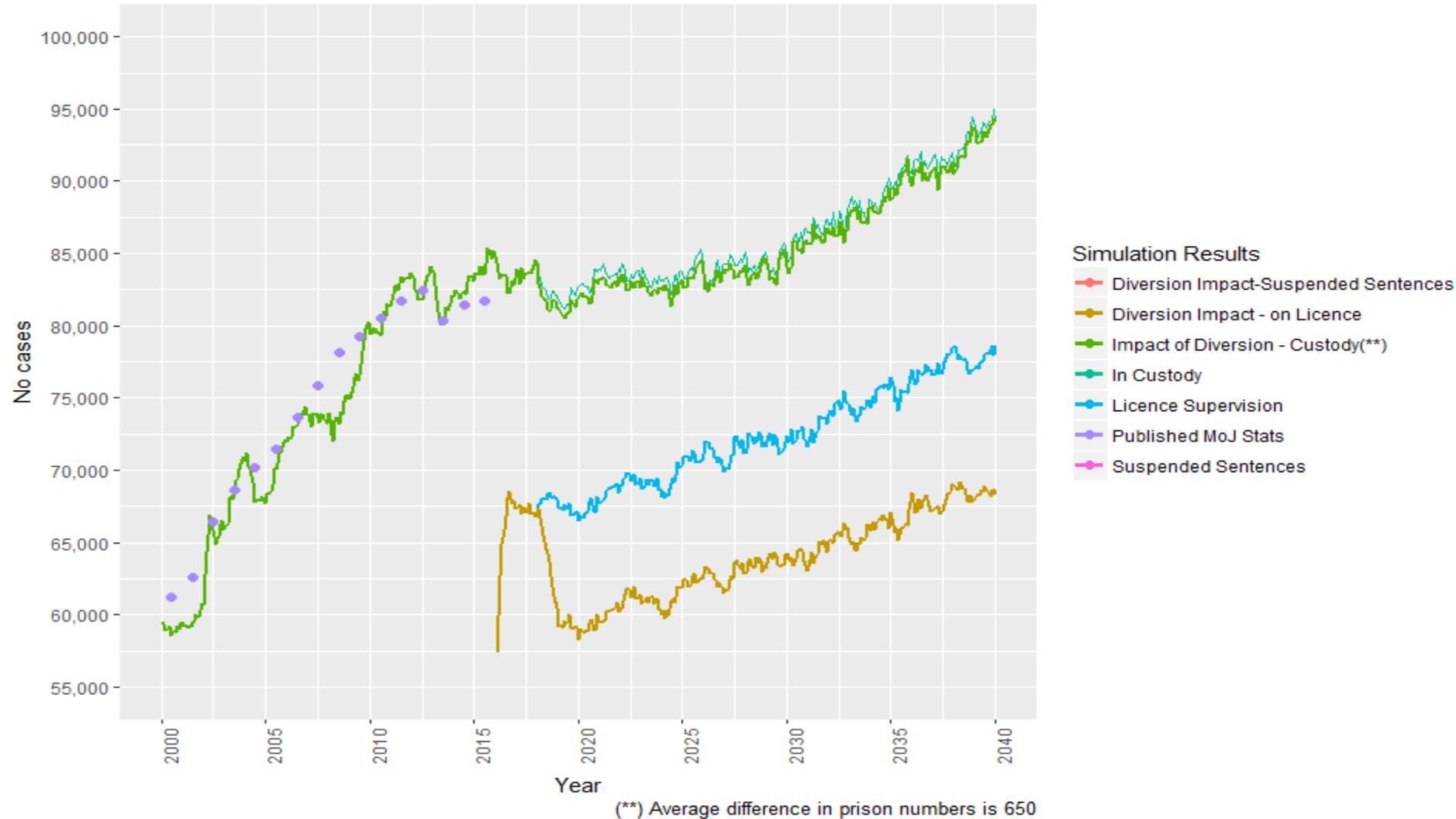
Short Custody Diversion Results ...

Impact of diversion (<12 months) on case levels - Males, Indictable and Summary Offences

No cases

Year

Simulation Results

— Diversion Impact-Suspended Sentences
— Diversion Impact - on Licence
— Impact of Diversion - Custody(**)
— In Custody
— Licence Supervision
— Published MoJ Stats
— Suspended Sentences

(**) Average difference in prison numbers is 3000

Short Custody Diversion Results ...

Impact of diversion (<3 months) on case levels - Males, Indictable and Summary Offences

Simulation Results
- Diversion Impact-Suspended Sentences
- Diversion Impact - on Licence
- Impact of Diversion - Custody(**)
- In Custody
- Licence Supervision
- Published MoJ Stats
- Suspended Sentences

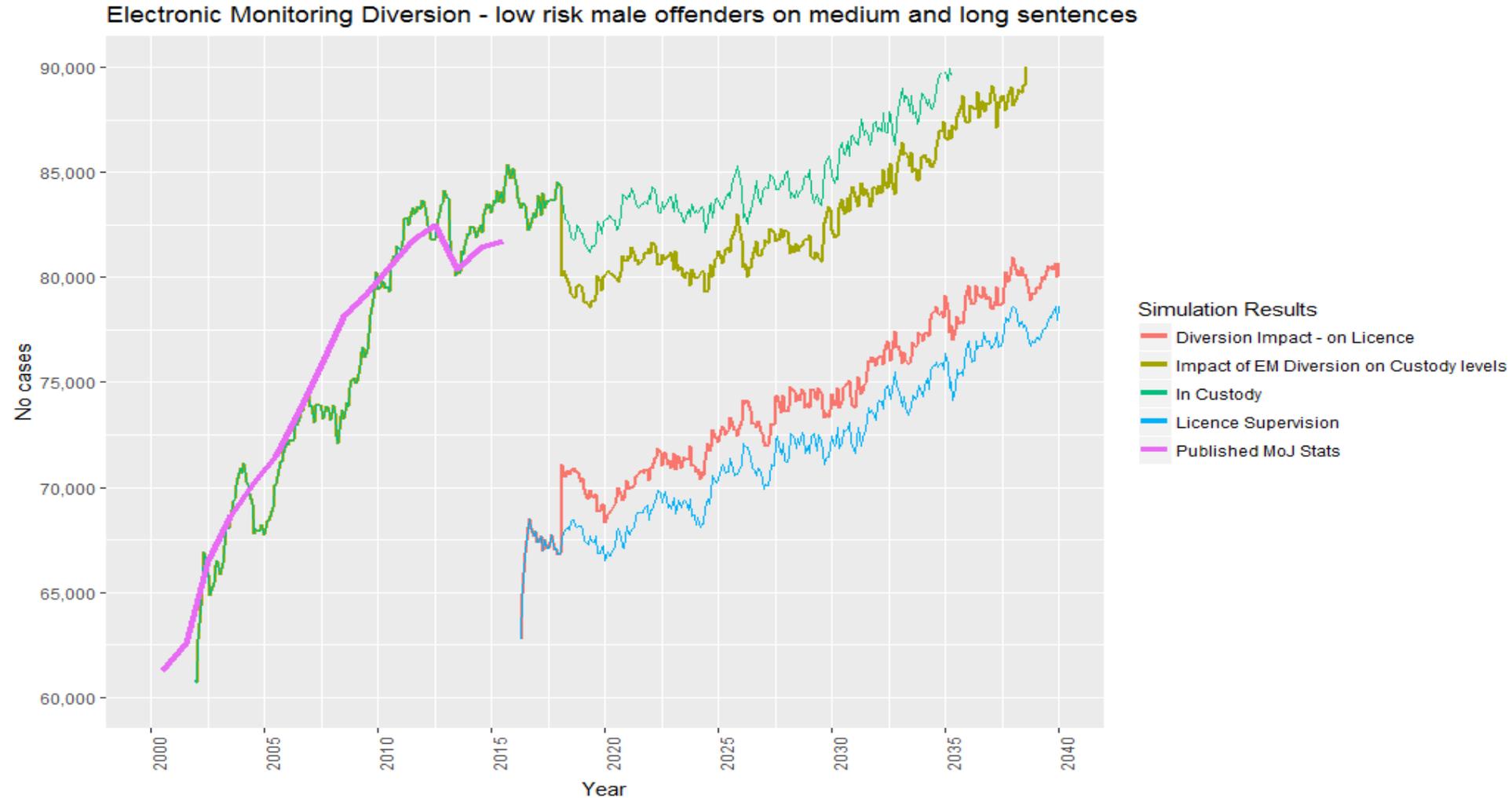(**) Average difference in prison numbers is 650

Reduced time spent in prison for lower risk offenders

- The scenario:

  - Eligible group comprises those offenders serving custodial sentences between 1 year and 10 years.

  - Not be assessed as high or very high risk of harm; those with more than one offence (i.e. the current one) are excluded as are those with prison discipline problems resulting in the custody time being extended beyond the (normal) 50% release point are excluded

  - will have served at least 30% of their sentence, and so they will be on community licence supervision for the 70% balance of the sentence.

  - Electronic Monitoring is a condition of supervision; other conditions would include access to rehabilitative interventions, employment etc..

- the change is introduced from Jan 2018

Reduced time spent in prison for lower risk offenders - results

Electronic Monitoring Diversion - low risk male offenders on medium and long sentences

Simulation Results
- Diversion Impact - on Licence
- Impact of EM Diversion on Custody levels
- In Custody
- Licence Supervision
- Published MoJ Stats

Continuing development …

- The scope and accuracy of the simulation engine continue to be developed to include:
  - Women offenders
  - Pre-court diversion
  - Analysis by crime type-redesign sentencing rules
  - Add social and geographical structure to population model
  - Measure reoffending rates and how these are influenced by interventions, crime and social factors
  - Cost analysis

- A set of quantitatively analysed policy ideas, such as the earlier examples

- More detail and up-to-date information can be found at www.justice-episteme.com

Conclusions: "Big Data" can help and has potential to be very influential

- Possible to design and implement a computer simulation of the operation of the criminal justice system in England & Wales

- Results compare well with published statistics across a range of categories of sentencing

- Simulation can be used to explore policy, sentencing and other reforms, and to provide insight into the operation of the system

- Development continues on the scope and fidelity of the simulation engine - so look forward to this becoming an increasingly powerful tool

- Results are being posted at www.justice-episteme.com which will host a range of quantitatively analysed policy ideas, including ones shared today

- Aim to put in place arrangements that are open and encourage participation in this work by the CJ community

•Q & A