GLAINTELLIGENCE UNIT

Use of migration data in population projections for London

Ben Corr

Greater London Authority

- Introduction to GLA projections
- Importance of migration
- Overview of population projection models
- Challenges

Introduction to GLA projections

Recent work builds on a long history:

- Roots in the early 1970s at the Greater London Council
- Work continued at London Research Centre
- Function now sits within the GLA's Intelligence Unit

- Produce a wide range of projection outputs at borough and ward level

Uses of GLA projections

Outputs inform wide range of planning activities, including:

- The London Plan (regional spatial development strategy)
- London Strategic Housing Market Assessment
- Transport planning (inputs to TfL's models)
- London Infrastructure Plan
- Individual local plans
- School place planning

Importance of migration in London

- London currently growing **> 100k** persons/year
- Net migration to London* **~ 38k/year**
- London's natural change* **~ 84k/year**

* mean for period mid-2009 to mid-2014

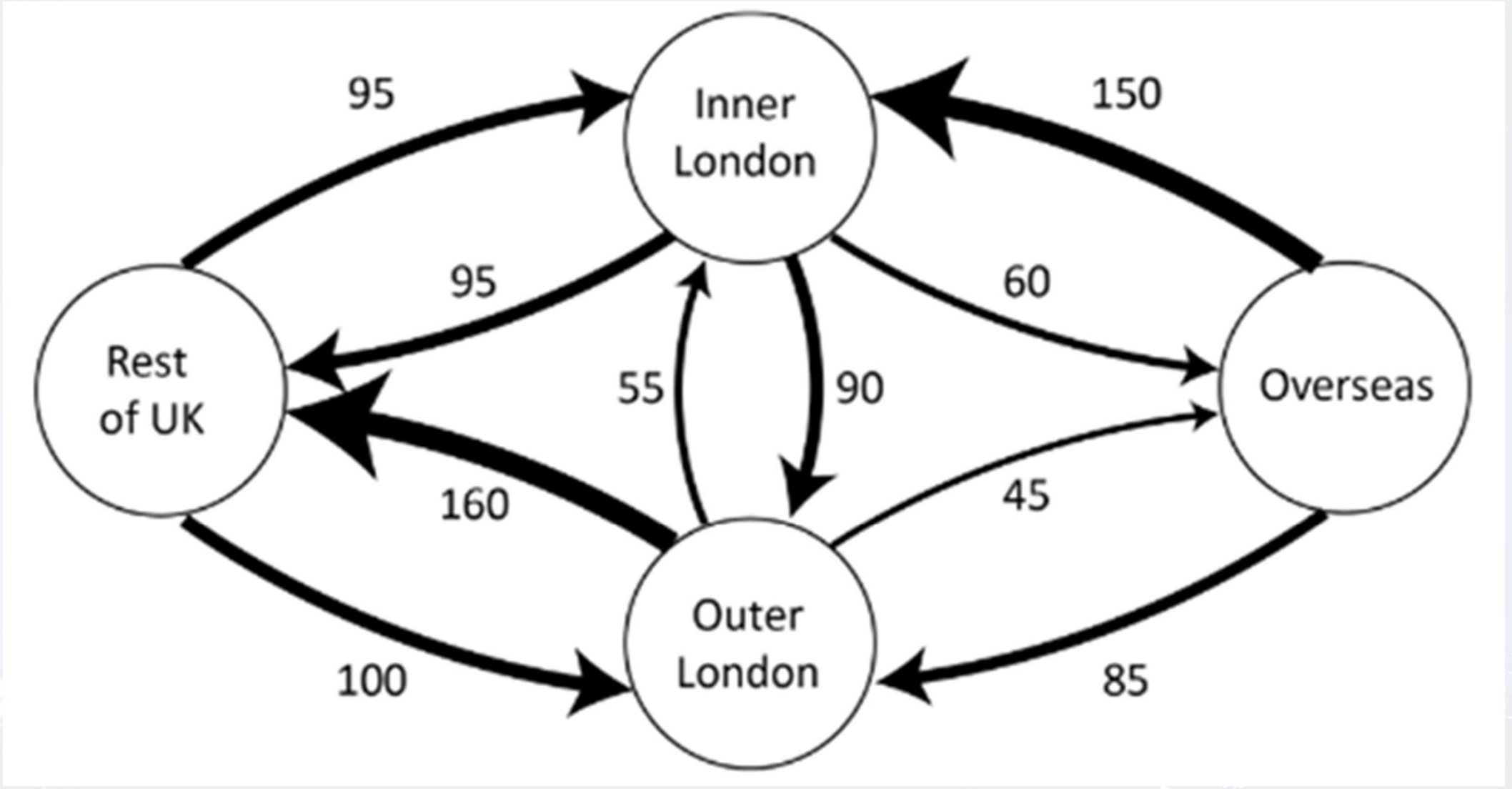
Importance of migration in London

- Net figures hide scale of gross flows in and out of London

For year to mid-2014:

- International inflow: **201k**
- International outflow: **93k**
- Domestic inflow: **204k**
- Domestic outflow: **273k**

London's gross migration flows



Average flows mid-2005 to mid-2010

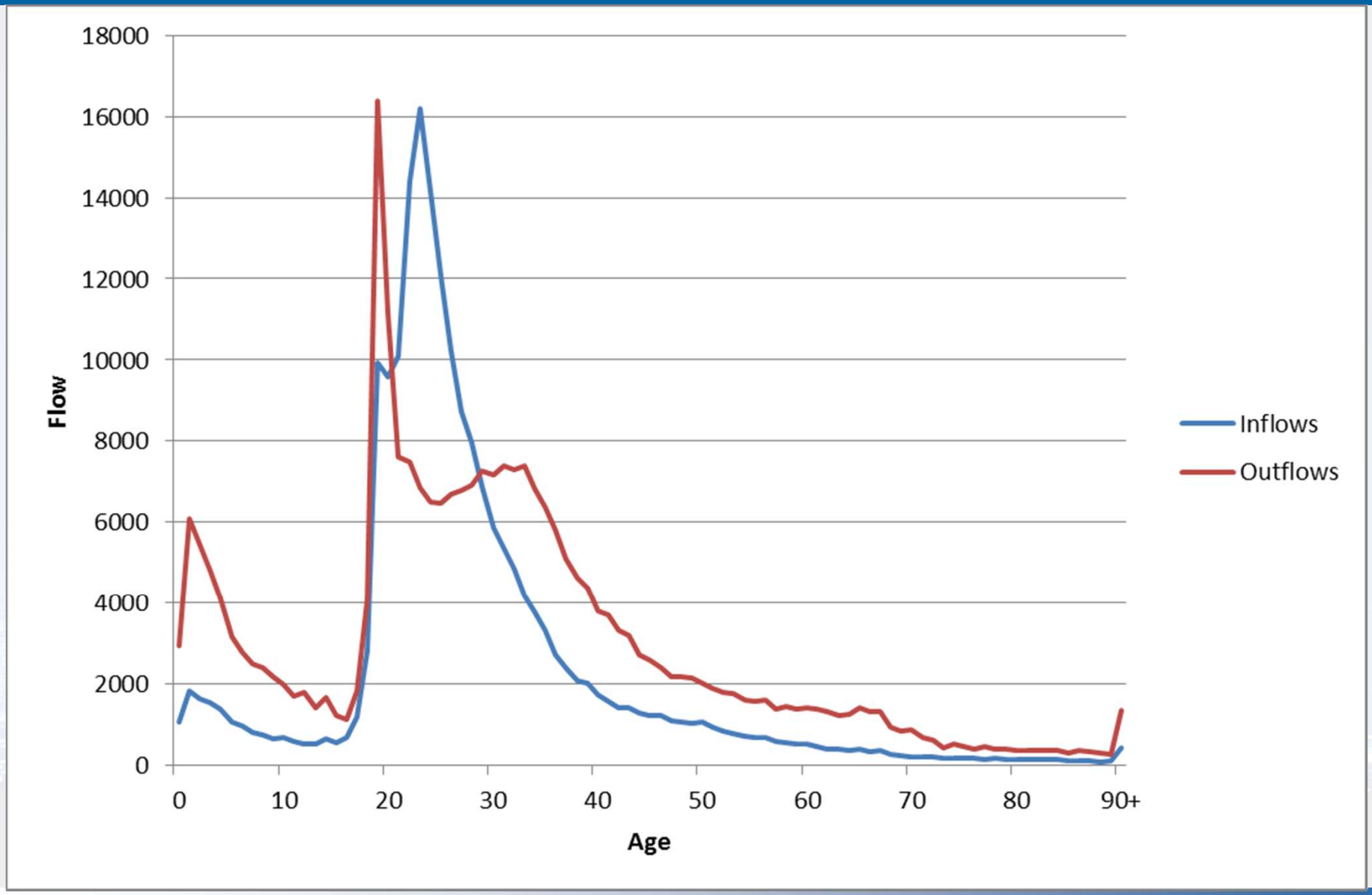
Source ONS MYE and ONS internal migration estimates

Importance of migration in London

- Gross flows matter because of differences in their characteristics
  - Flows have different age/ethnicity/country of birth profiles
- Impact on **structure** of London's population greater than direct impact on total **numbers**
- Migration turnover keeps London's population young

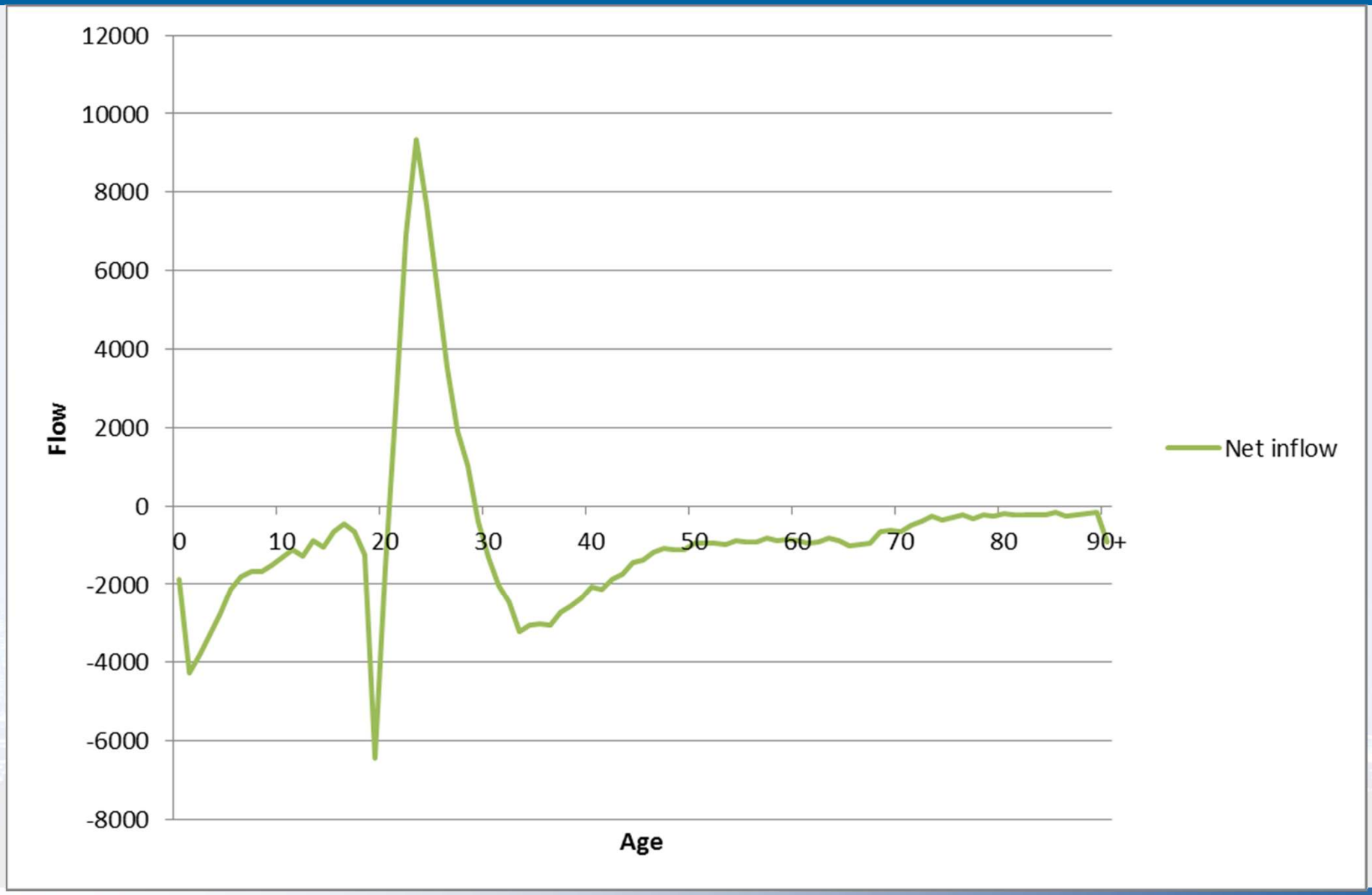
    - Which keeps natural change high

London: internal in- and outflows Mid-2014



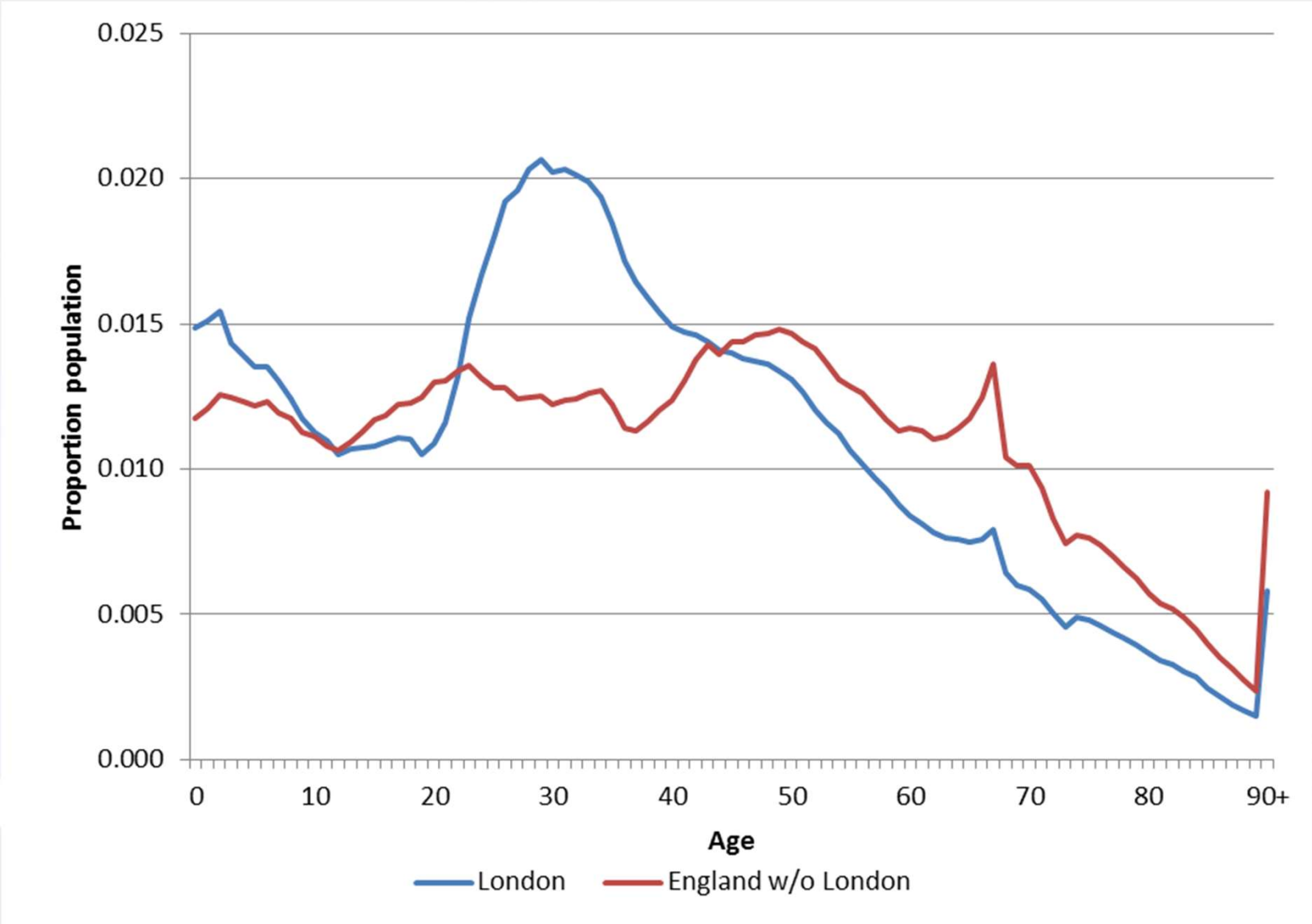
Source: ONS internal migration estimate mid-2013 to mid-2014

London: internal net inflow Mid-2014



Source: ONS internal migration estimate mid-2013 to mid-2014

Age structure:
London vs England mid-2014



Source: ONS 2014 MYE

Importance of migration in London

- For projections we also care about inter-borough moves

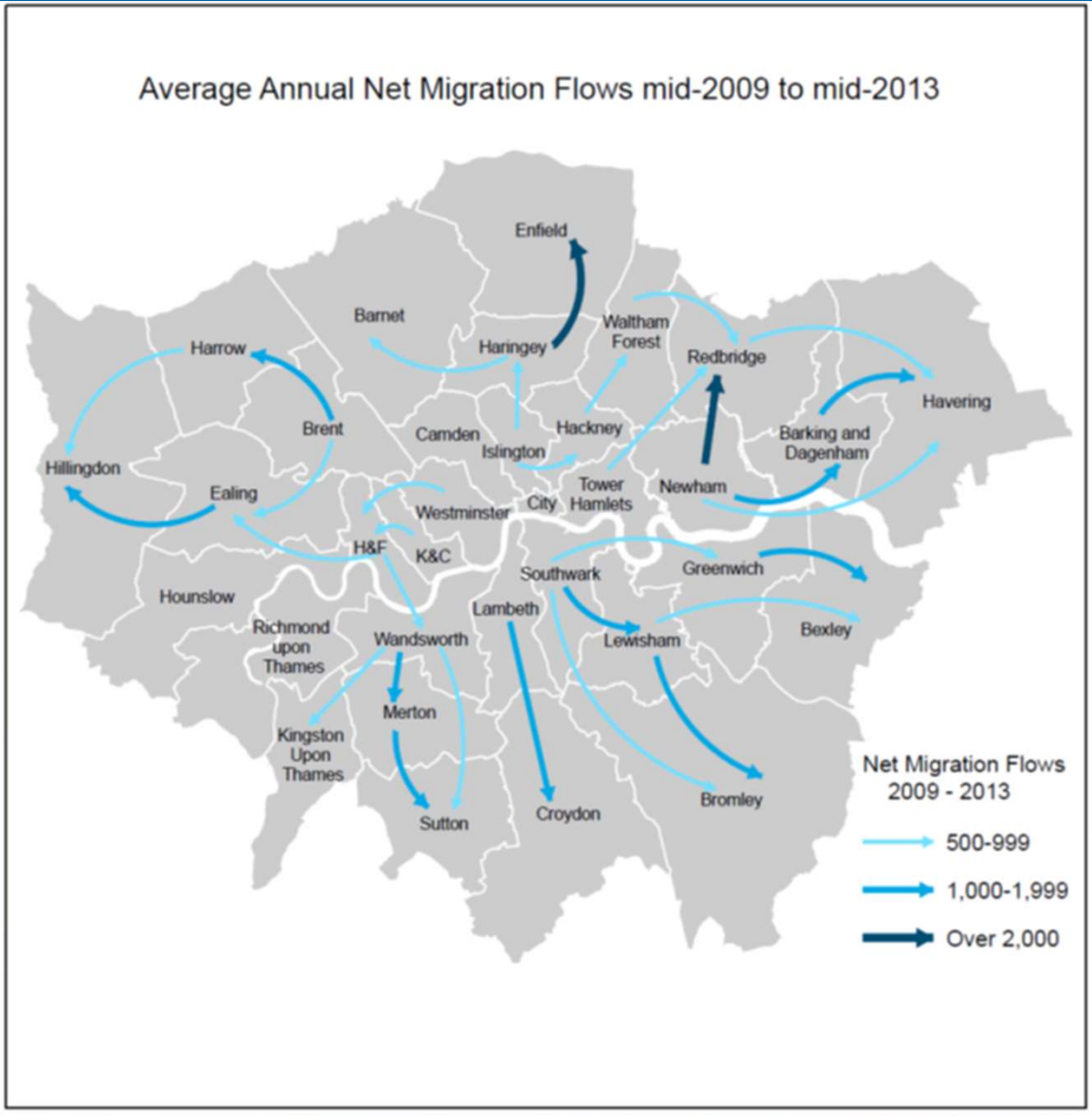
Including these:

Domestic flows into London boroughs: **584k**

Domestic flows out of London boroughs: **653k**

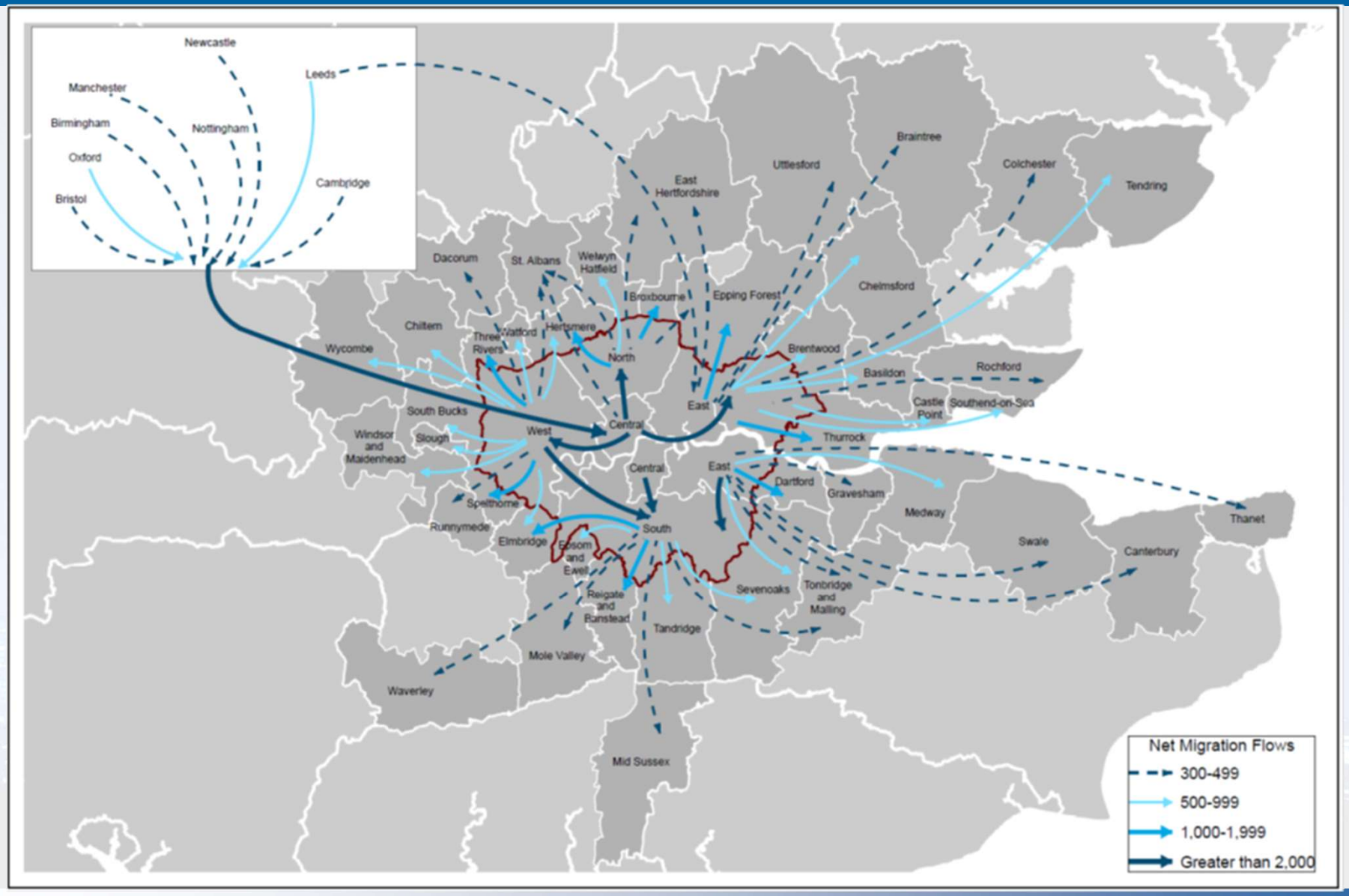
Borough model needs to account for ~ **1.5M** moves/year

Interborough net flows



Origin Borough	Destination Borough	Net Flows
Barking and Dagenham	Havering	1076
Brent	Harrow	1407
Brent	Ealing	626
Ealing	Hillingdon	1688
Greenwich	Bexley	1554
Hackney	Waltham Forest	811
Hammersmith and Fulham	Wandsworth	924
Hammersmith and Fulham	Ealing	678
Haringey	Barnet	655
Haringey	Enfield	2320
Harrow	Hillingdon	704
Islington	Hackney	573
Islington	Haringey	755
Kensington and Chelsea	Hammersmith and Fulham	943
Lambeth	Croydon	1496
Lewisham	Bexley	506
Lewisham	Bromley	1366
Merton	Sutton	1159
Newham	Redbridge	2252
Newham	Havering	768
Newham	Barking and Dagenham	1687
Redbridge	Havering	953
Southwark	Bromley	581
Southwark	Greenwich	635
Southwark	Lewisham	1336
Tower Hamlets	Redbridge	563
Waltham Forest	Redbridge	988
Wandsworth	Kingston upon Thames	507
Wandsworth	Sutton	535
Wandsworth	Merton	1216
Westminster	Hammersmith and Fulham	685

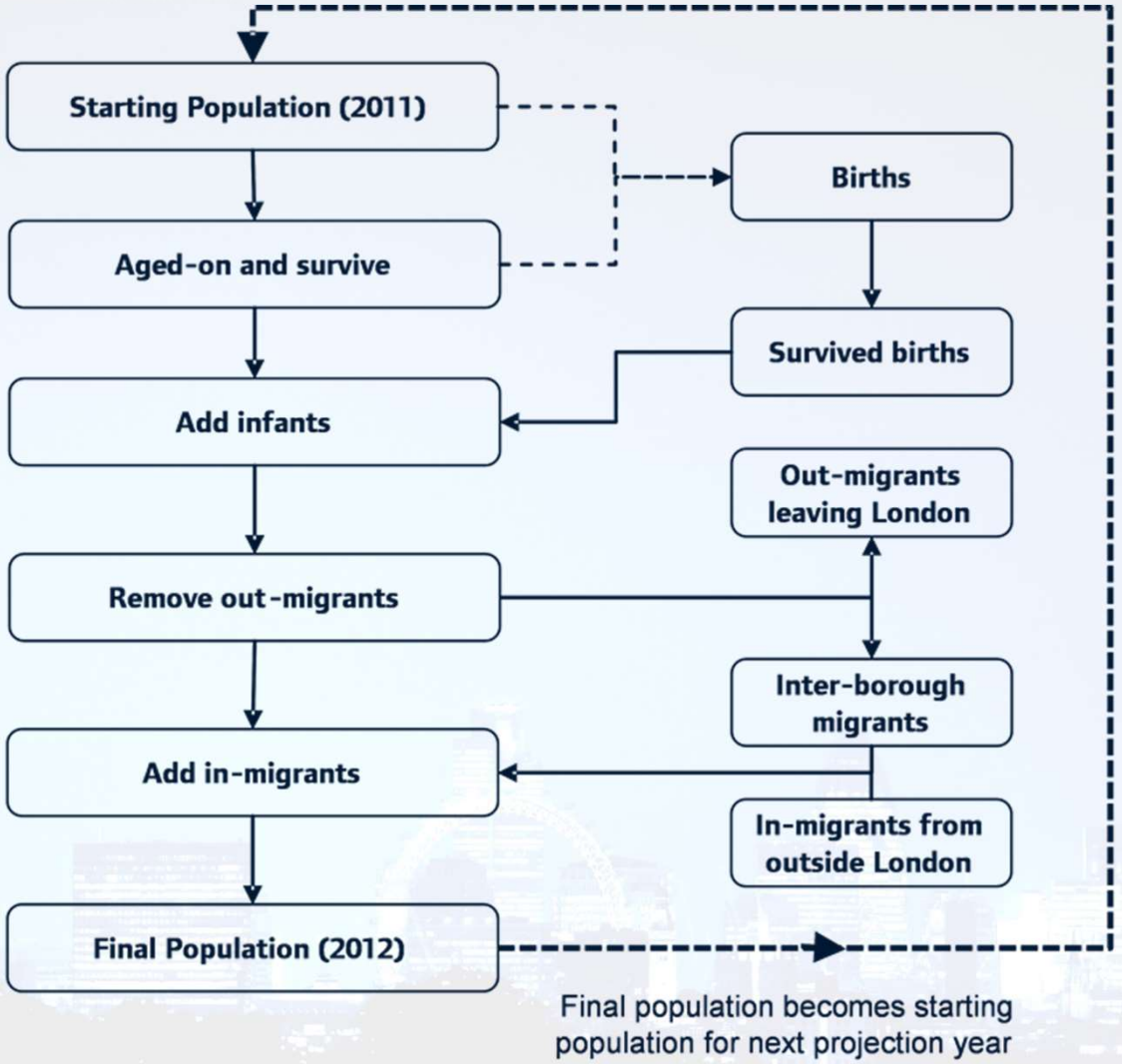
Regional net migration flows



Overview of GLA population projection models

- Cohort component models
- Project forward from a starting population one year at a time, accounting for:
  - Births
  - Deaths
  - Migration

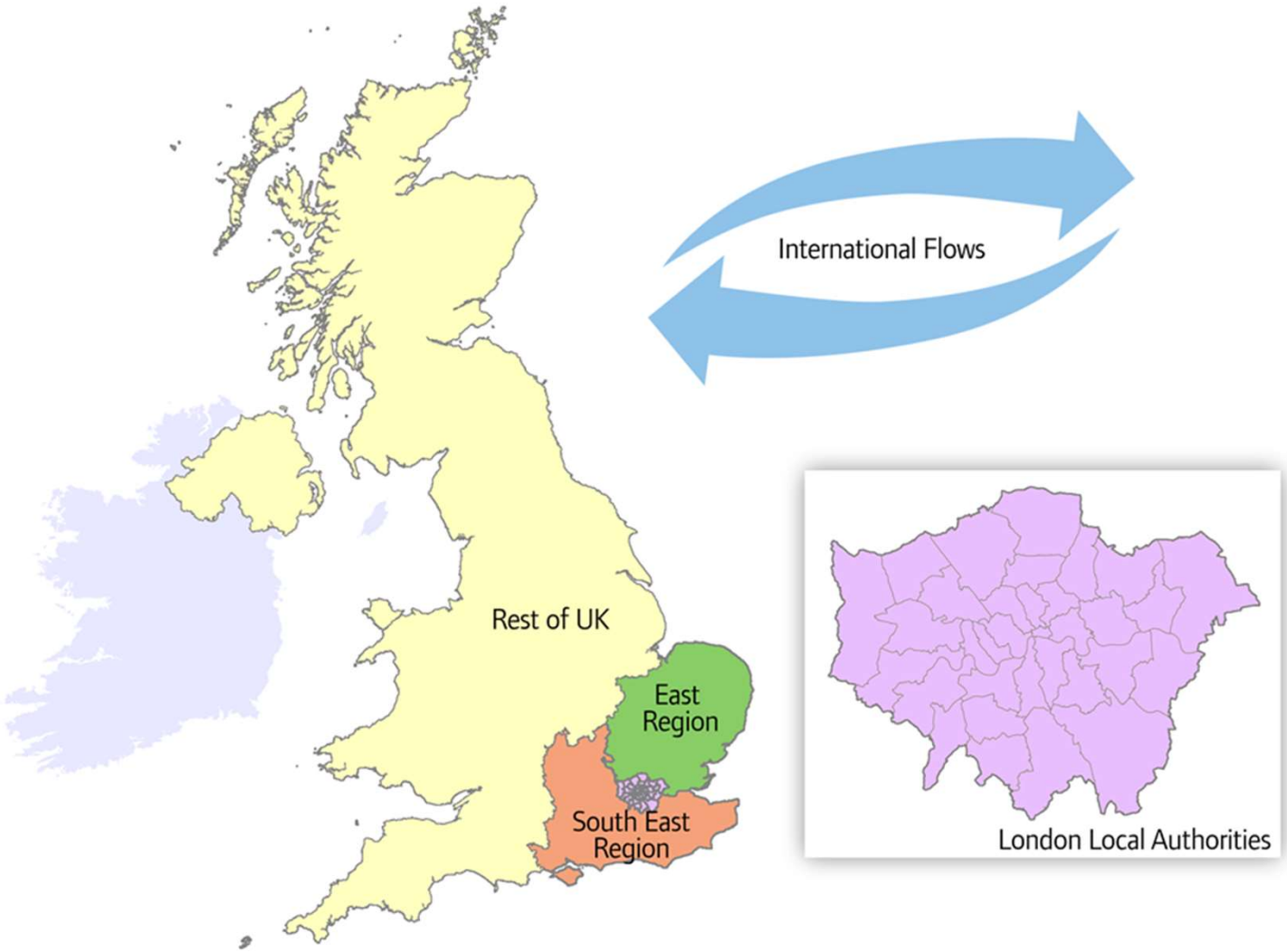
Example cohort component model



Borough cohort component model

- Multi-area model
- 33 London Authorities, 3 UK “regions”, overseas
  - East, South East, and Rest of UK
  - Projected population for UK regions exogenous to model
- Flows modelled between each area

Model areas


International Flows
Rest of UK
East Region
South East Region
London Local Authorities

Modelling migration flows

Project migration by:

- Flows – project past flows forward without accounting for changes to origin population
  - used for international inflows

- Rates/propensities – use past data to estimate chance of someone making a move from one area to another
  - Flows change as origin population changes
  - Used for every other flow in the model

Modelling migration flows

Data comes from:

- Census origin-destination tables
- Annual migration estimates

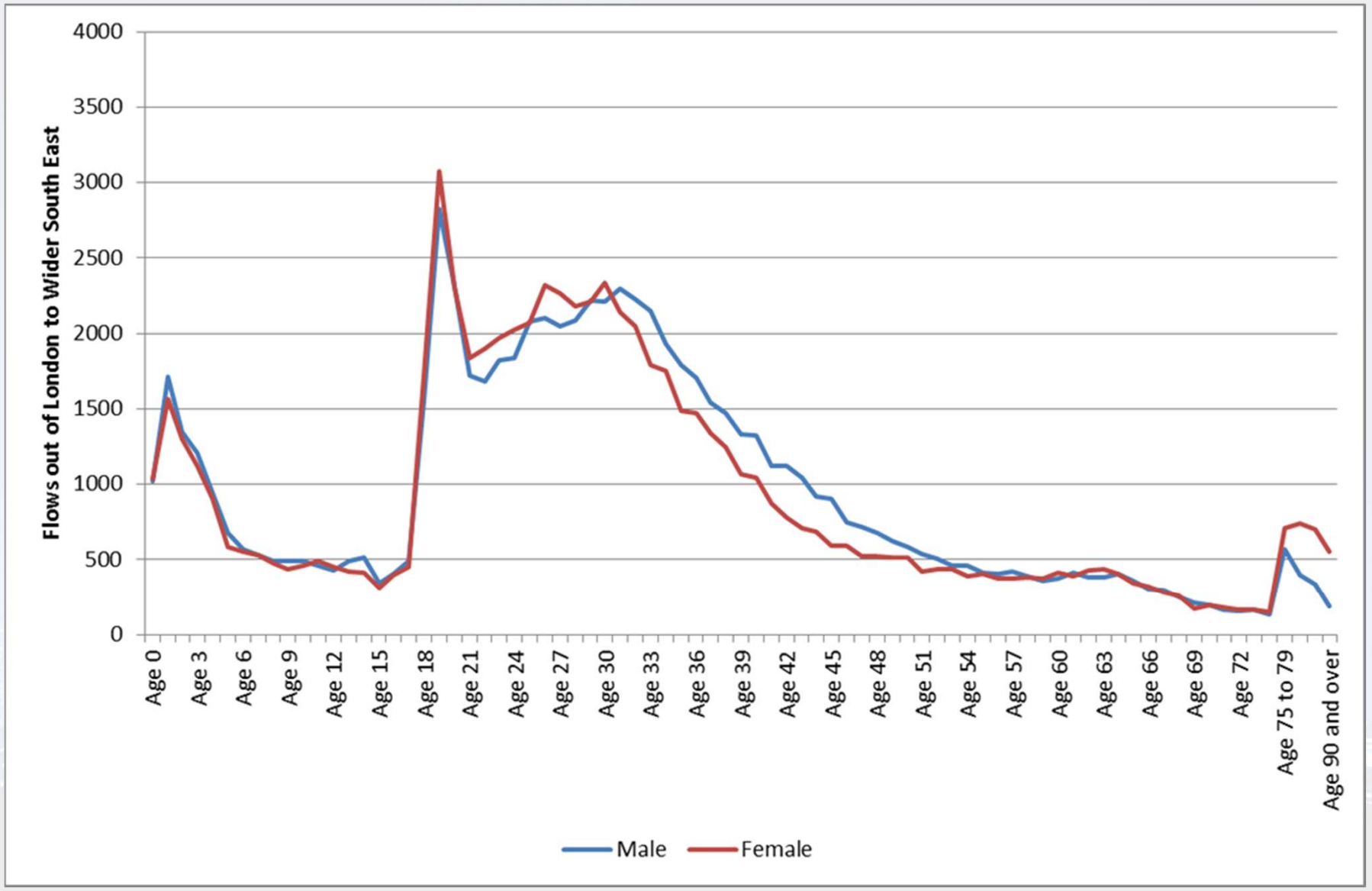
Census origin-destination data

- Based on stated address one year earlier
- Good coverage and reliability
- Only updated every 10 years
- Takes four years for results to become available
- No international outflows
- Multiple moves may have occurred over the year
  - Both international and domestic

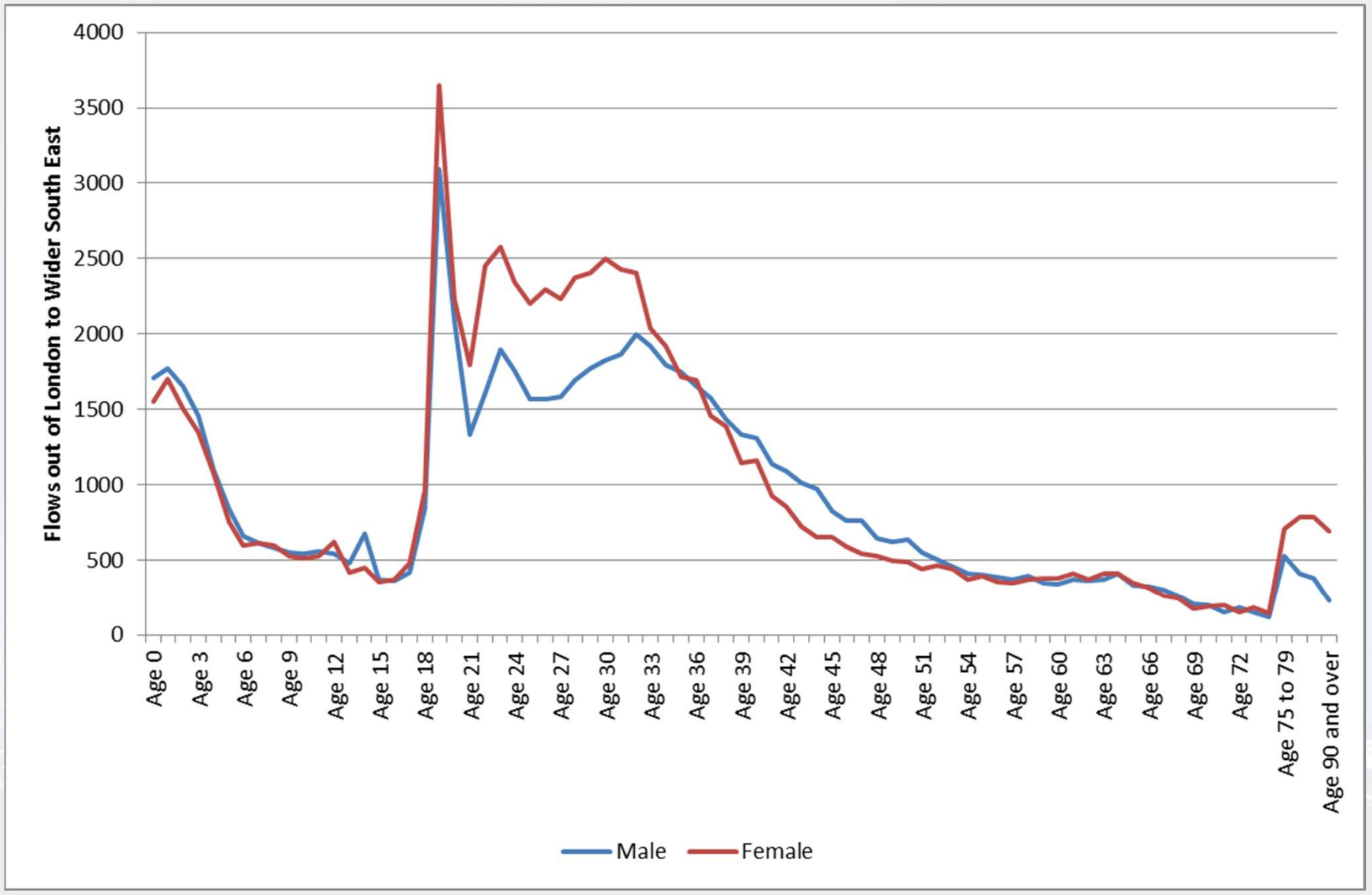
ONS annual internal migration estimates

- Based on moves recorded in NHS systems
  - NHSCR and PRDS
  - Supplemented by HESA data
- Annually updated
- Contains significant age and sex bias
  - failures to register moves with GP - especially by young males

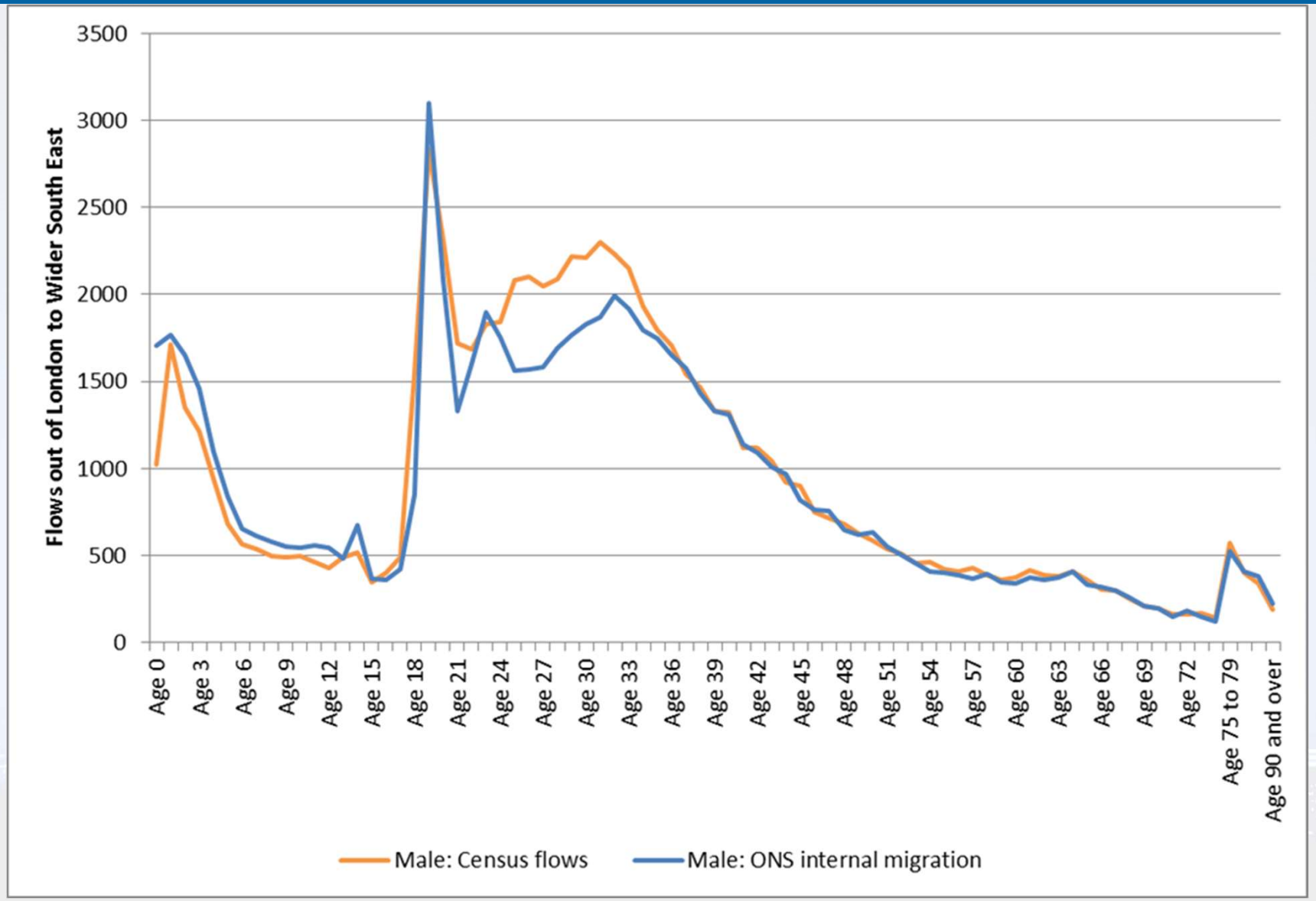
Example Census origin-destination data: London to wider SE region



Example ONS internal migration flows: London to wider SE region



Comparison of sources: London to wider SE region (Males)



Modelling migration flows

Data comes from:

- Census origin-destination tables
- Annual migration estimates

Data combined to take advantage of strengths of each source

- Derive base propensities from Census data
- Scale to match total moves from annual series

Migration for small area models

- Annual migration data not published below borough level
- Rely on census data combined with other sources to build proxies
- Limits to what origin-destination tables can be commissioned from census

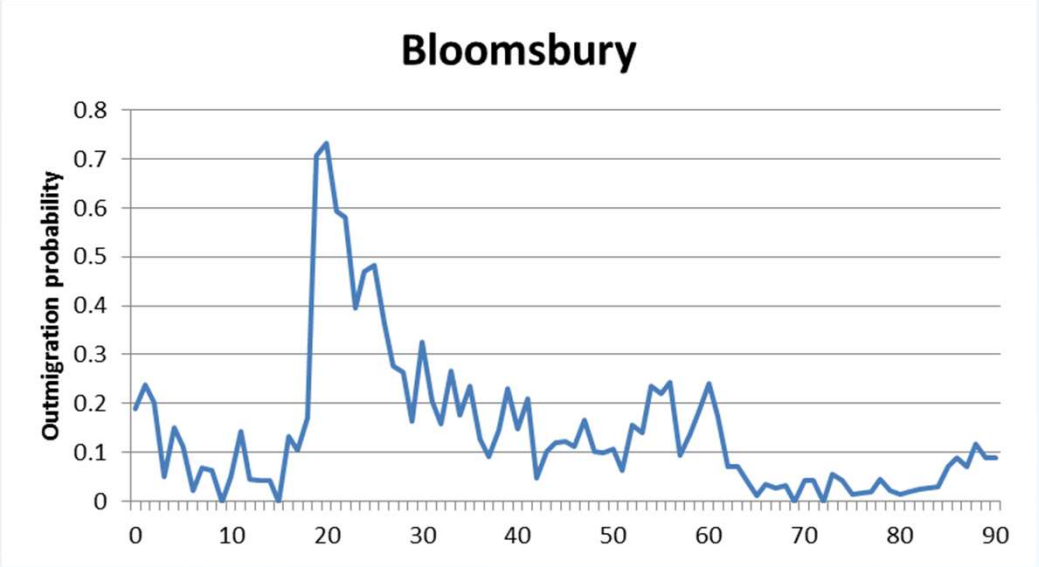
Small area models
Projecting outflows

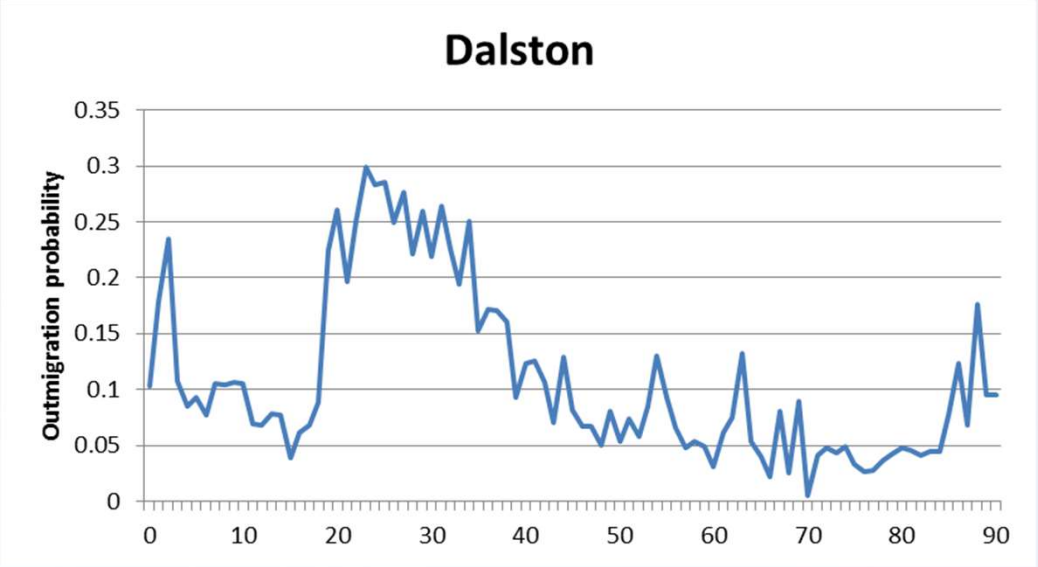
- Outflows projected using probabilities based on moves recorded in census
- Local authority international outflow estimates available from ONS MYE
  - Disaggregation to wards based on number foreign born

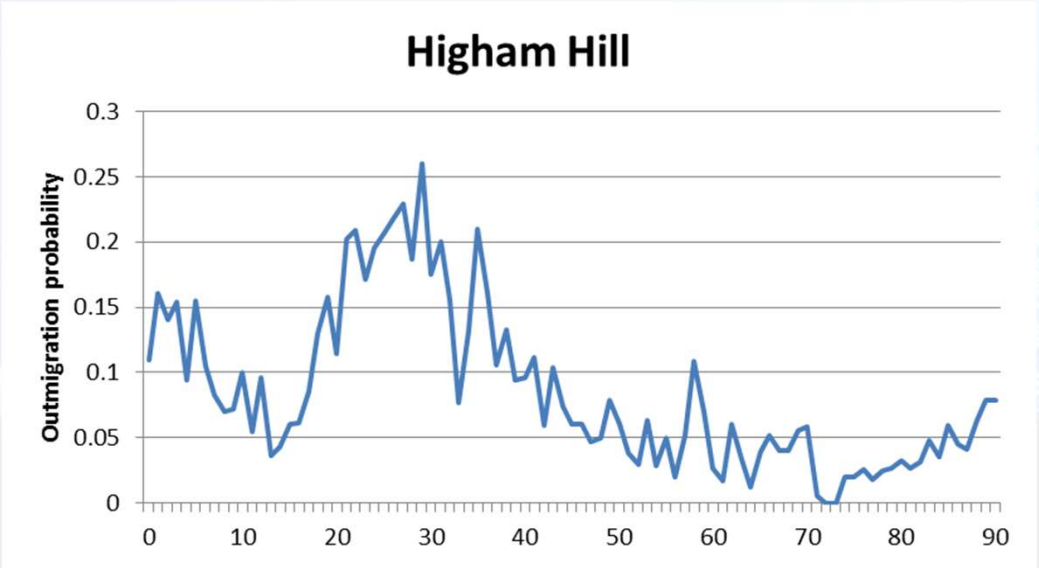
Small area models
Projecting inflows

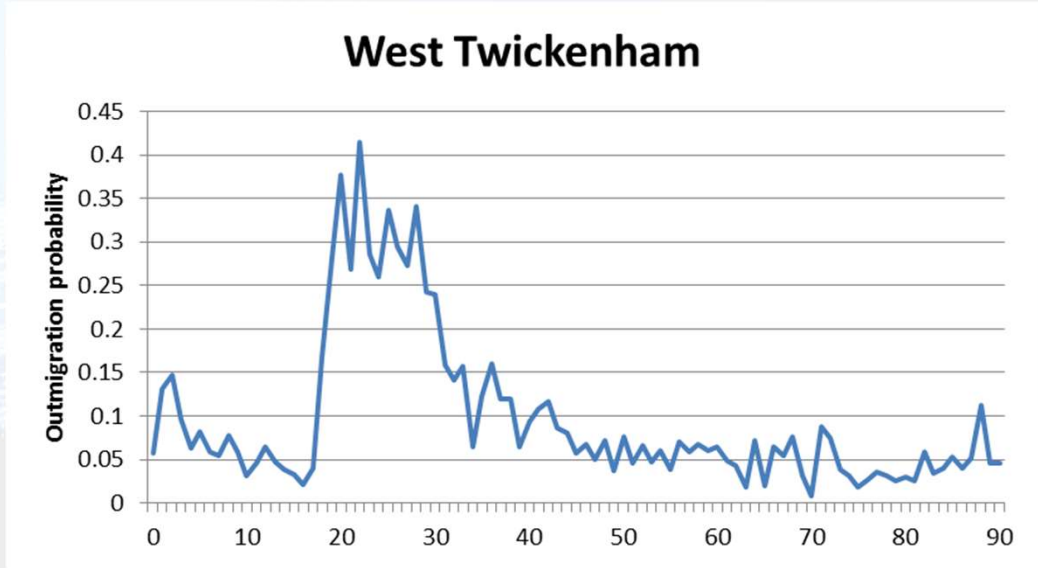
- Census gives age and sex characteristics of inflows
- Data combined with housing data to create migration proxies
  - Inflows scaled to retain consistent relationships between population and dwelling stock
  - More dwellings -> more inflow

Example outflow probabilities

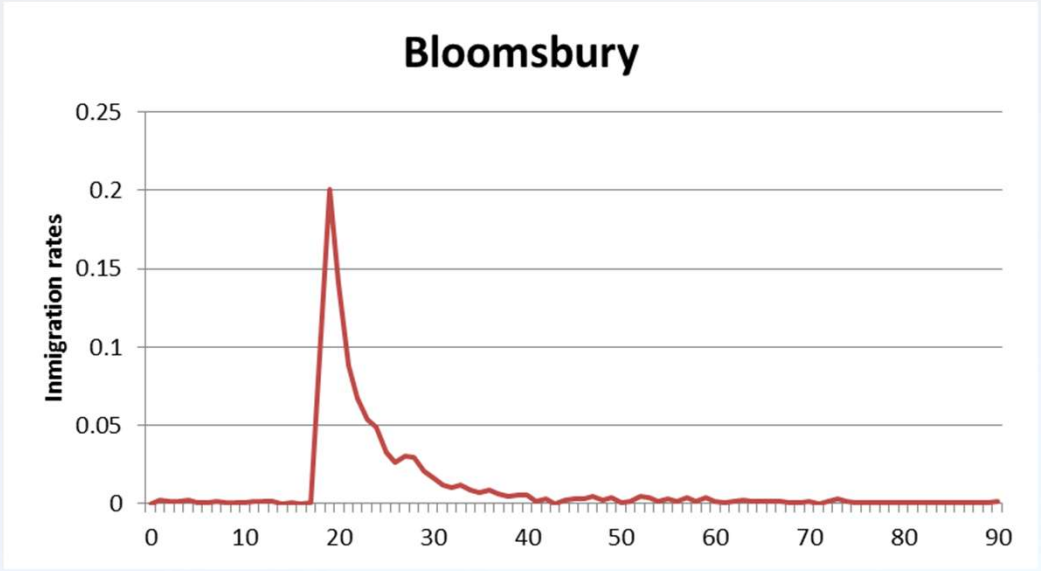


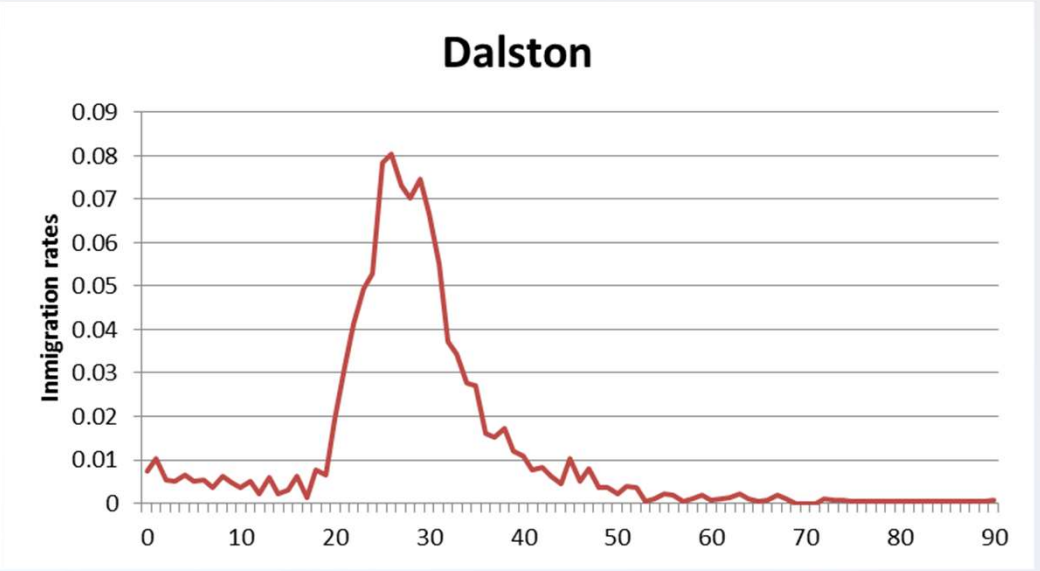


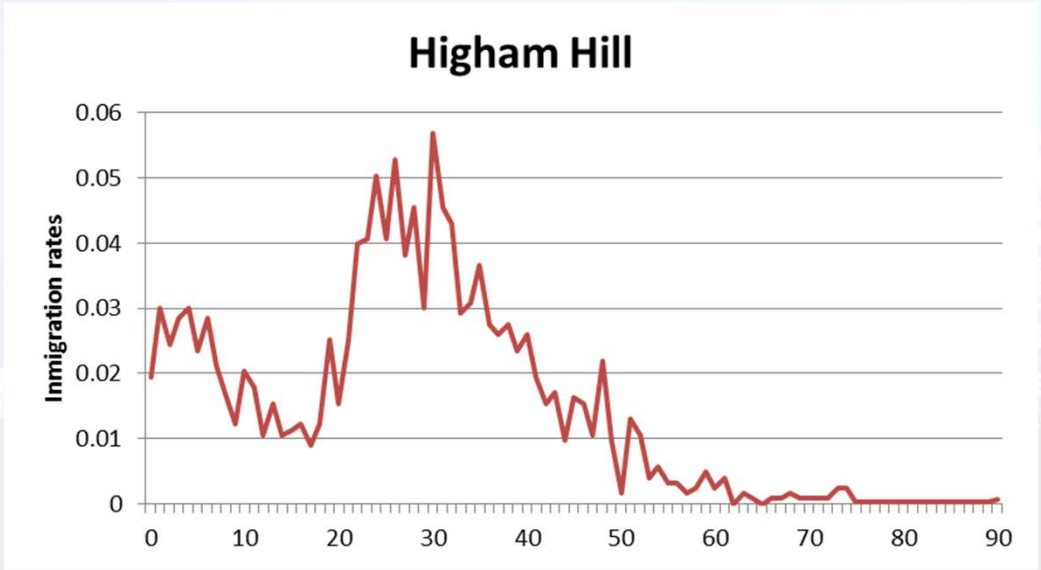


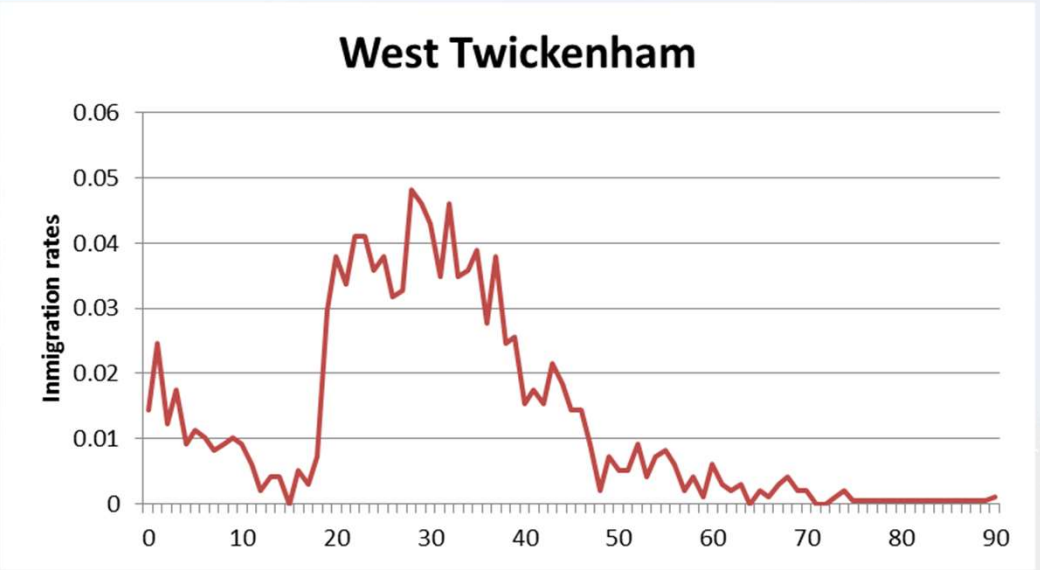


Example inflow characteristics

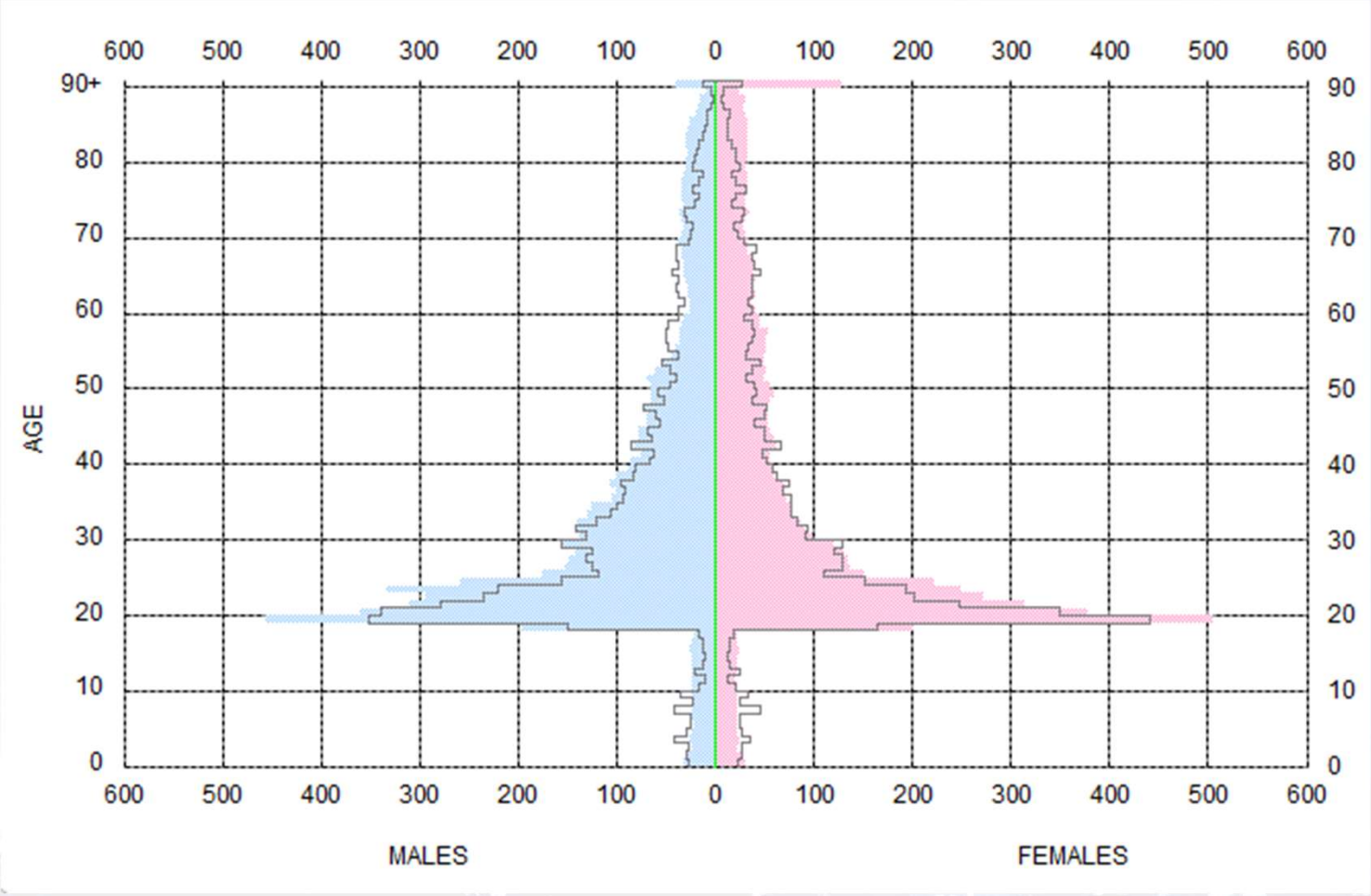






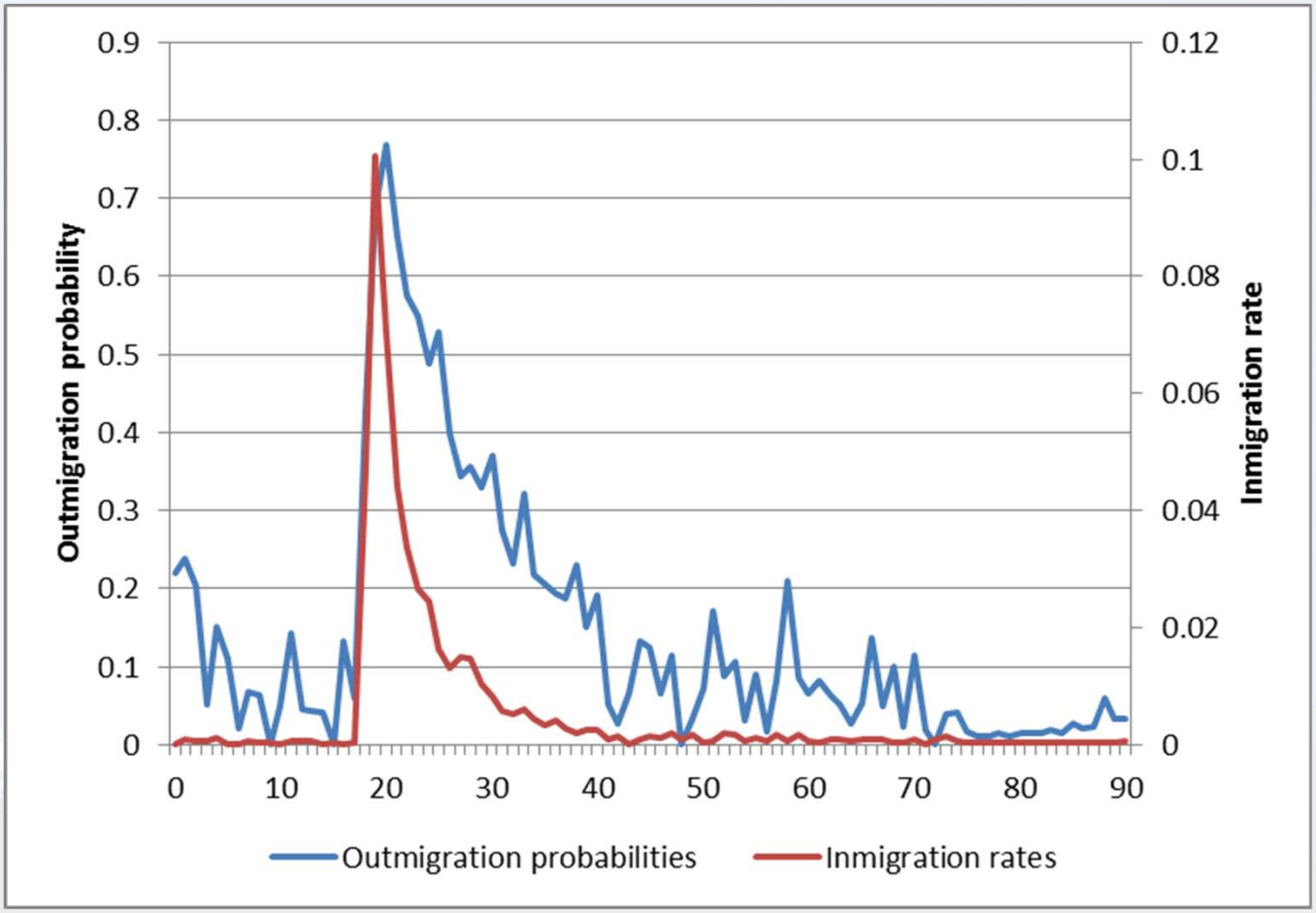


Example results: 2011 & 2031
Student areas (Bloomsbury)

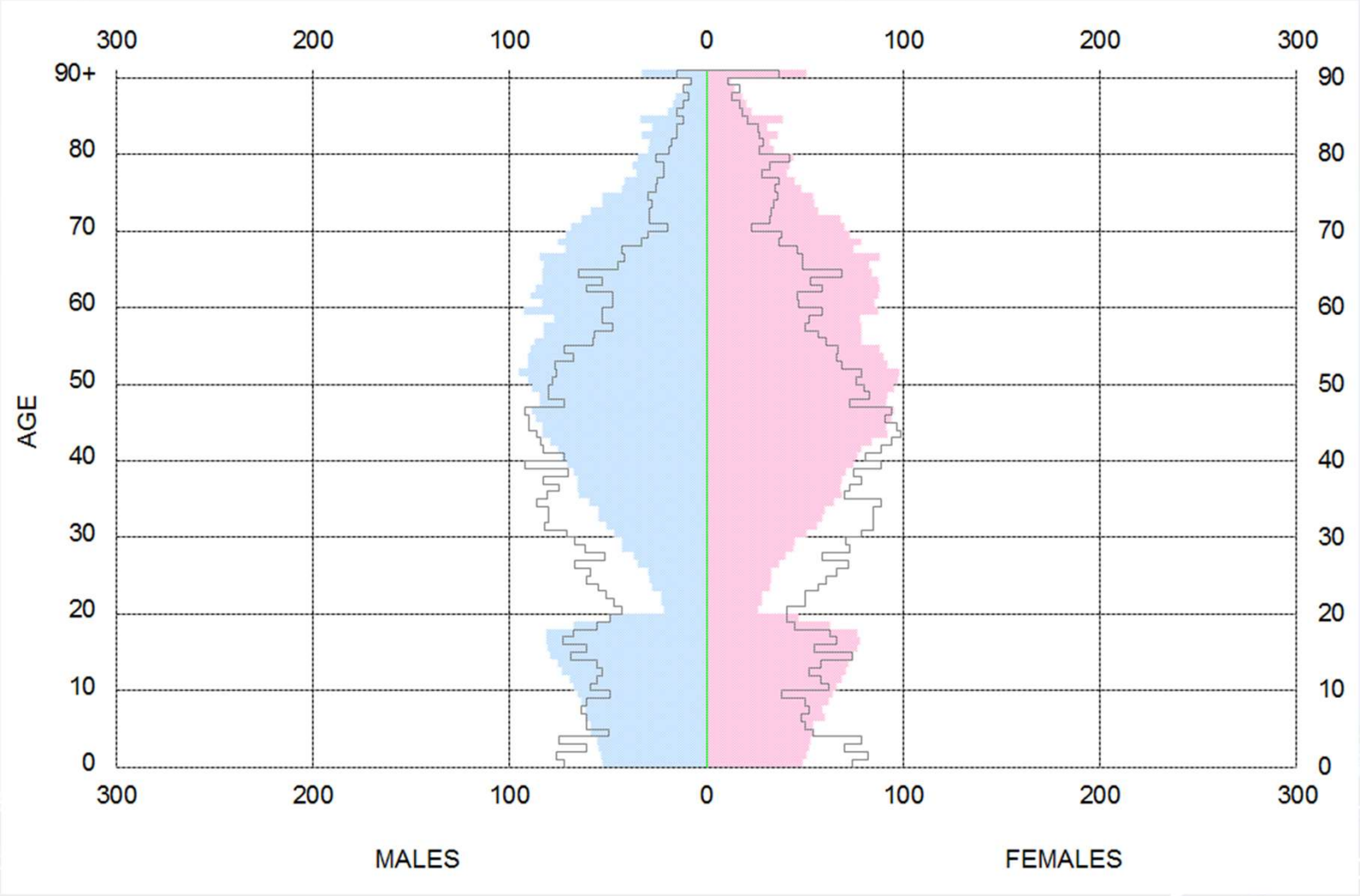


Migration inputs: Bloomsbury

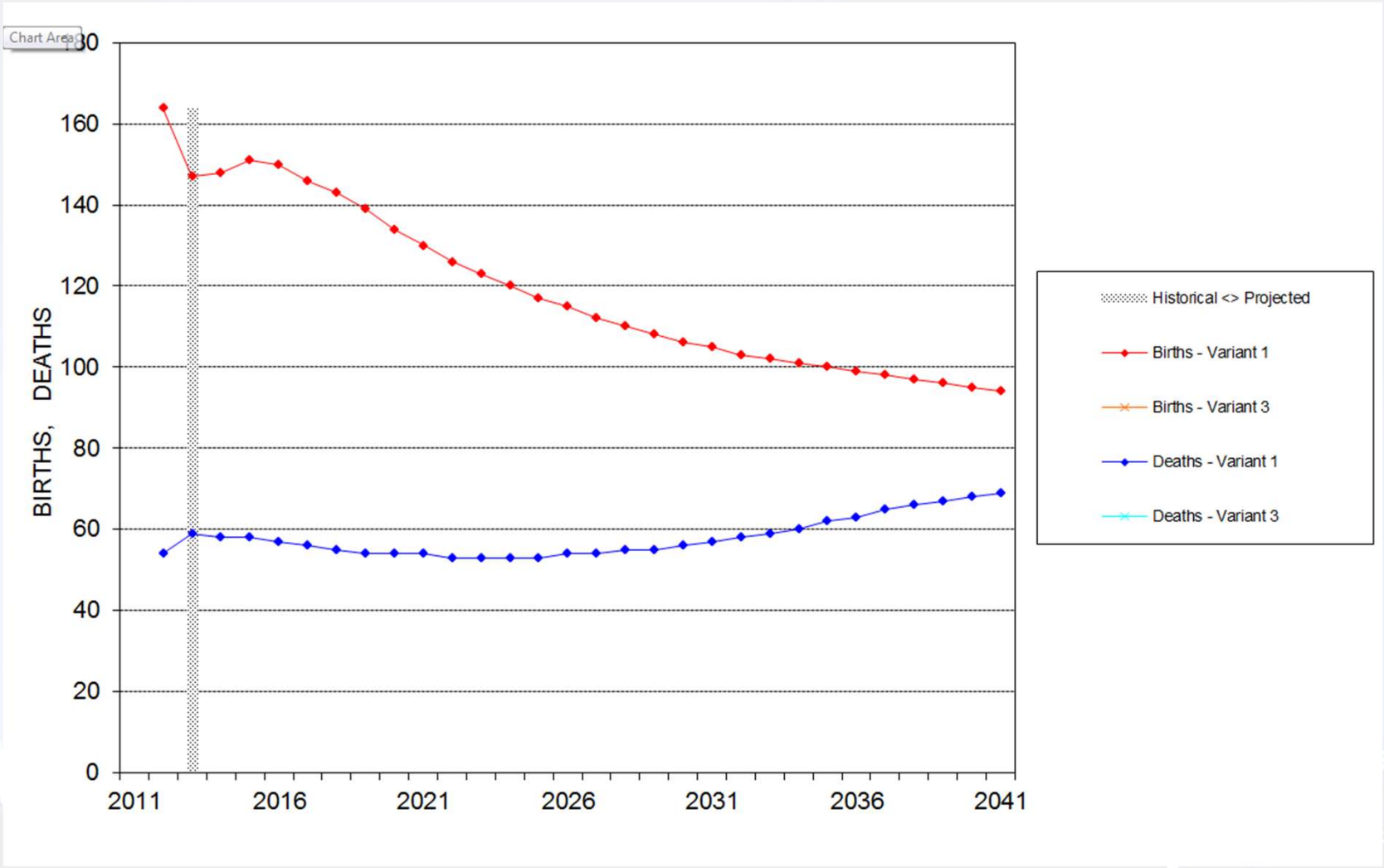
- Sharp inflow peak at age 19
- Outflow peak at age 20



Example results: 2011 & 2031
Falling young adults (Carshalton Central)

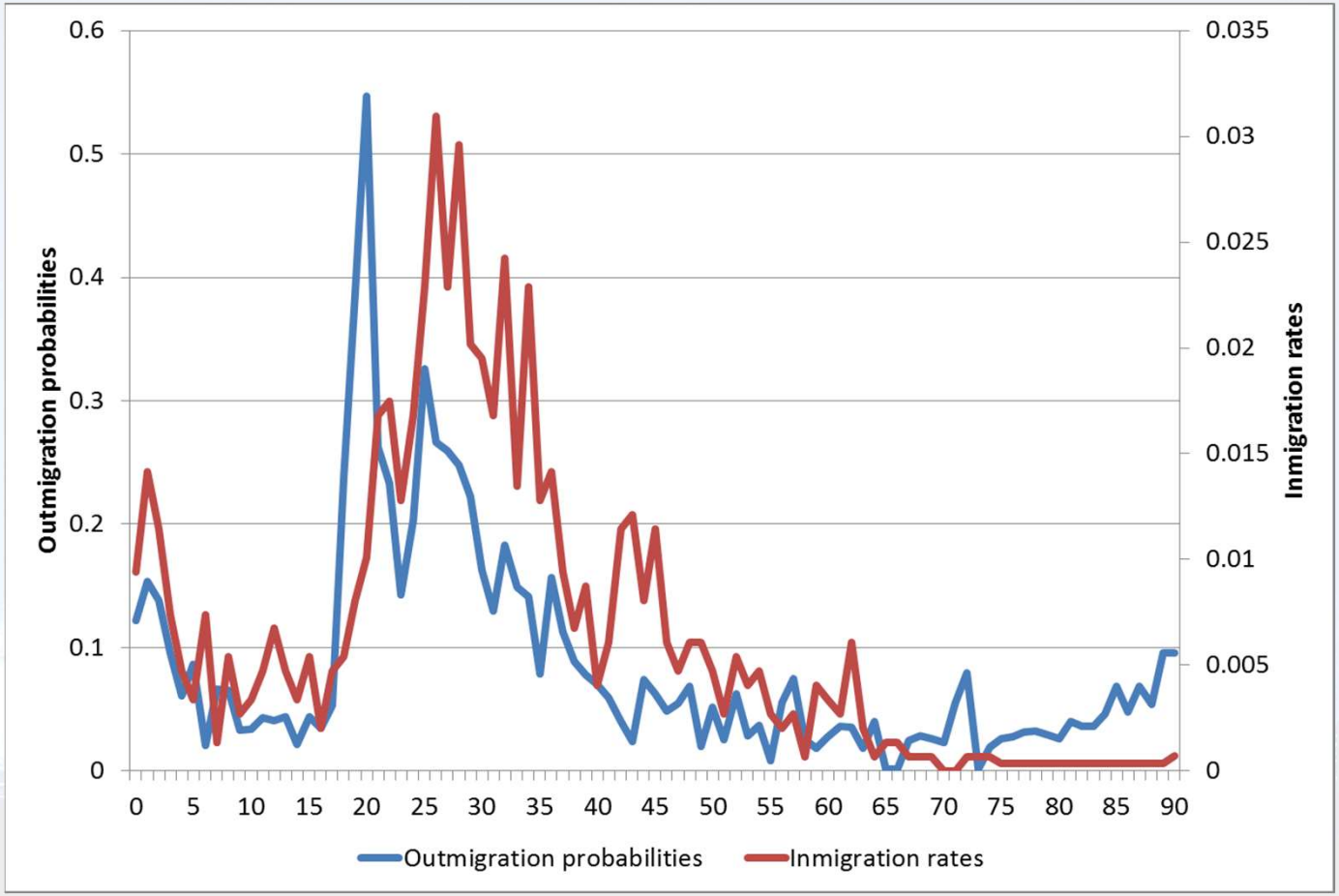


Example results: births and deaths Carshalton Central



Migration inputs: Carshalton Central

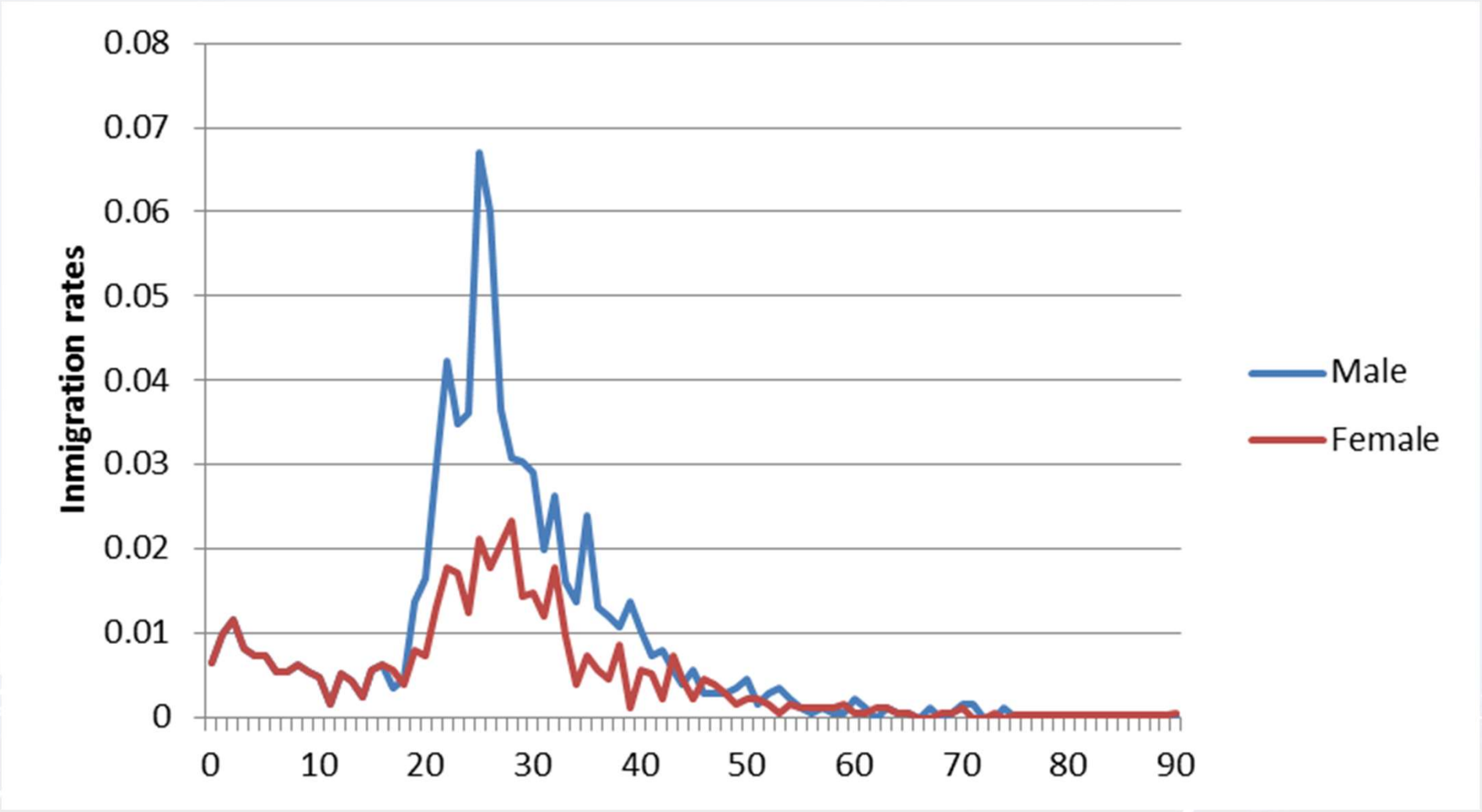
- High outmigration of students
- Low in-migration rates until late 20s



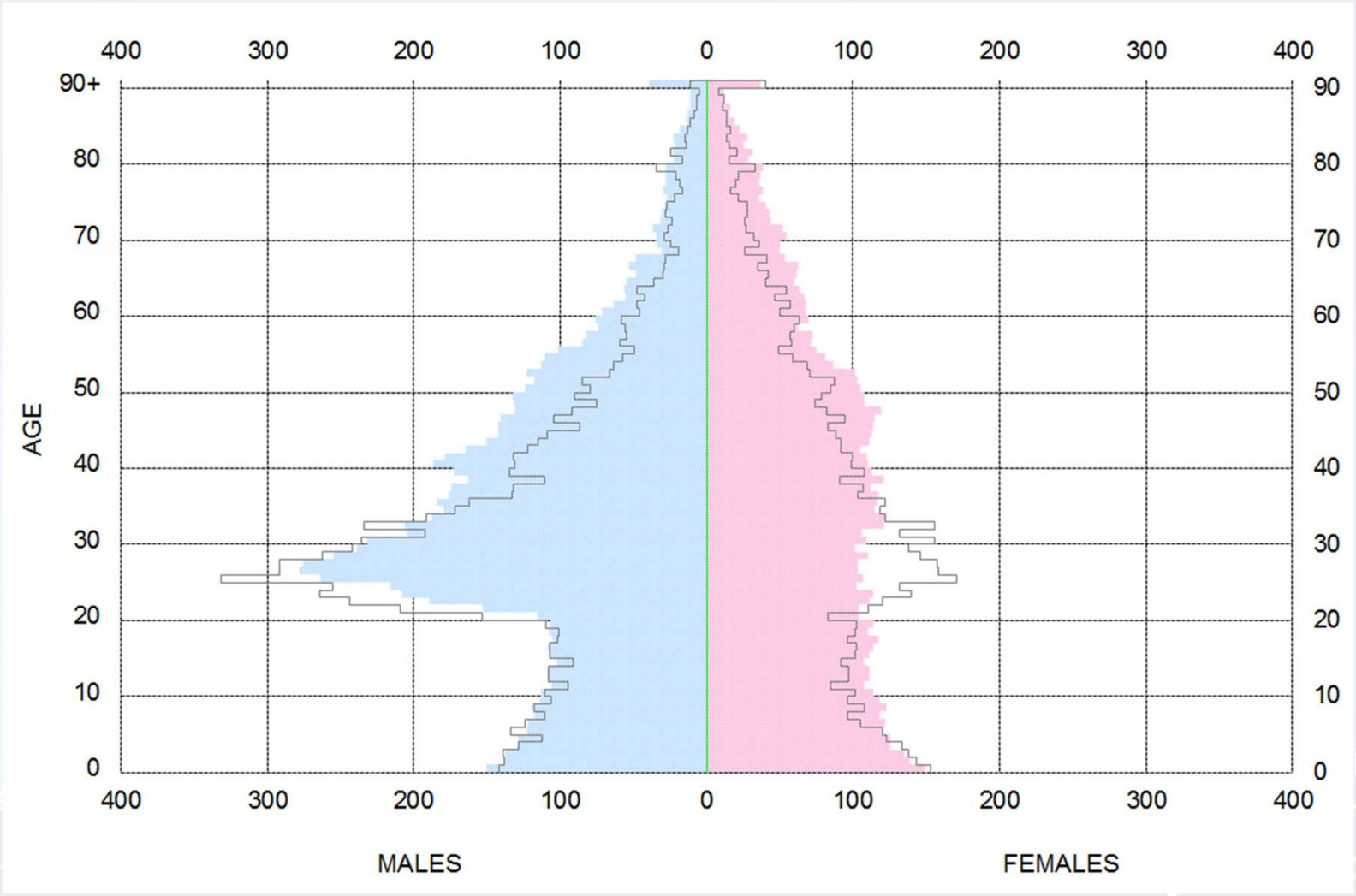
Gender bias

- Male and female migration rates/probabilities combined for most wards to reduce noise
- Separate male/female rates used if evidence of genuine difference in behaviour

Gender differences: East Ham Central



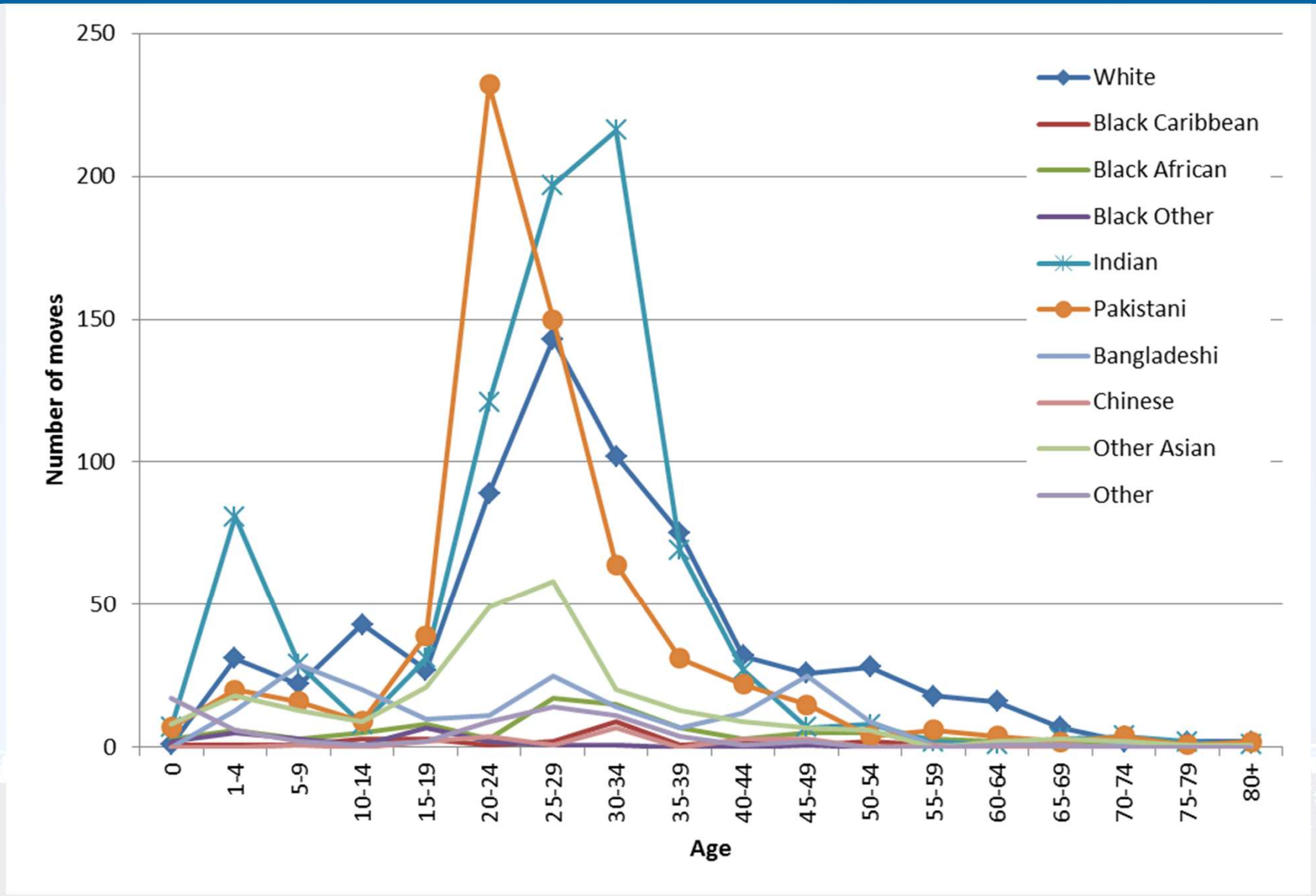
Example results: 2011 & 2031
East Ham Central



Ethnic group projections

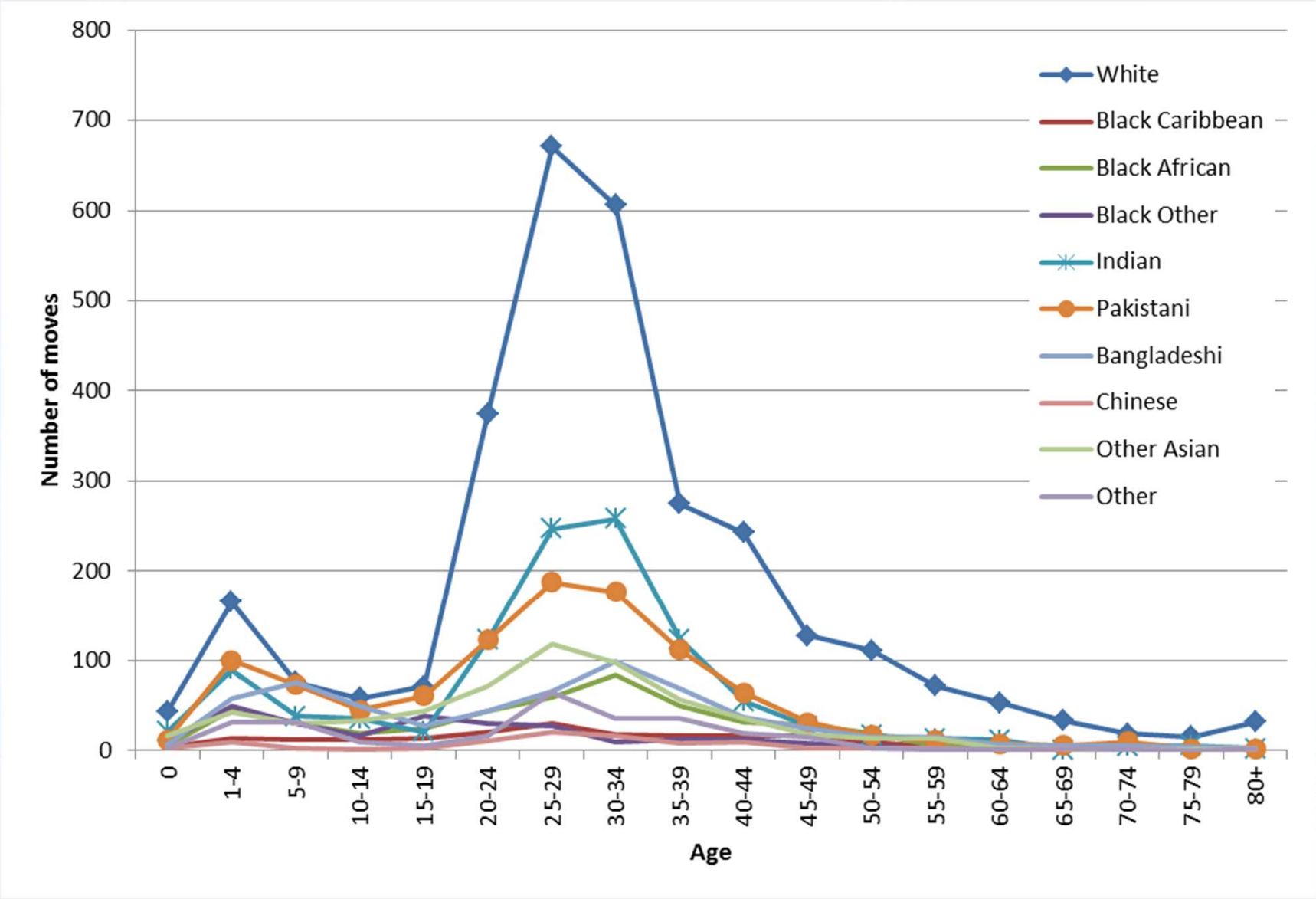
- Make use of moves by ethnicity recorded in Census
- Use to disaggregate modelled migration flows between ethnic groups

Ethnic migration flows Redbridge – international in



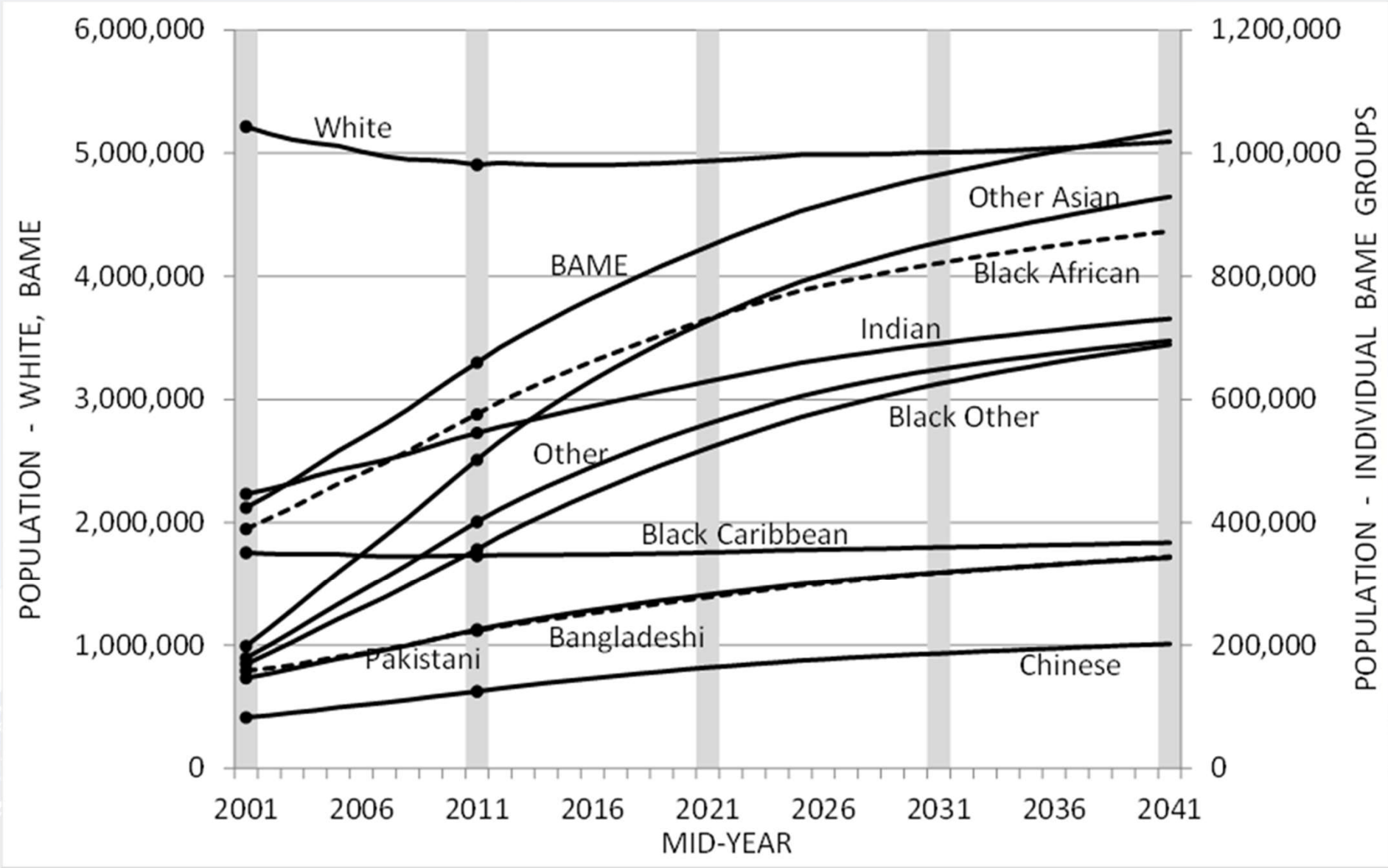
2011 Census: moves from overseas to Redbridge

Ethnic migration flows
Redbridge – Domestic in



2011 Census: moves from rest of UK to Redbridge

Projected ethnic group populations: Greater London



Challenges

- Accuracy and consistency of input data
- Unpredictable nature of migration
- Communicating results to users

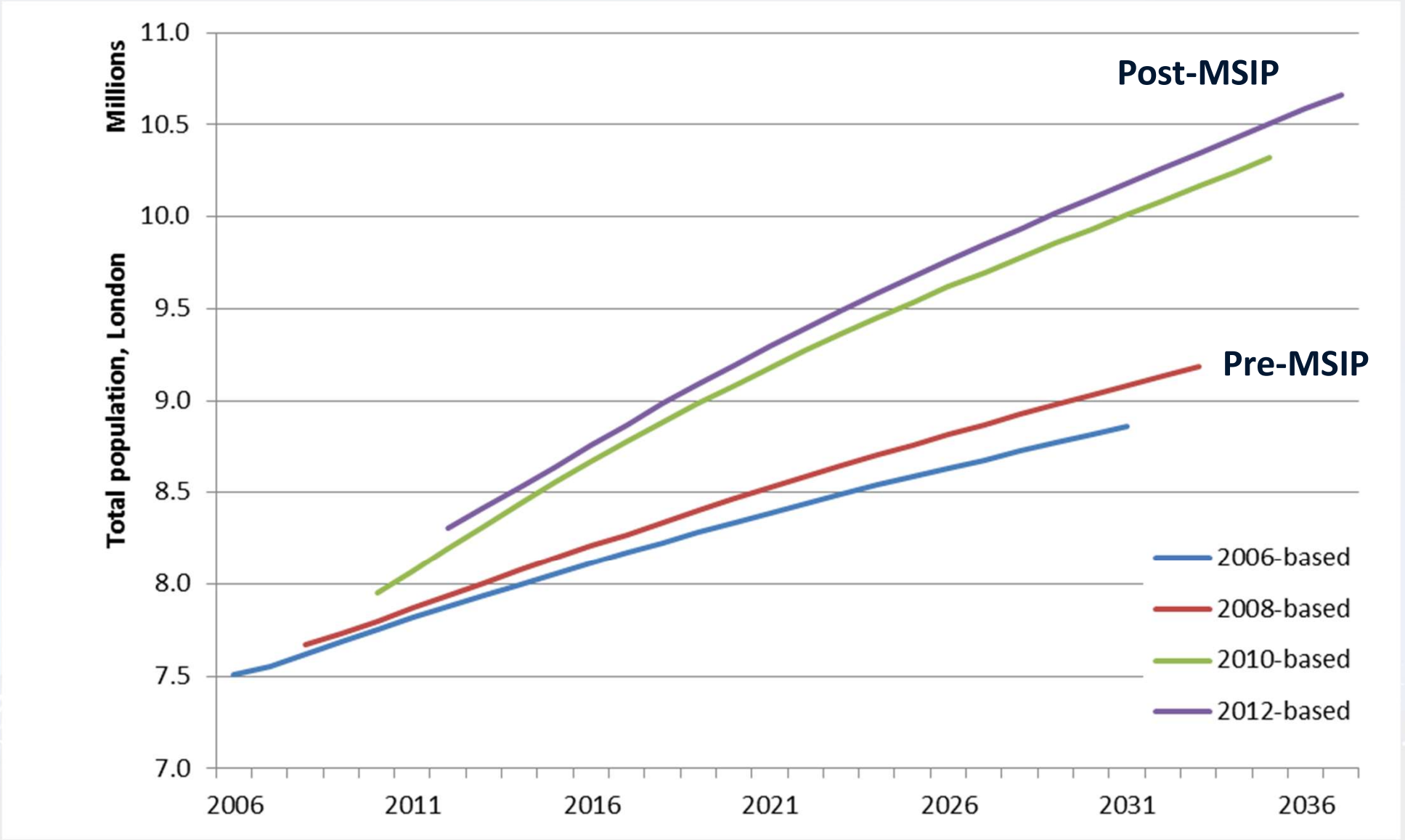
Accuracy and consistency

- Migration difficult to accurately measure
  - Especially international outflows
- Estimates get revised/improved
- Small errors and biases add up when projecting 25+ years forward
- London especially susceptible due to asymmetry and volume of flows
- Checking against multiple independent sources best way to guard against issues

Revisions/improvements to estimates

- E.g. Migration Statistics Improvement Programme
- Great improvement in quality of international inflow estimates
- Huge impact on projections for London…

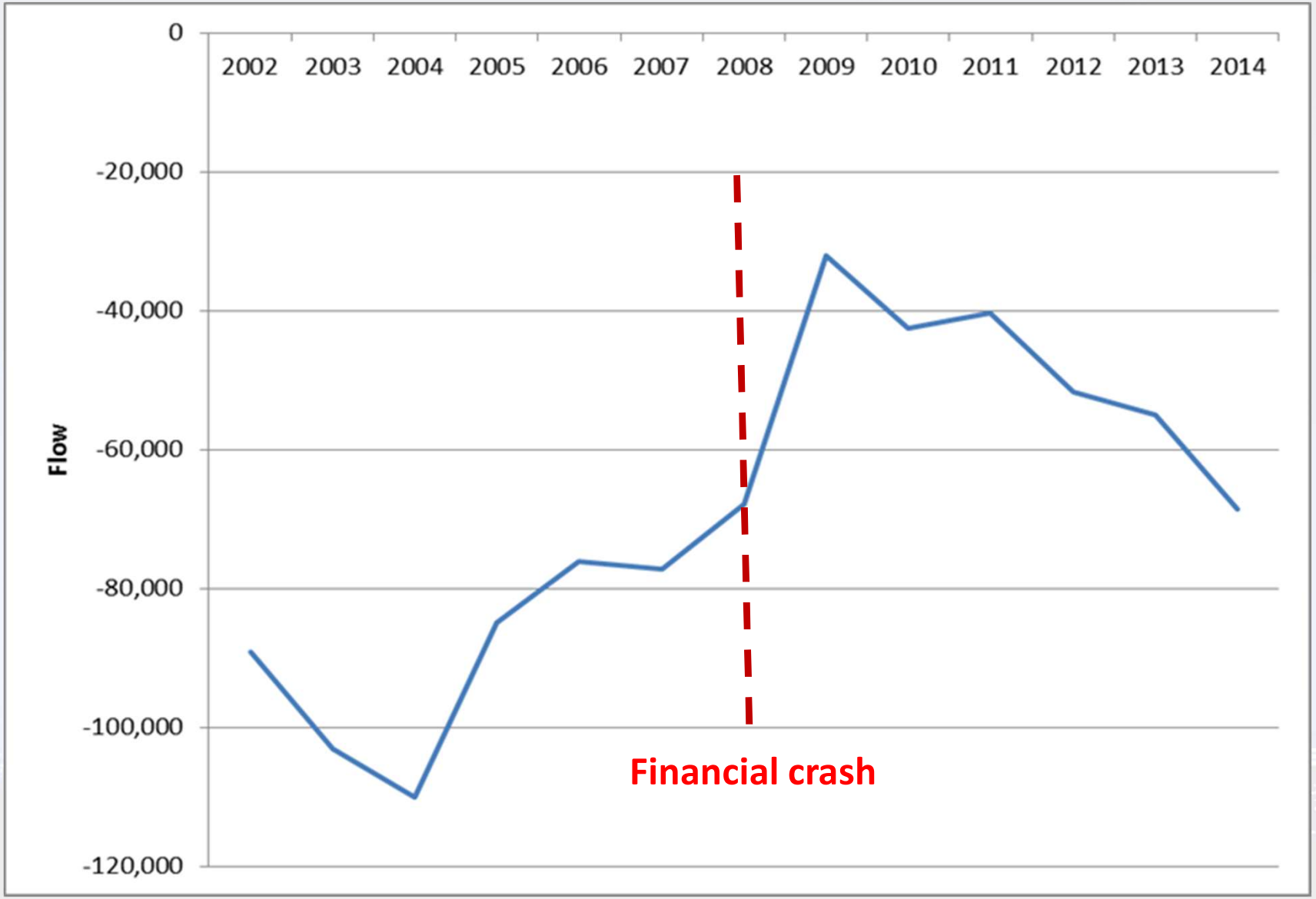
Impact of improved migration estimates



Impact of financial crisis

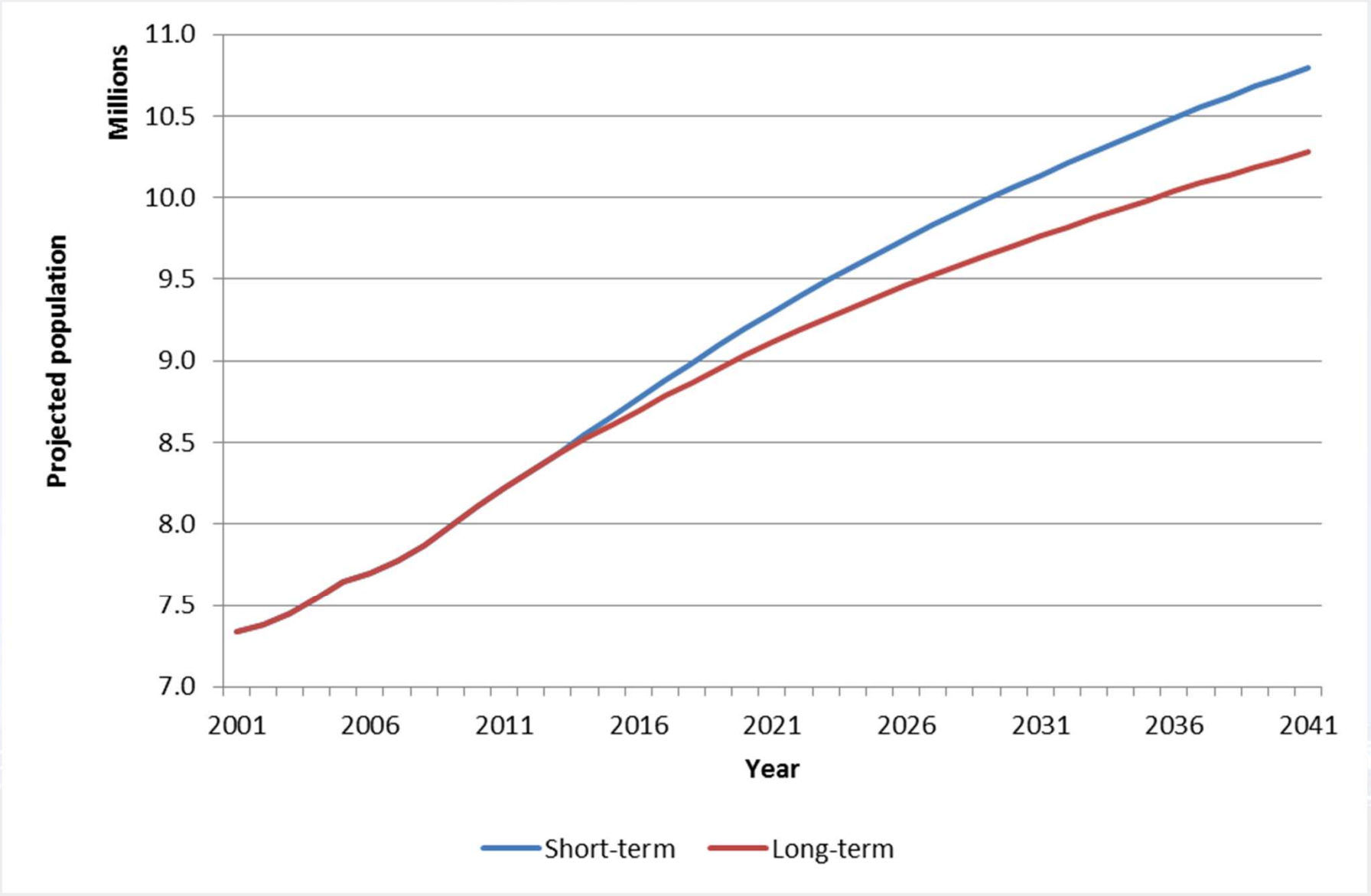
- Financial crisis prompted large fall in domestic migration flows from London
- Correlated with similar fall in house sales across wider region

London:
Net domestic migration



Source: ONS internal migration estimates mid-2001 to mid-2014

London total population
5yr vs 12yr migration trend



Communicating uncertainty

- Migration flows can't be accurately predicted
- What projections really tell you is:

"**If** things continue as they have in the past, this is how the population will look"

- Ensuring appropriate use of projections is a big challenge for producers
- Do probabilistic projections / variants help?

Questions?

Contact:
ben.corr@london.gov.uk

Latest projections:
http://data.london.gov.uk/dataset/2014-round-population-projections

Recruitment:
http://www.london.gov.uk/city-hall/jobs/current-vacancies