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Public Economics Lectures 2014

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The cost of living

- Measures of inflation are used for all kinds of things
  - Determine monetary policy
  - Index benefits and taxes
  - Set wages in private and public sector contracts
  - Inflate/deflate historical series of economic data
- But there are different measures (e.g in the UK: RPI, CPI, CPIH, RPIJ, GDP deflator..)
- Which measure you use can make a lot of difference
  - switch from RPI to CPI indexation of benefits expected to save £4 billion in 2014-15

The cost of living

- How are changes in the cost of living measured?
- Can it vary across households?
- How might this affect inequality/poverty measures?

Some theory

Some theory

- Inflation is defined as an increase in the general level of prices
- But what is the general price level?
- ONS price survey collects the prices of over 120,000 items each month
- *Fundamental problem*: Many price changes need to be aggregated into a single number (e.g an inflation rate of 2%)

Different approaches

- There are different ways to answer what the most appropriate index is
- Test approach: does the price index *P()* satisfy appropriate (common-sense) axioms such as

$$P(p_0, p_1)P(p_1, p_0) = 1$$

- Statistical approach: is the price index a good statistical predictor of the average price change?
- Economic approach: does the index approximate the change in the *cost of living*

Some possible indices

- A Laspeyres index for two periods (0 and 1)

$$L = \frac{\sum_{i=1} q^i{}_0 \, p^i{}_1}{\sum_{i=1} q^i{}_0 \, p^i{}_0} = \sum_{i=1} w_0^i \, \frac{p^i{}_1}{p^i{}_0}$$

- Where w_0^i is the budget share of good *i* in period *0*
- A Paasche index

$$P = \frac{\sum_{i=1} q^i{}_1 \, p^i{}_1}{\sum_{i=1} q^i{}_1 \, p^i{}_0}$$

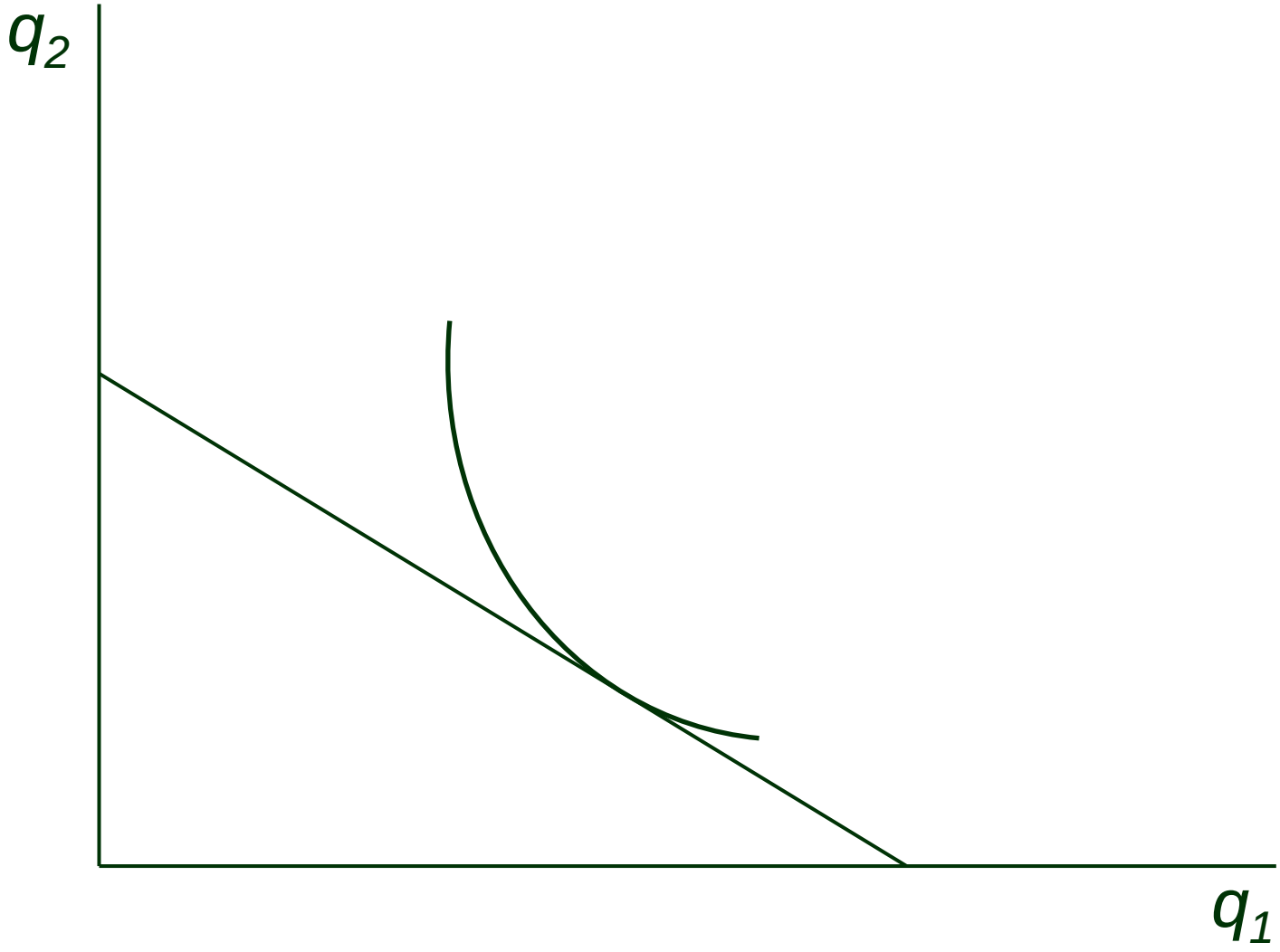
The economic approach

- Define a cost function $c(u_t, p_t)$
- This tells us the cost (level of expenditure) need to attain a given utility when the consumer faces prices p_t
- A cost of living index gives the ratio of cost functions in two periods

$$C = \frac{c(u_0, p_1)}{c(u_0, p_0)}$$

- This tells us how much money we need to give consumer to compensate them for the price change

Substitution bias



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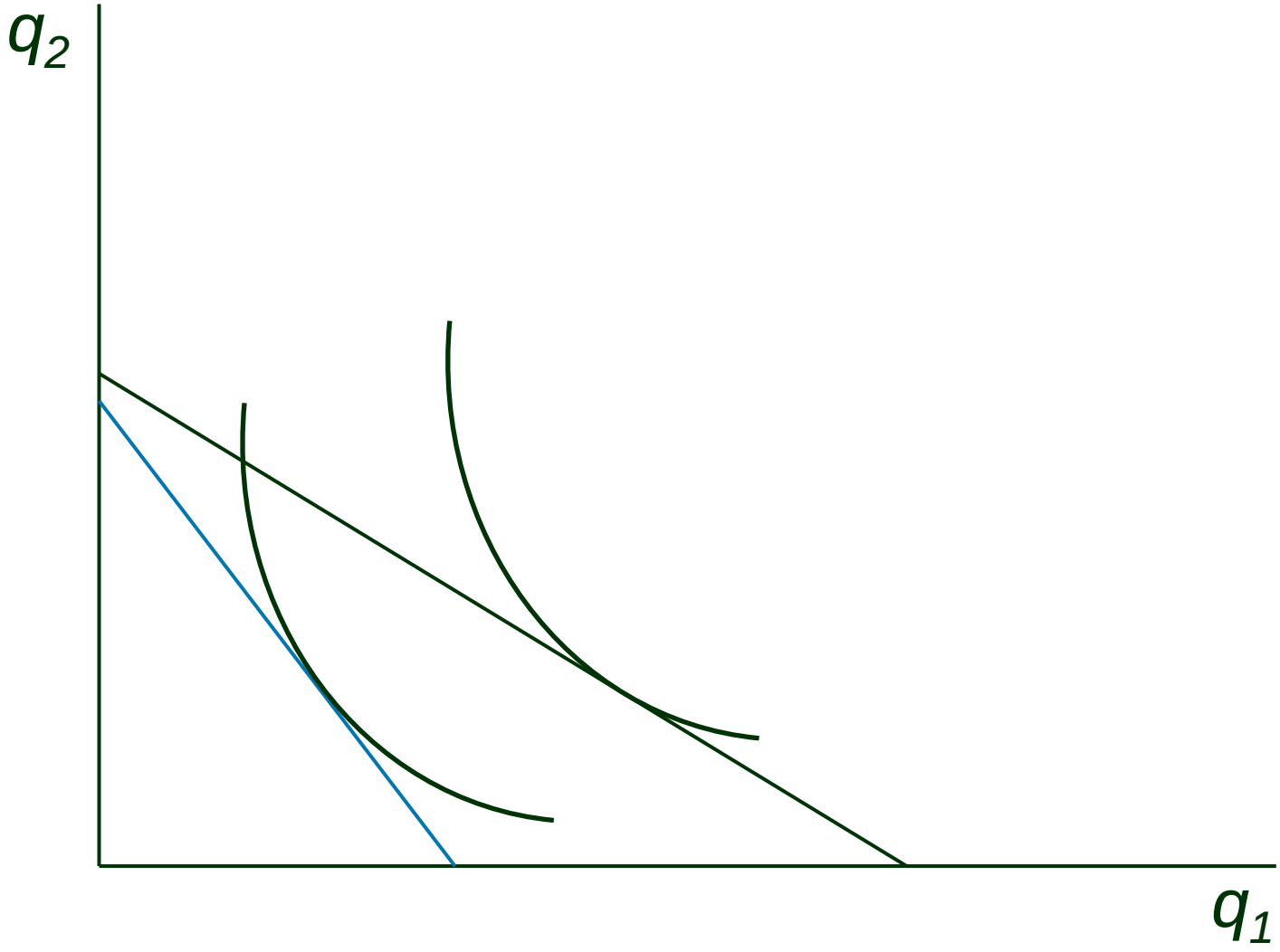

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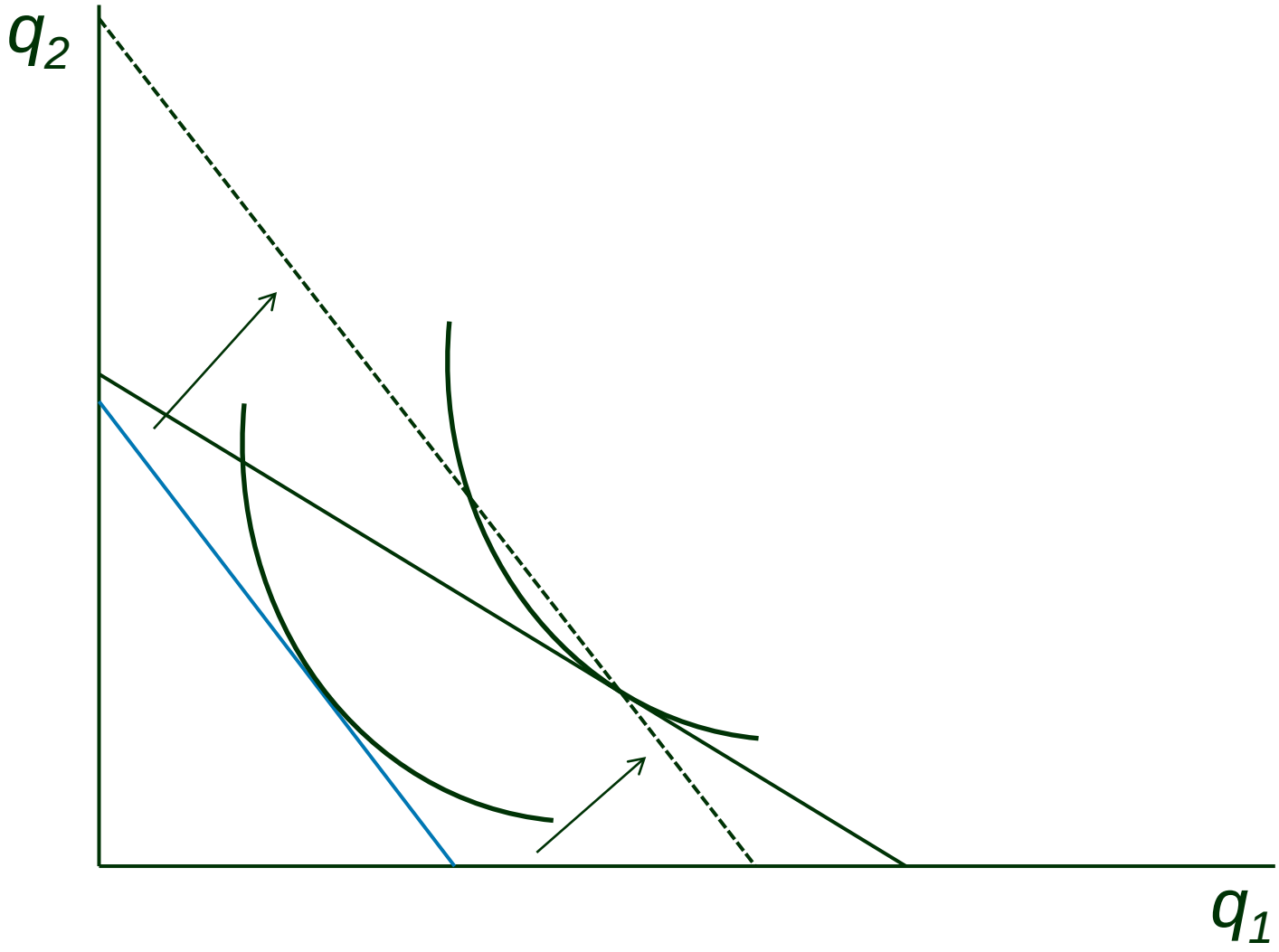

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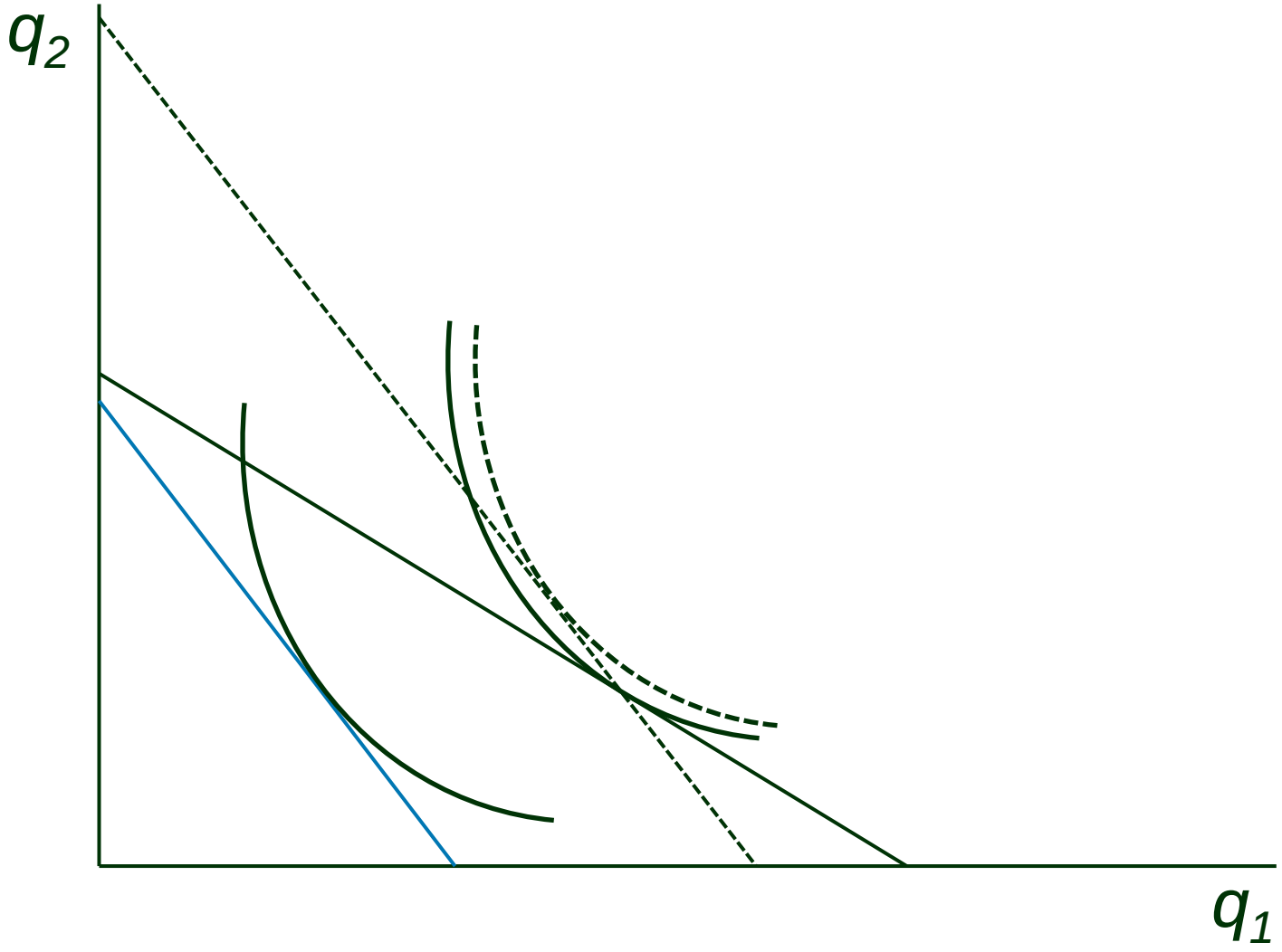

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The economic approach

- Substitution bias means that

$$L = \sum_{i=1} w_0^i \frac{p_1^i}{p_0^i} \geq \frac{c(u_0, p_1)}{c(u_0, p0)}$$

- The Laspeyres overstates the true cost of living index (unless consumers do not substitute between goods)
- *Not* true that the Paasche is greater than the cost of living index
- The cost of living index is bound by the Paasche and Laspeyres for homothetic preferences

The economic approach

- Some formulae may be exact for certain preferences
- If preferences are Cobb-Douglas, ratio of cost functions is the *geometric mean*

$$\frac{c(u_0, p_1)}{c(u_0, p0)} = \frac{\sqrt[N]{\prod_{i=1}\left(p_1^i\right)^{w^i}}}{\sqrt[N]{\prod_{i=1}\left(p_0^i\right)^{w^i}}} = \sqrt[N]{\prod_{i=1}\left(\frac{p_1^i}{p_0^i}\right)^{w^i}}$$

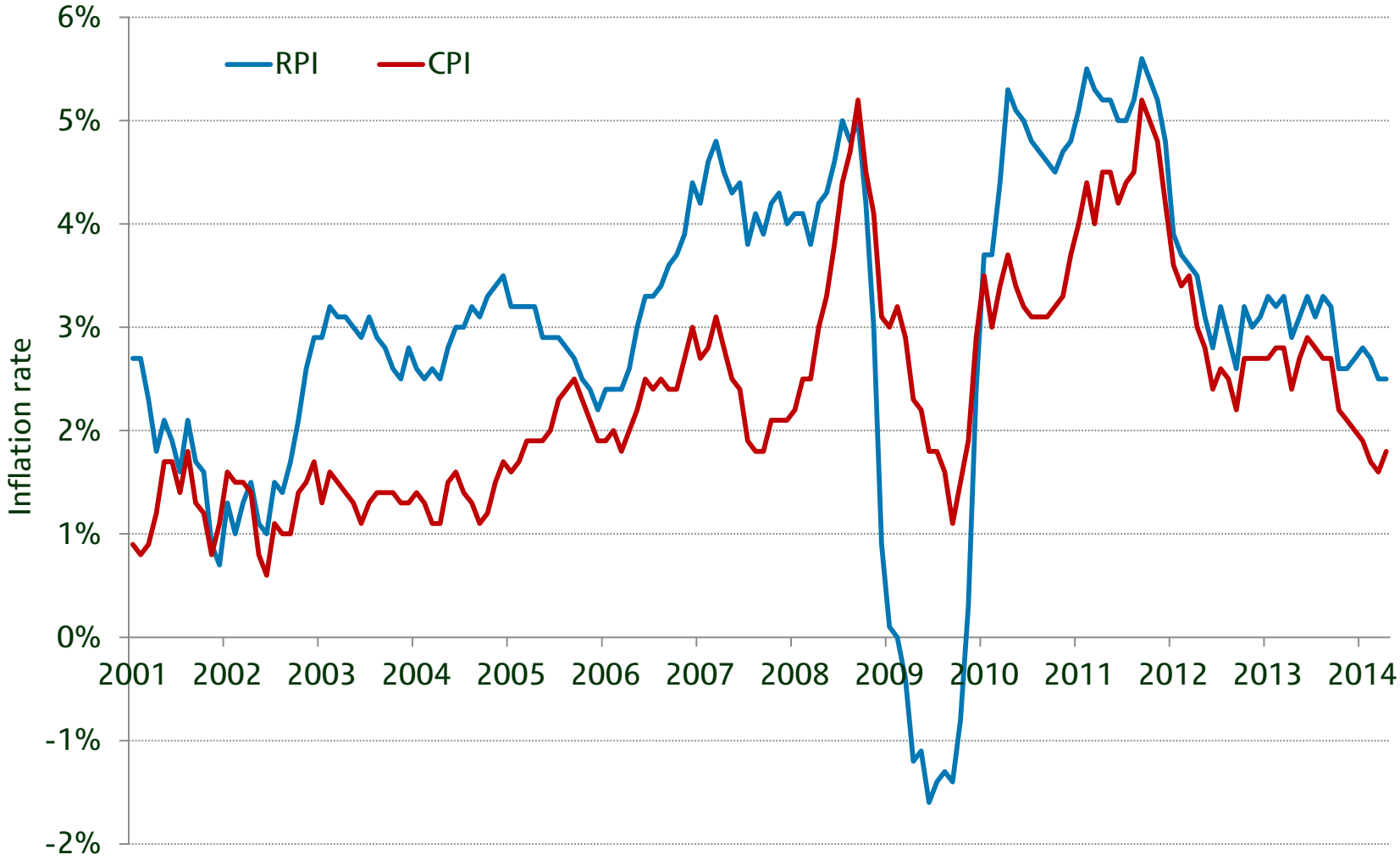
- This means all goods have constant shares
- This allows for substitution of a particular form
  - A 10% increase in price results in a 10% reduction in quantity i.e. an own price elasticity of -1

Inflation measures in the UK

The real world: cost of living indices in the UK

- Define a basket of goods and services
  - Items to go into basket to represent different patterns of spending
  - Updated each year
- Price and expenditure surveys to calculate indices
- Historically two main measures
  - Retail Price Index (RPI)
  - Consumer Price Index (CPI)
- Inflation rates chained from year to year as the basket is updated

RPI and CPI, 2001-2014



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The RPI and CPI

- Differences
  - RPI includes housing costs such as council tax and mortgage interest payments
- Differences in formula used to calculate price changes in the first stage at which the indices are calculated
- The CPI is typically lower
- CPI gradually replaced RPI for various official purposes
  - Monetary policy target
  - Benefits and tax thresholds

Why do the rates differ?

- Before calculating price changes for categories like “food” start off calculating changes for similar products (e.g white sliced bread)
  - No quantity information at this level
  - Differences in the mathematical formulae underlying the formula
- RPI makes us of the *Carli* index

$$Carli = \frac{1}{N}\sum_{i=1}^{N}\frac{p_1^i}{p_0^i}$$

- CPI makes use of the *Jevons* index

$$Jevons = \sqrt[N]{\prod_{i=1}^{N}\frac{p_1^i}{p_0^i}}$$

Which formula?

- The geometric mean is always less than or equal to the arithmetic mean (hence CPI tends to be lower)
- When budget shares are equal across goods
  - Carli equivalent to a Laspeyres
  - Jevons corresponds to cost of living index for Cobb-Douglas preferences
  - However what happens if we don't know quantity weights?
- Differences led to awkward questions as CPI became more widely used
- Possibility of abolishing the RPI in 2013
  - Decided to introduce a new index instead – the RPIJ – because of concerns over the Carli index
  - Fails the test of *time reversal*

Which formula?

- Differences led to awkward questions as CPI became more widely used
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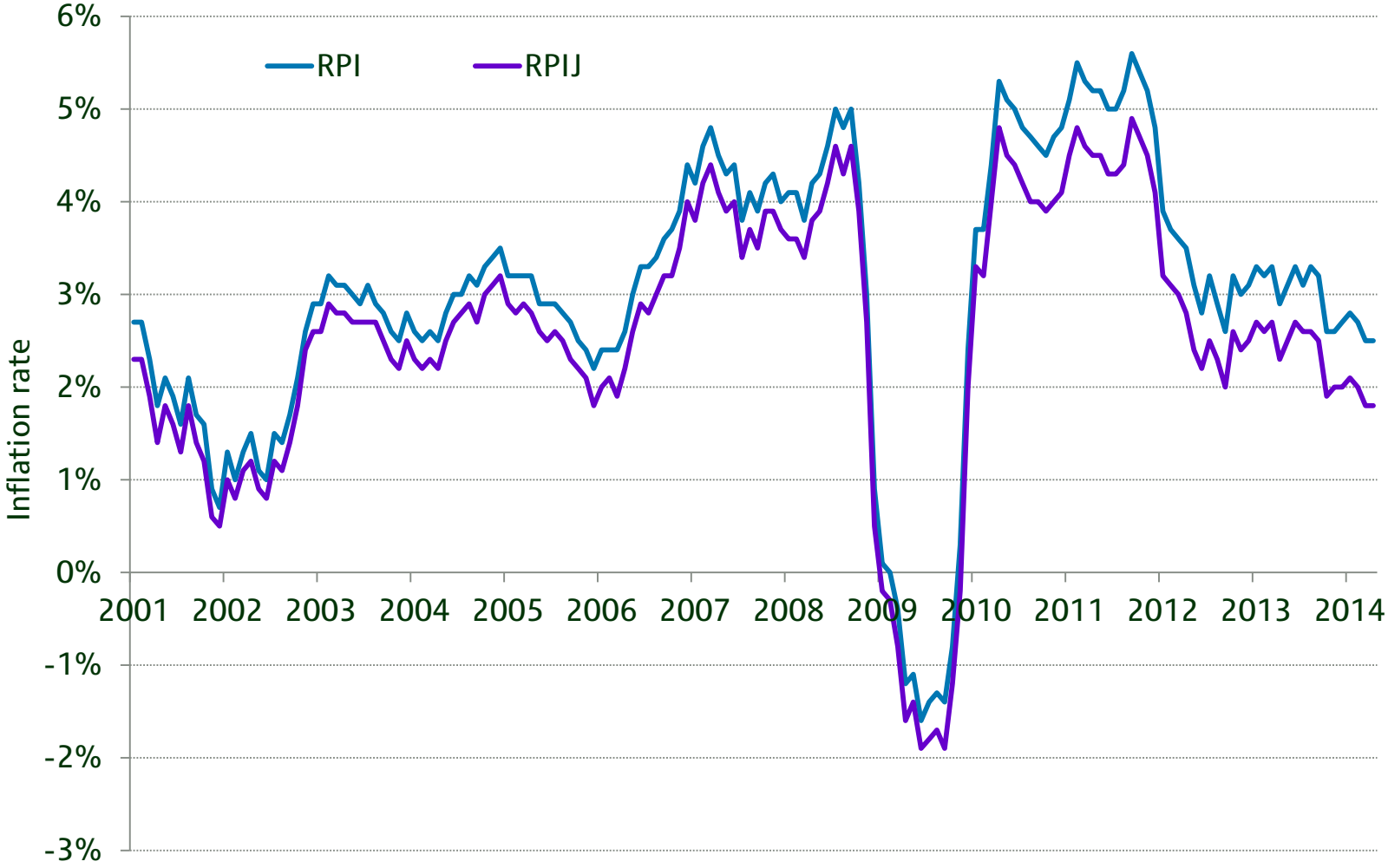
The RPI and RPIJ



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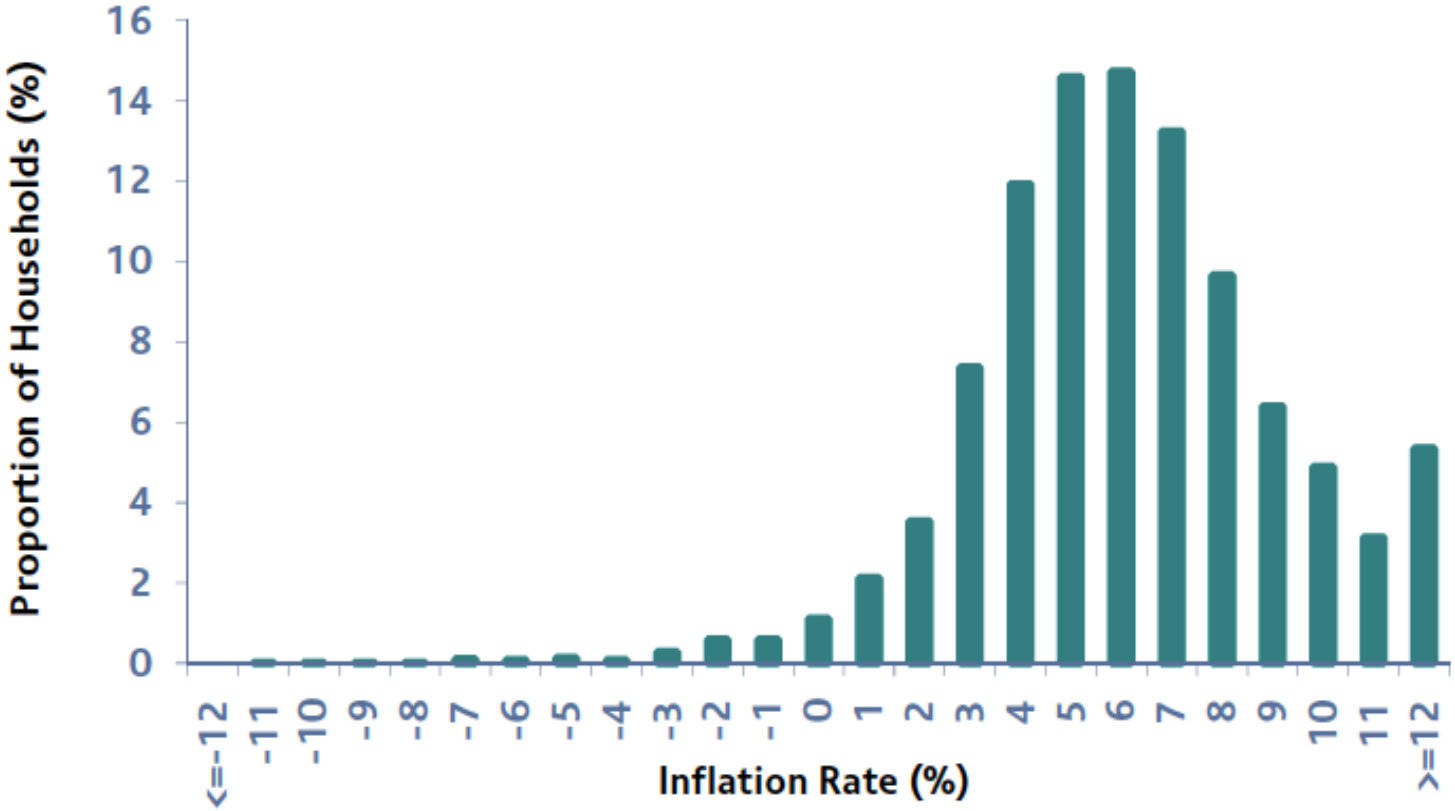
Household inflation

Headline versus Household inflation

- Headline inflation rates are supposed to track the inflation experienced by a representative consumer
- However different households may face different inflation rates
- All households would have the same inflation rates if:
  - All had the same spending patterns
  - Or all items had the same inflation rates
- We can use expenditure data from household surveys to calculate our own inflation rates and to look at the variation

Distribution of inflation rates: 2008



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Average inflation and `Average' inflation

- Official measures are only ever supposed to be an average
- However, they are *plutocratic* averages not *democratic* averages
- Democratic indices
  - Weight households equally
- Plutocratic indices
  - Weight households according to their share of total sample expenditure
- The latter gives higher weights to the preferences of high spending households

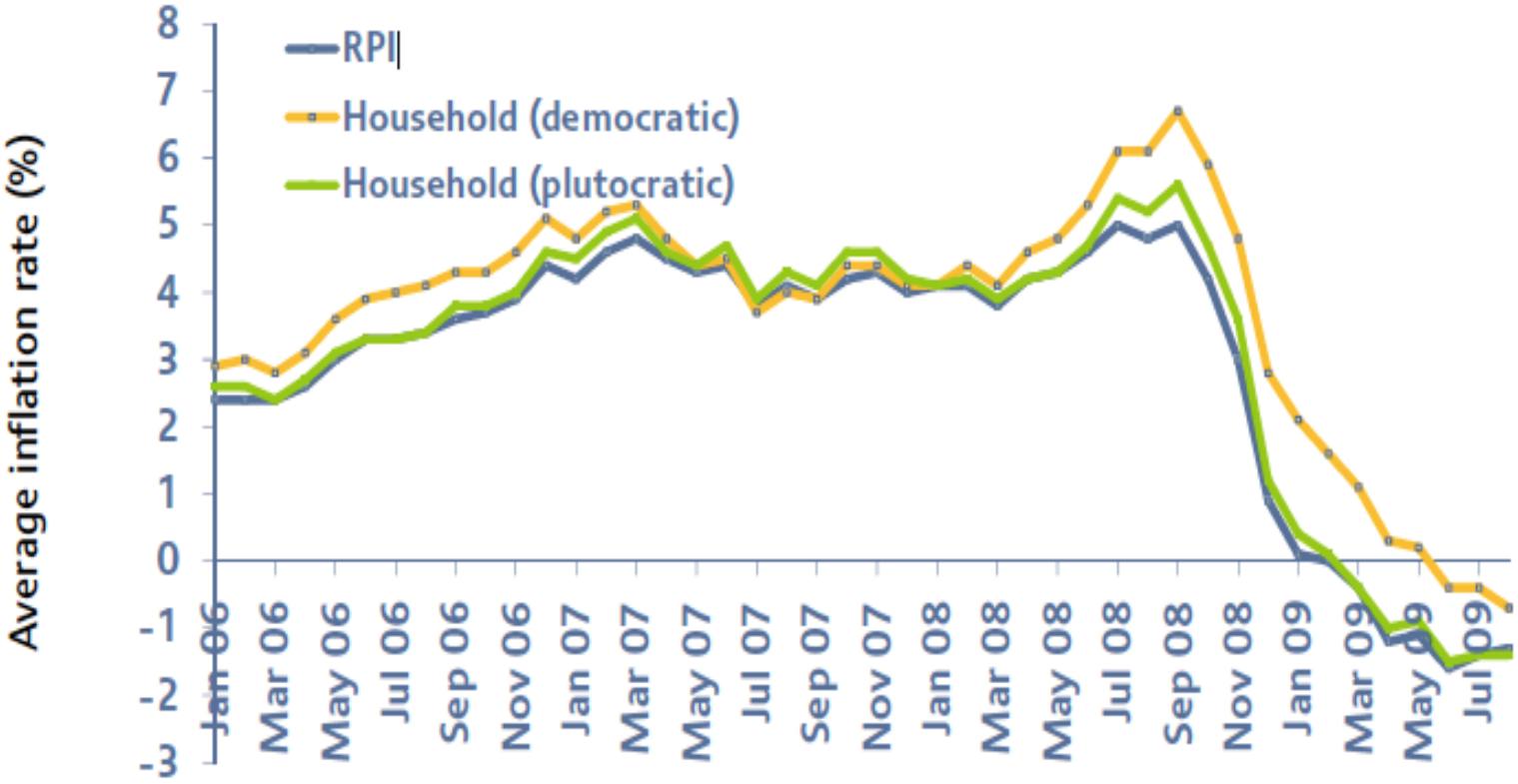
Average inflation and `Average' inflation

- Two people

	Budget share essentials	**Budget share luxuries**
Person 1	100%	0%
Person 2	75%	25%
Democratic weights	87.5%	12.5%

- But if spending of person 2 is twice that of person 1: plutocratic weight for luxuries is 16.7%

Average inflation and `Average' inflation



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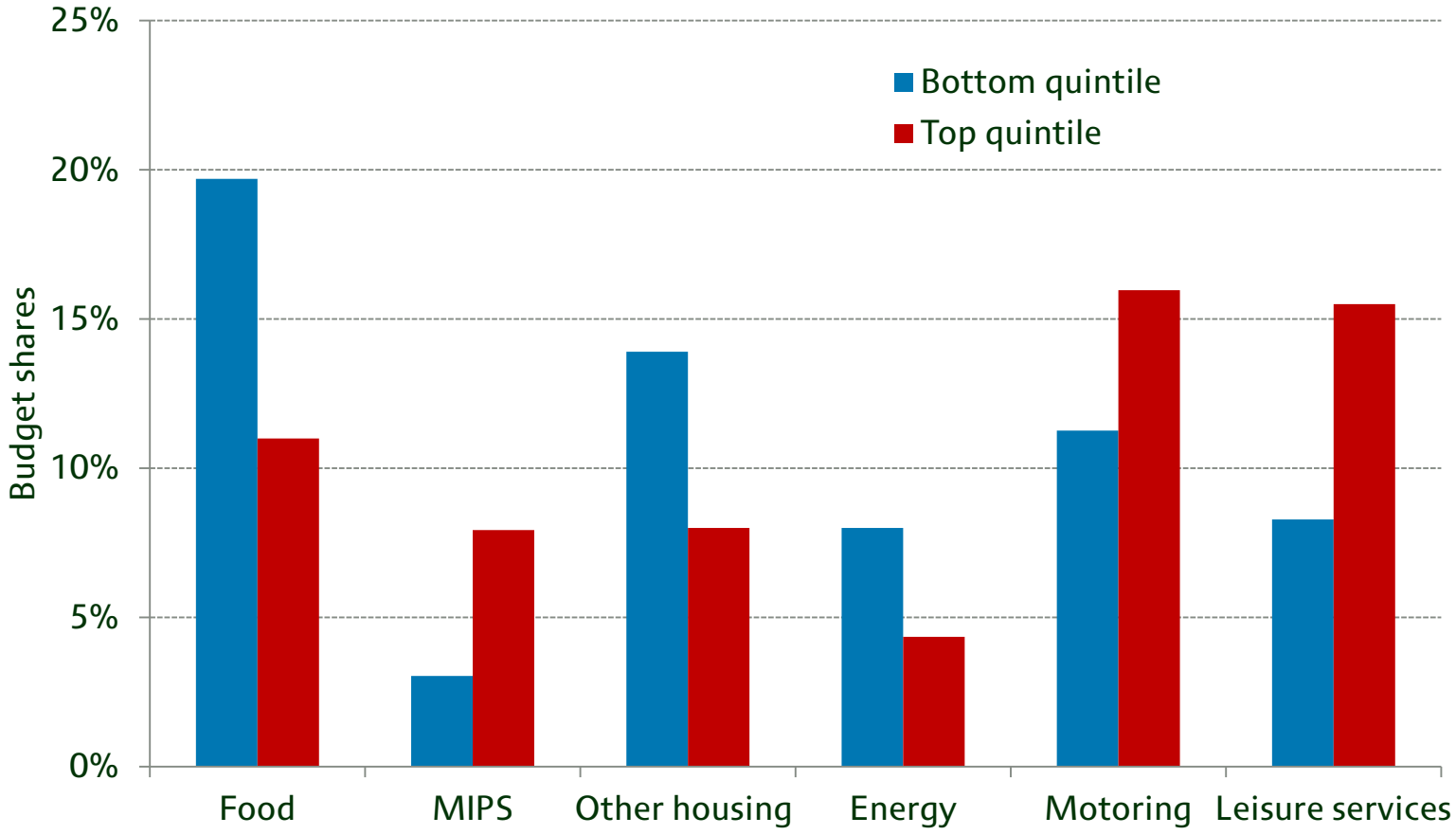
Inflation across the income distribution

- Systematic differences if:
  - There are significant differences in the spending patterns of low- and high-income households.
  - Prices change differently for goods that are disproportionately consumed by low- or high-income households.

Budget shares for key goods for top and bottom income quintiles, 2011/12



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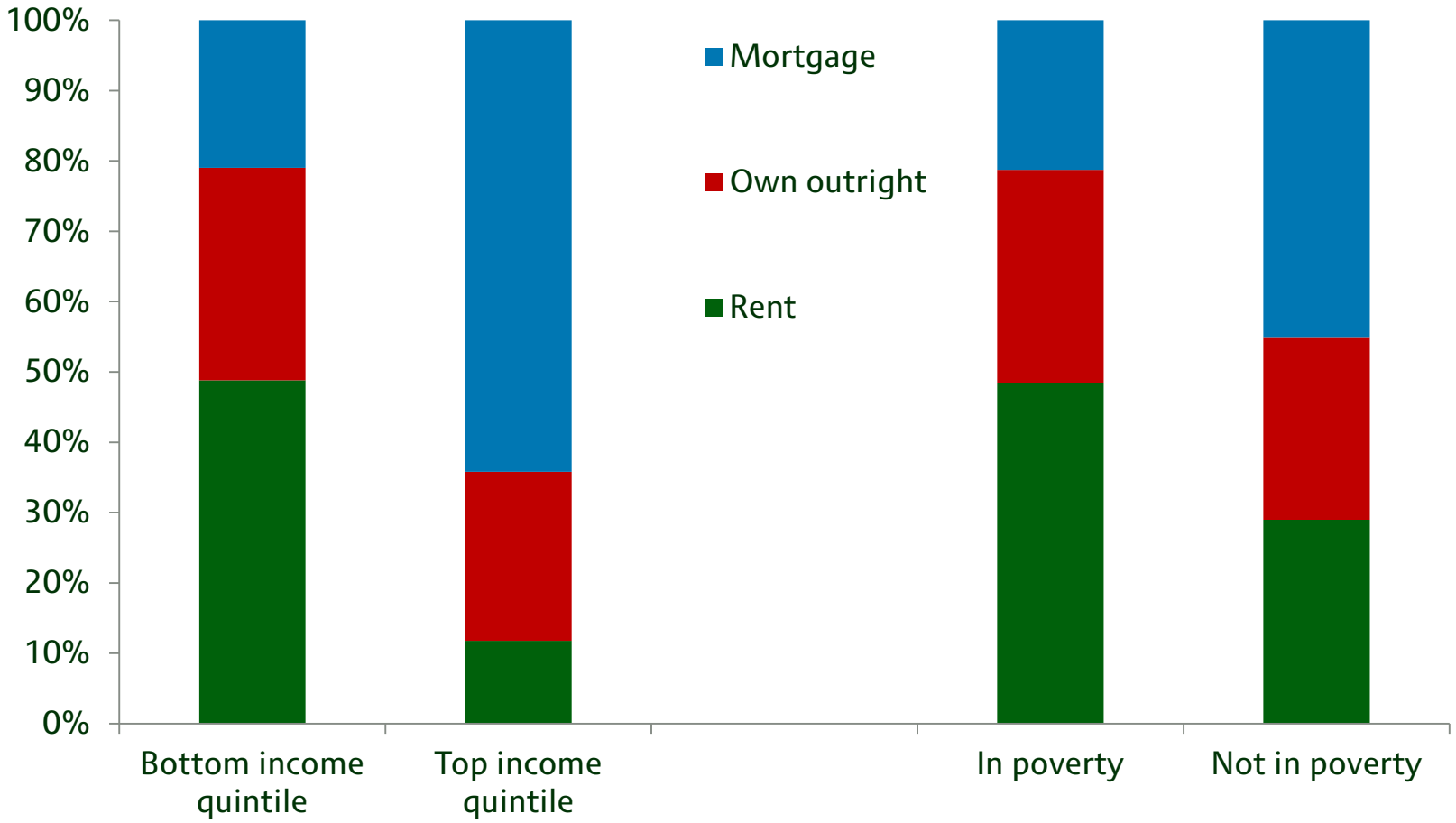
Proportions renting, owning outright and owning mortgages for different groups, 2011/12



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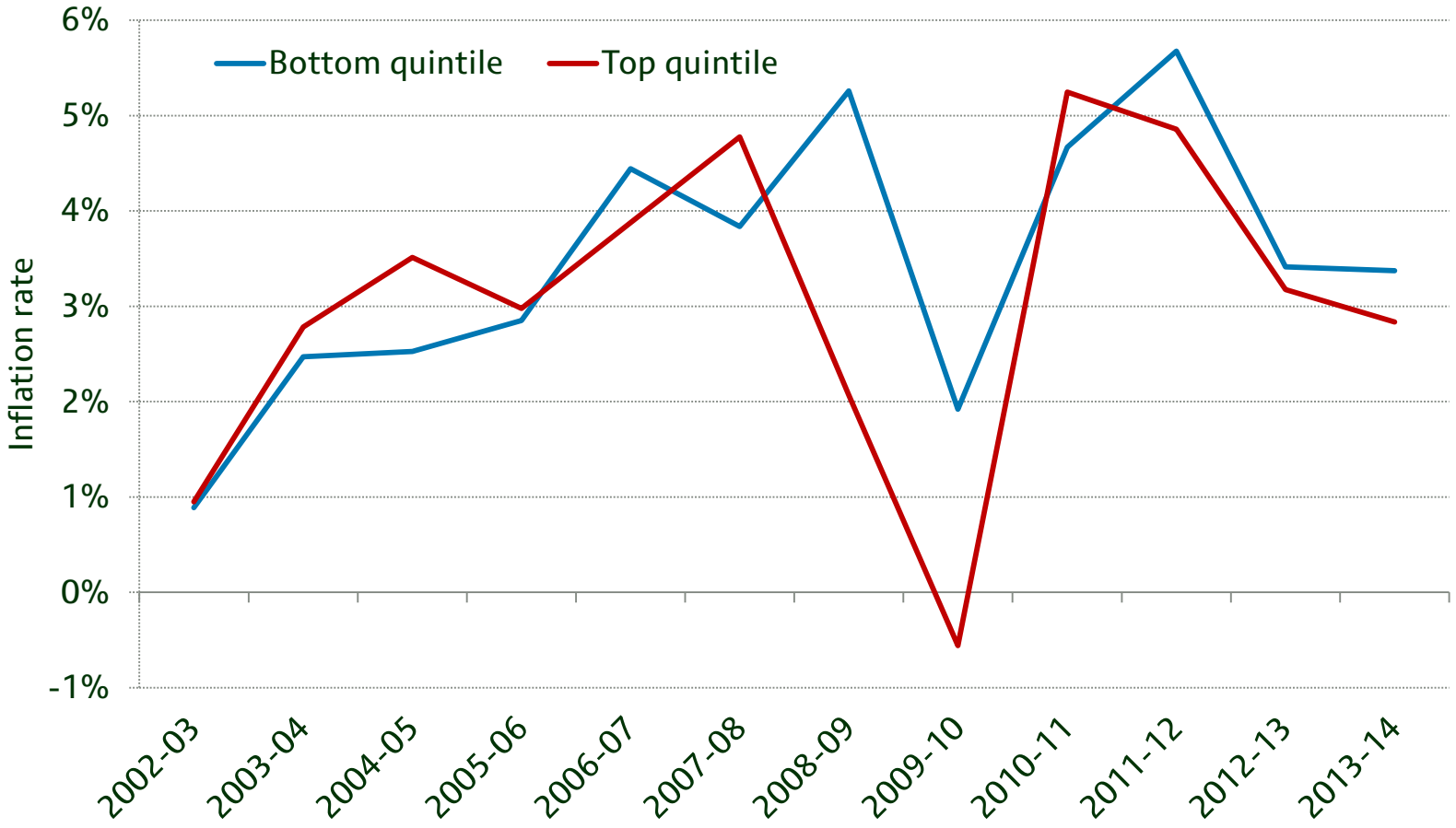
Average inflation rates for top and bottom income quintiles, 2002/03 to 2013/14



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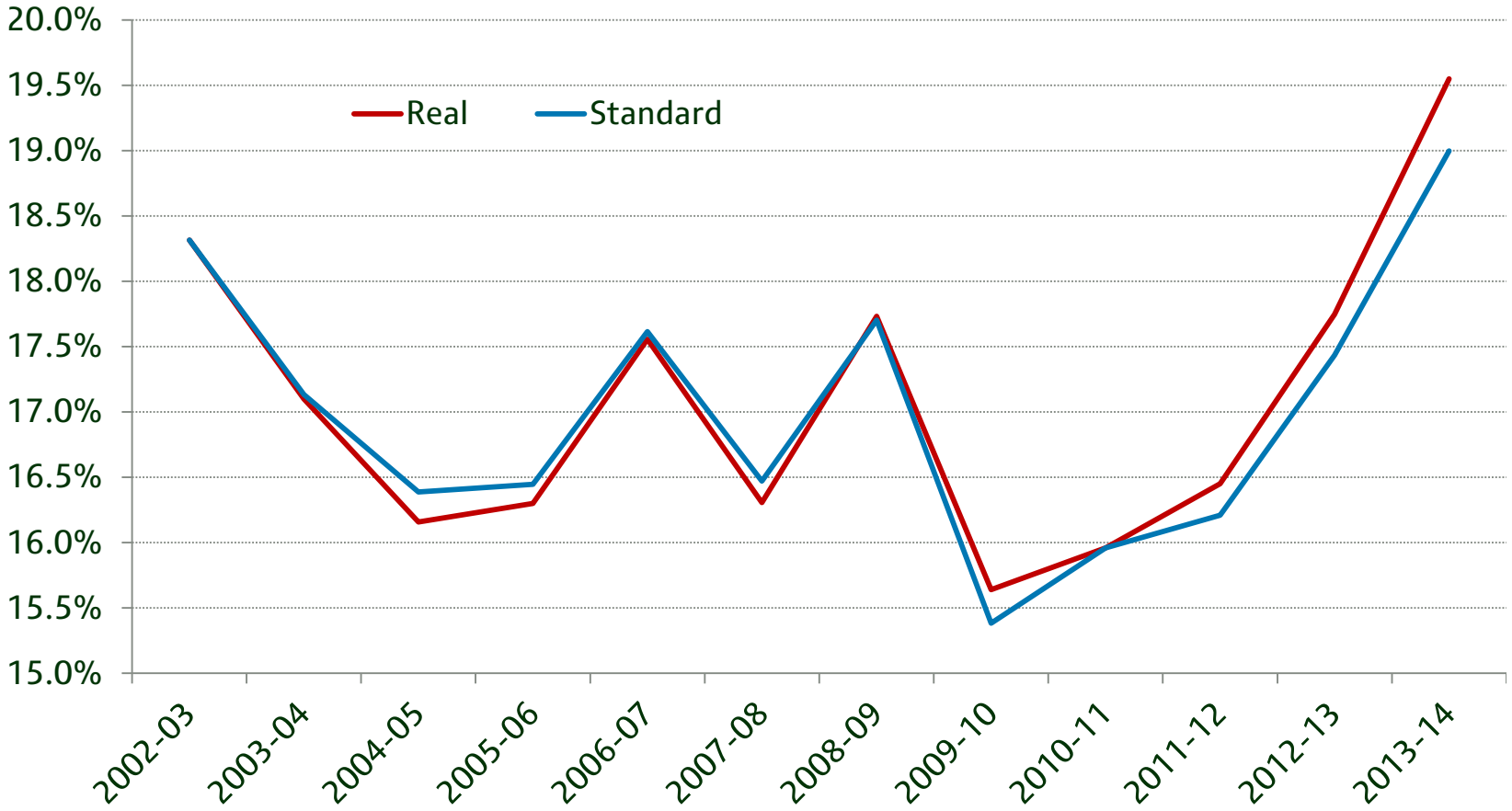
Real versus nominal absolute poverty rates, 2002-03 to 2013-14



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