

Is Inflation Heterogeneously Distributed Among Income Groups?*

Jens Mehrhoff[†], Claus Christian Breuer[‡]

[†]Deutsche Bundesbank,

[‡]University of Duisburg-Essen

11th Ottawa Group Meeting

Neuchâtel, 27-29 May 2009

*This presentation represents the authors' personal opinion and does not necessarily reflect the view of the Deutsche Bundesbank or its staff.

Outline of the Presentation

1. Introduction and Motivation
2. Literature and Methodology
3. Income and Expenditure Survey
4. EVS 2003 Data
5. Heterogeneity Between Income Groups
 1. Heterogeneity in the CPI Weights
 2. Heterogeneity in the Inflation Rates
6. Conclusion

1. Introduction and Motivation

- **Price increases in the spring and summer of 2008.**
- **In particular, food and energy prices have risen.**
- **With the financial and economic crisis, this period of continuous price growth came to a halt. Historically low interest rates and quantitative easing policies, lead some economists to predict risks of rising inflation rates in the near future.**
- **German social security and pension payments are not automatically adjusted to the growth rate of the CPI.**
- **Claims from both politicians and the unions for social measures.**

1. Introduction and Motivation

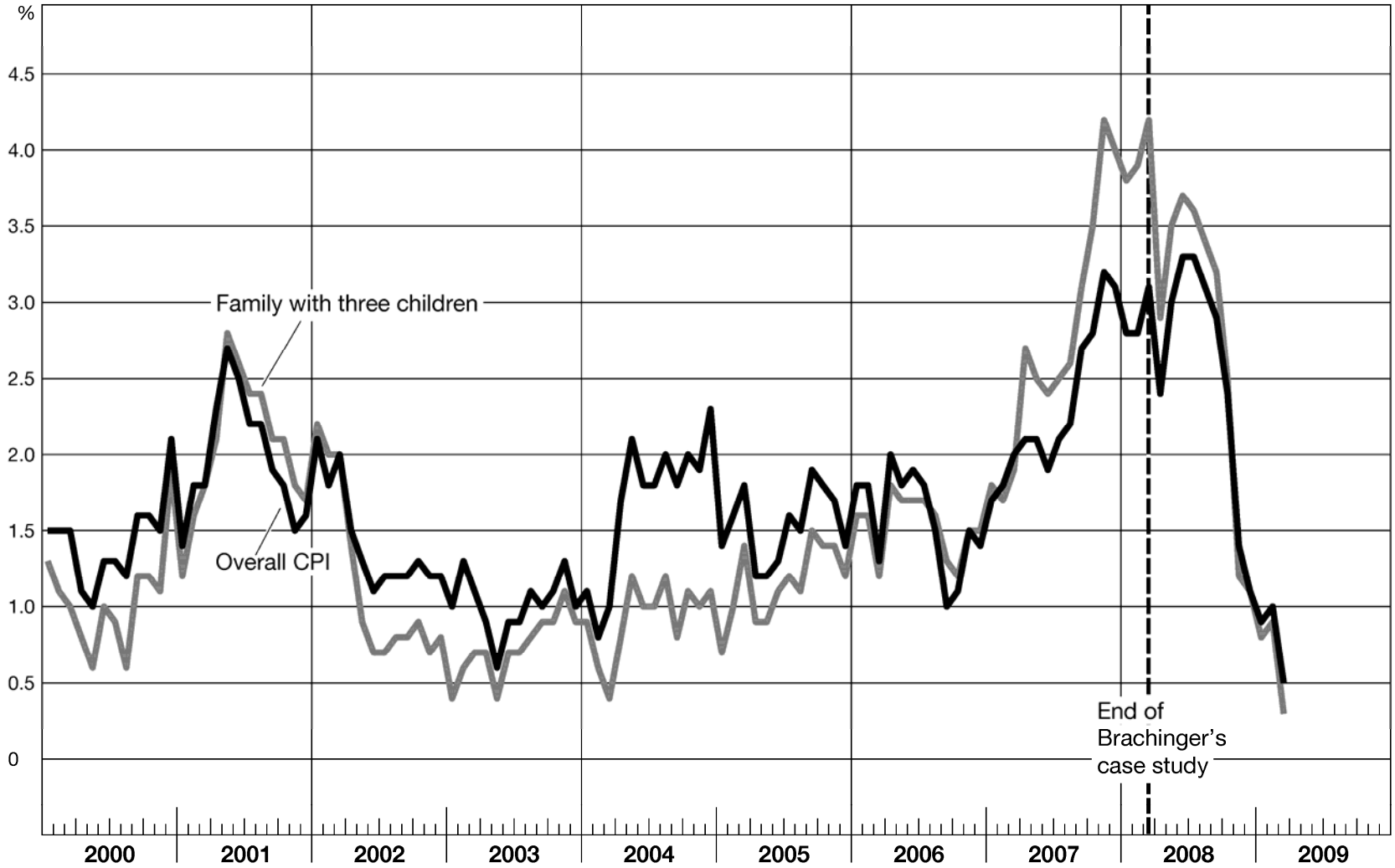
- **Whether or not this perception of different inflation burdens is legitimate, is not easy to answer.**
- **The German Federal Statistical Office (GFSO) calculated price indices for three household types up to the end of December 2002.**
- **Now only a single overall CPI is computed.**
- **The aim is to quantify the differences in the inflation rates by income grouped household types.**
- **We use household level micro data to calculate income group specific weighting schemes.**

2. Literature and Methodology

- **Brachinger (2008) focused on the very special case of a family with three children and a net monthly income between €2,600 and €3,600.**
- **This household type covers just 0.61% of the population's households.**
- **Household does not consume tobacco products and spends only a small amount on alcohol products.**
- **Use of expenditure data from German sample survey of household income and expenditure (abbreviated by its German initials EVS, which stands for *Einkommens- und Verbrauchsstichprobe*).**
- **The EVS 2003 contains only 371 household datasets of this very specific household type.**

Figure 1

Brachinger's case study of household type specific inflation rates



2. Literature and Methodology

- **Tober (2008) found somewhat less pronounced, yet significant differences between household specific inflation rates.**
- **Brachinger (2008) and Tober (2008) used publicly available EVS data for eleven broad consumption goods categories (corresponding approximately to the twelve two-digit COICOP divisions).**

2. Literature and Methodology

- | We calculate income group specific Laspeyres price indices (PIs) at a lower level of aggregation, the four-digit COICOP class level.**
- | We have access to EVS household level micro data.**
- | A further diversification of household types by other socio-demographic characteristics would reduce our sample sizes per household type and the representativeness of the results could not be guaranteed anymore.**
- | A lower level of commodity aggregation but a higher level of household aggregation.**

3. Income and Expenditure Survey

- | The EVS is a cross-section household survey, conducted every five years.**
- | A household is defined as a statistical unit with the provision that it is a group of persons whose command over income is shared.**
- | Households participate voluntarily.**
- | A net sample of 53,432 fully completed questionnaires in 2003.**
- | The EVS is a quota rather than a stratified random sample.**
- | Nearly the entire German population is covered.**

3. Income and Expenditure Survey

- **The EVS is divided into four parts:**

1. Initial household interview.
2. An appendix to the initial household interview.
3. A household book.
4. A detailed log book.

- **Equal coverage of all month of the year is ensured.**

- **The EVS is the most important source to calculate the weighting scheme and to select the items of the German CPI.**

4. EVS 2003 Data

- **For research purposes, the GFSO provides so-called Scientific-Use-Files containing anonymised data from 42,744 household books and 11,831 detailed log books.**
- **We calculate weighting schemes for 13 different income groups according to the households' monthly net income (which not only includes market income but also social assistance benefits of the household members).**
- **The expenditure categories follow COICOP at the four-digit level.**
- **The GFSO provides monthly sub-indices of the CPI at the COICOP four-digit level free of charge (data range from January 2005 to March 2009).**

Table 1: Summary statistics

Income group in €	Number of households	EVS share in %	CPI weight in %	I^* in €	C^* in €	C/I^* in %
<1,000	2,271	5	2	749	945	126
1,000-1,500	3,901	9	5	1,267	1,324	104
1,500-2,000	4,693	11	7	1,754	1,685	96
2,000-2,500	4,953	12	9	2,250	2,085	93
2,500-3,000	4,779	11	10	2,746	2,405	88
3,000-3,500	4,516	11	11	3,245	2,704	83
3,500-4,000	3,806	9	10	3,744	2,953	79
4,000-4,500	3,160	7	9	4,243	3,221	76
4,500-5,000	2,628	6	8	4,737	3,389	72
5,000-5,500	2,069	5	7	5,243	3,622	69
5,500-6,000	1,522	4	5	5,738	3,897	68
6,000-7,000	1,955	5	7	6,454	4,177	65
≥7,000	2,491	6	11	8,994	5,050	56
Total	42,744	100	100	3,474	2,661	77

* I : Income, C : Expenditures, C/I : Consumption ratio

5.1 Heterogeneity in the CPI Weights

- **The EVS is dominated by low and middle-income households.**
- **The major share of the CPI weight is assigned to middle and high-income households.**
- **The expenditure inequality is found to be moderate – Gini coefficient of 23.2%.**
- **Note that the Gini coefficient is a measure of expenditure inequality, instead of income inequality.**

Lorenz curve

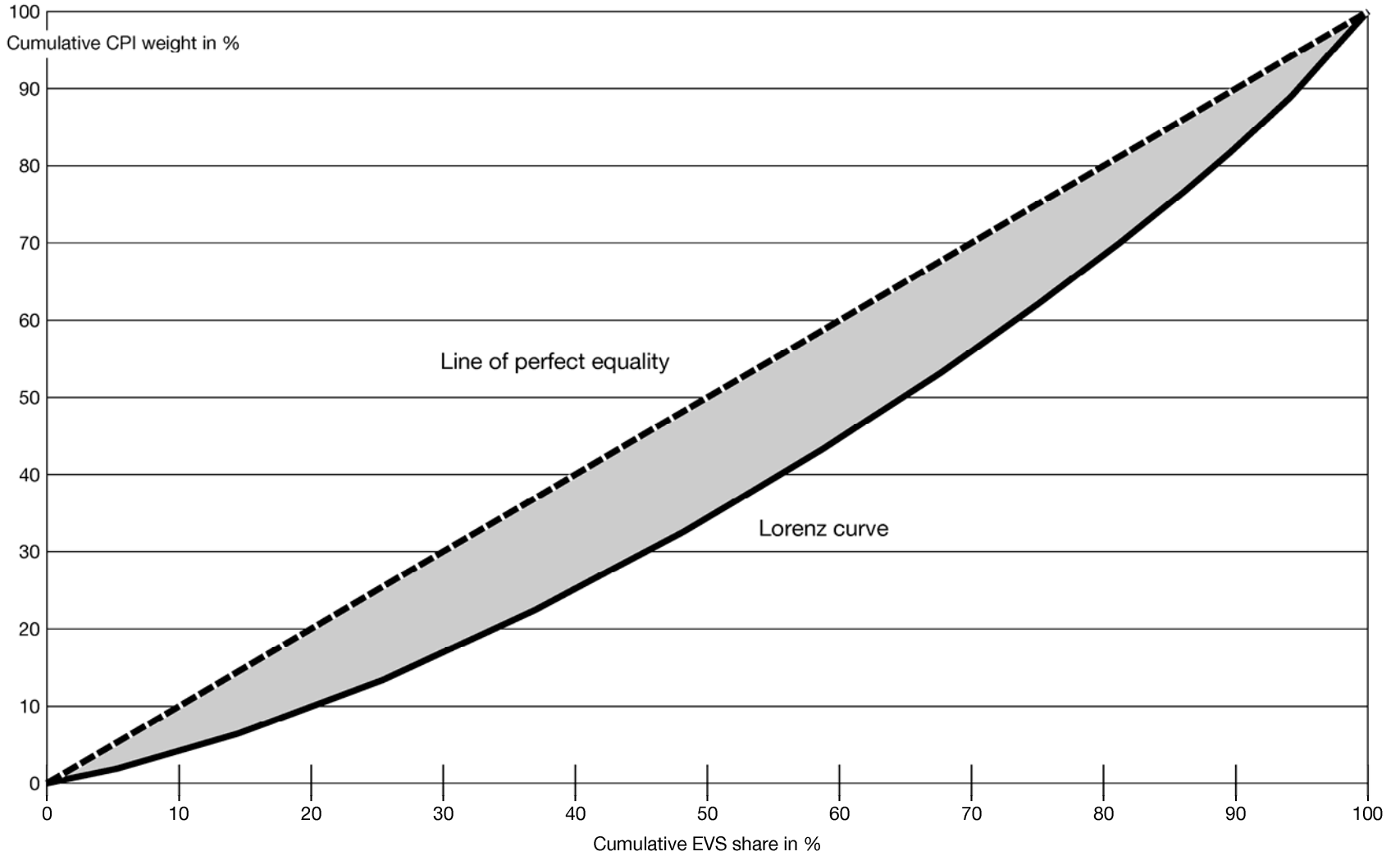
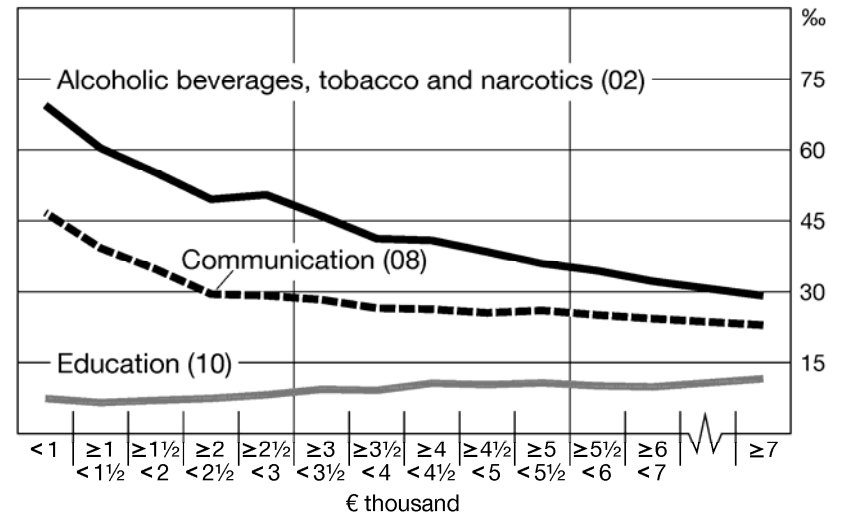
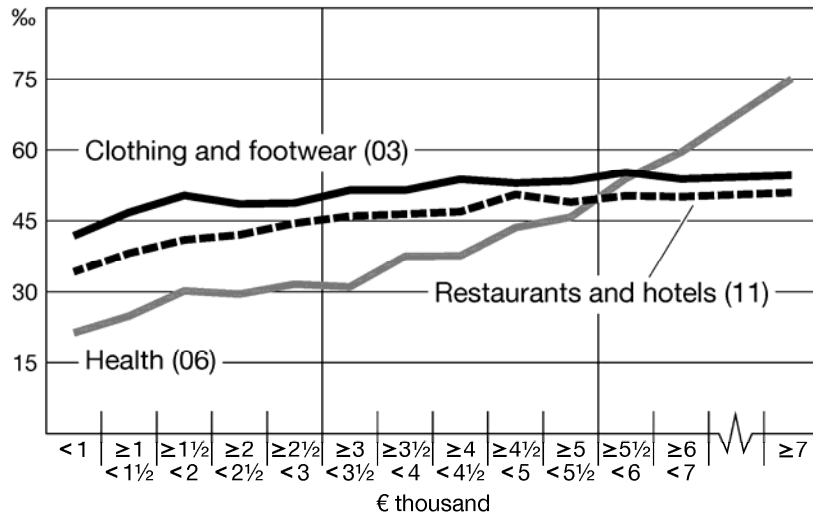
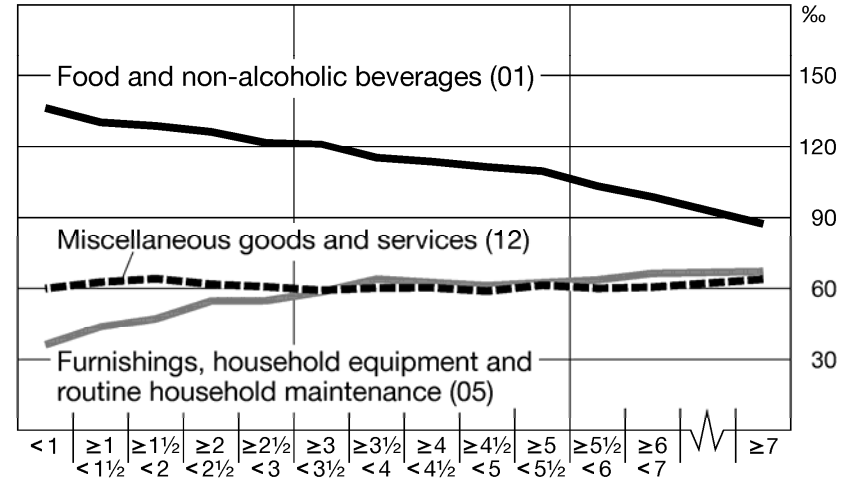
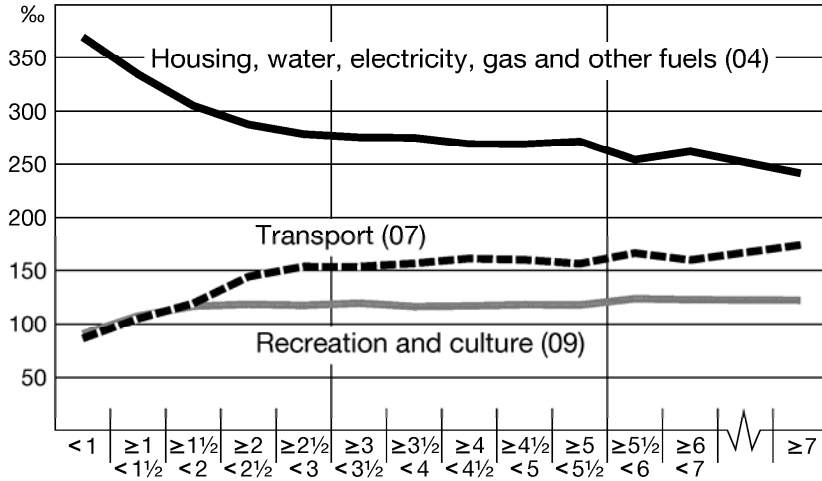


Figure 3

Expenditure shares by COICOP division



5.2 Heterogeneity in the Inflation Rates

- I We calculate income group specific monthly Laspeyres price indices (PIs) and their year-on-year inflation rates with base year 2005 = 100 for each of the 13 income groups.**
- I No single income group shows the minimum or maximum inflation rate throughout.**
- I Minimum and maximum lie in a narrow band between income groups and hence, are very close to each other and thus to the overall CPI.**
- I Our recalculated CPI is very close to the official one.**

Figure 4

Year-on-year inflation rates

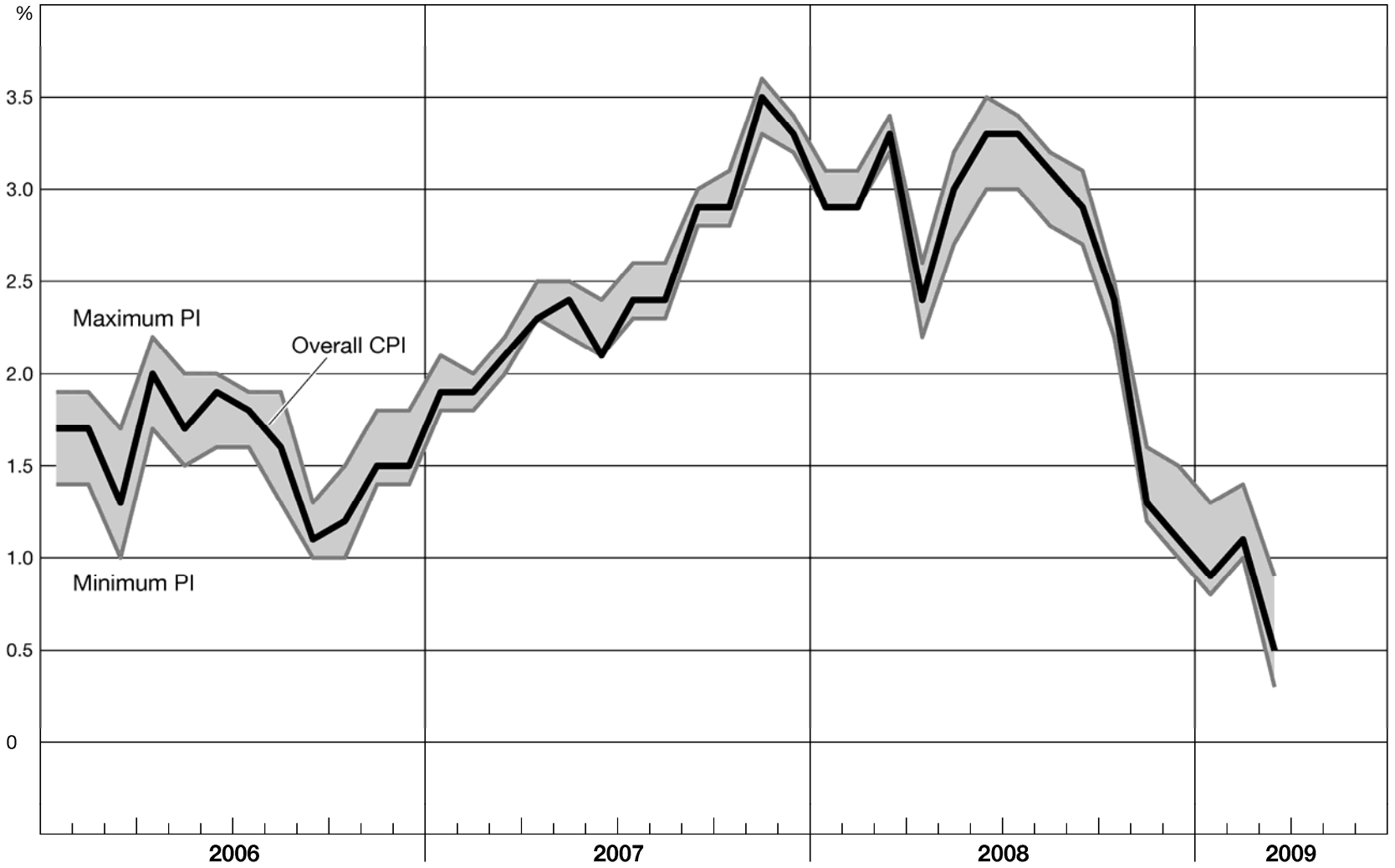


Figure 5

Deviation measures

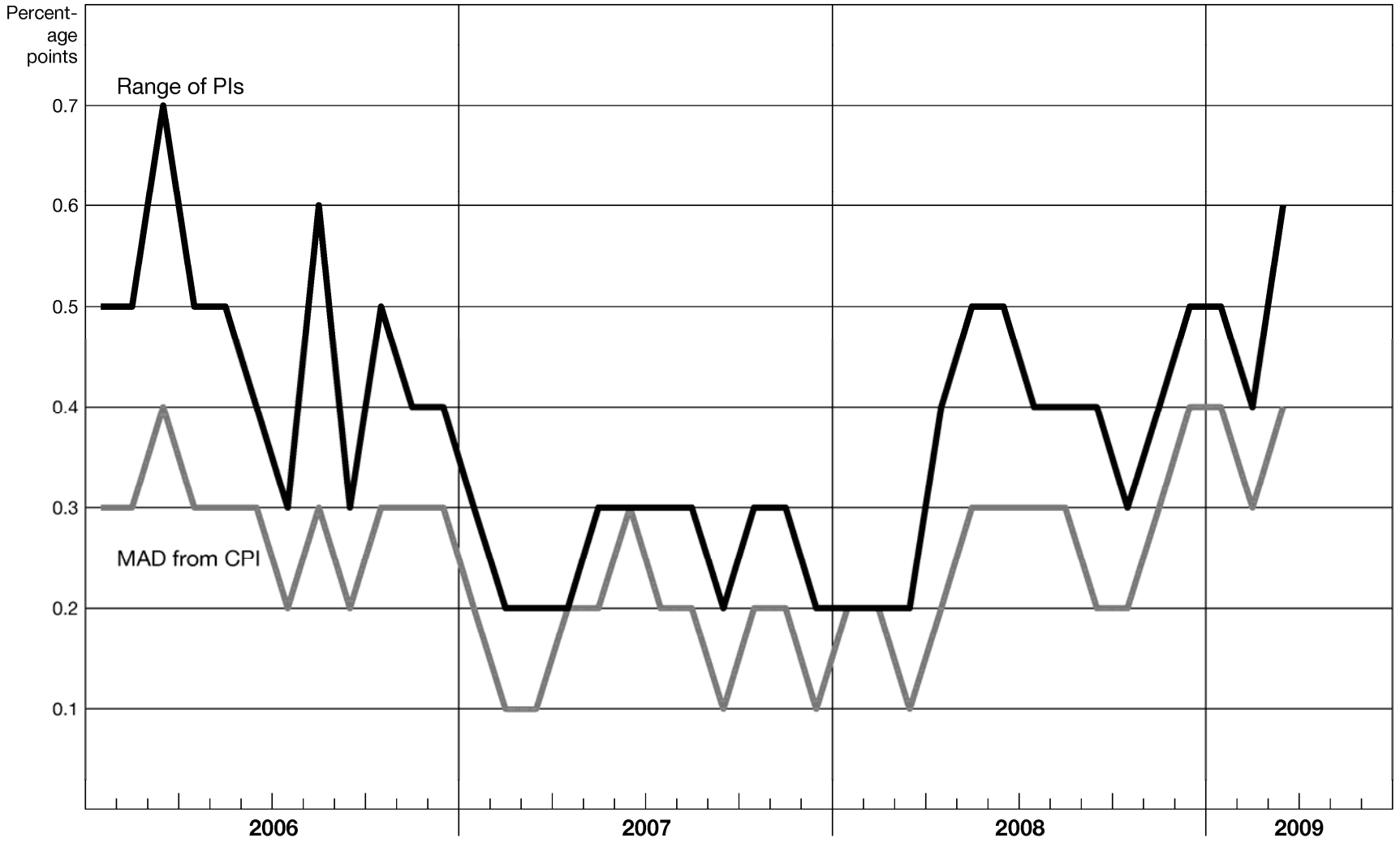
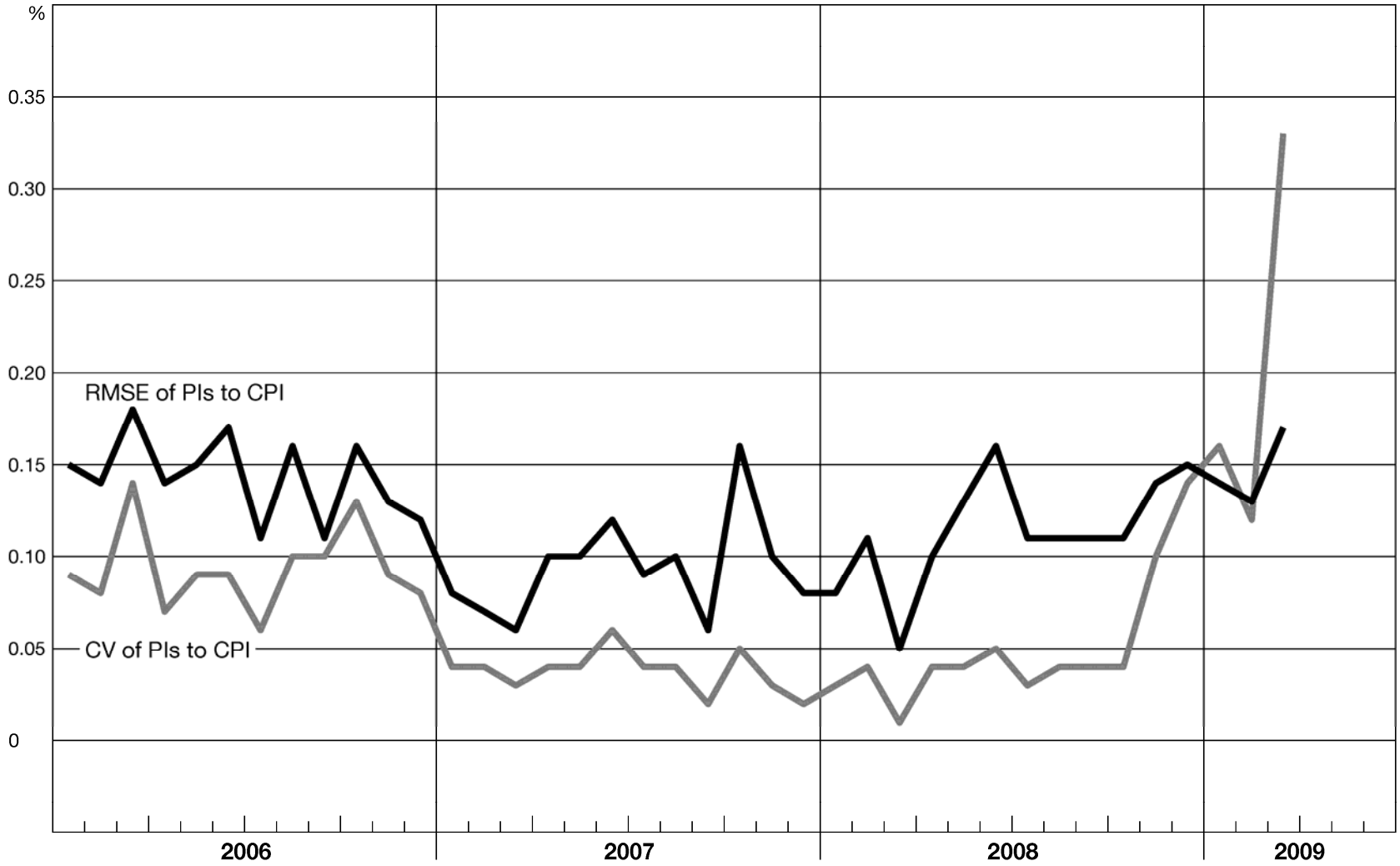


Figure 6

Variation measures



5.2 Heterogeneity in the Inflation Rates

Table 2: Heterogeneity measures

Statistic	Range in pp [×]	MAD in pp [×]	RMSE in %	CV*
Mean	0.4	0.2	0.12	0.06
Standard deviation	0.1	0.1	0.03	0.04
Minimum	0.2	0.1	0.05	0.01
Median	0.4	0.3	0.11	0.05
Maximum	0.7	0.4	0.18	0.16

[×]: percentage points; *: CV statistics adjusted for an extreme value in March 2009.

6. Conclusion

- **The general inflation trend is almost the same, irrespective of the household's net income.**
- **EVS data are from the year 2003, so that we have no information about potential adjustments in consumption.**
- **An alternative would be the use of income equivalence scales to classify the income groups.**
- **If one wants to calculate income group specific price indices, besides the weighting scheme itself, the basket of goods and the stores where the goods are bought need to be adjusted; quality adjustment must be performed separately.**
- **If price indices were calculated in this way, the results might change.**