

# Cost-of-living indices for Germany

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## Outlook:

1. Introduction
2. COLI approximation
3. Data
4. Results
5. Conclusion
6. Work in Progress

# 1. Introduction

- Increase in food prices
- Compensation for social welfare recipients
- CPI good measure of cost-of-living changes?
- Quantifying the substitution bias
- Focus on the food commodity group

## 2. COLI approximation

$$(1) \quad P_{0t}^{COL} = \frac{c(\mathbf{P}_t, \bar{u})}{c(\mathbf{P}_0, \bar{u})}$$

- Parametric approach
- Estimation of an Almost Ideal Demand System (AIDS):

$$(2) \quad w_{it} = \alpha_i + \sum_j \gamma_{ij} \ln p_{jt} + \beta_i (\ln x_t - \ln P_t)$$

$$(3) \quad \ln P_t = \alpha_0 + \sum_k \alpha_k \ln p_{kt} + \frac{1}{2} \sum_k \sum_j \gamma_{kj} \ln p_{kt} \ln p_{jt}$$

## 2. COLI approximation

- Price elasticities:

$$(4) \quad \varepsilon_{ijt} = \left( \frac{\gamma_{ij}}{w_{it}} \right) - \left( \frac{\beta_i}{w_{it}} \right) \left( w_j - \beta_j \ln \left( \frac{x_t}{P_t} \right) \right) - \delta_{ij}$$

- Expenditure elasticities:

$$(5) \quad \eta_{it} = 1 + \frac{\beta_{it}}{w_{it}}$$

## 2. COLI approximation

- why AIDS?
  - flexible functional form, as the AIDS expenditure function is a second order approximation to any expenditure function
  - easy derivation of the expenditure function by applying duality theory
  - Slutsky symmetry, homogeneity of degree zero in prices and expenditure and adding-up condition imposed by parameter restrictions:

$$\gamma_{ij} = \gamma_{ji}, \sum \gamma_{ij} = 0, \sum \alpha_i = 1, \sum \beta_i = 0$$

## 3. Data

- German income and expenditure survey
  - every five years (1988, 1993, 1998, 2003)
  - 0.2% households in Germany covered (75,000)
  - stratified quota samples
  - “detailed log book” for food-, beverage- and tobacco-commodities
- Nine staple foods chosen
  - high data availability
  - no quality change

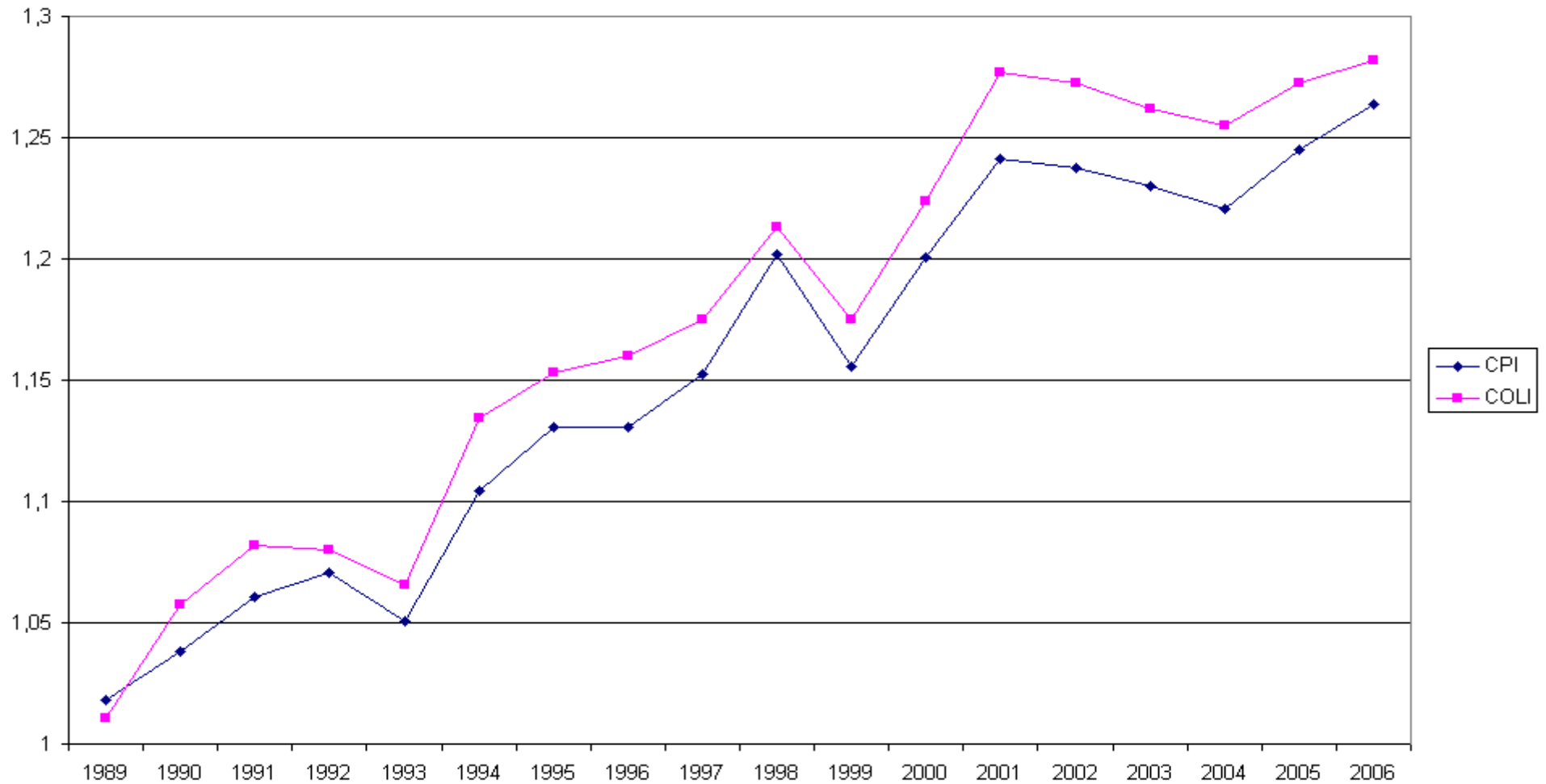
## 3. Data

- only couples with children under eighteen to ensure homogeneity of the sample
- for 1988 we have 2581 observations
- price data from the official German consumer price statistic



# 4. Results

COLI and CPI for base year 1988



## 4. Results

Table 1: Laspeyres type CPI and COLI, base year 1988.

Year	Laspeyres CPI	COLI	Bias
1989	1.0184	1.0109	0.0075
1990	1.0383	1.0576	-0.0193
1991	1.0606	1.0816	-0.0210
1992	1.0707	1.0803	-0.0096
1993	1.0506	1.0655	-0.0149
1994	1.1043	1.1343	-0.0300
1995	1.1308	1.1530	-0.0222
1996	1.1306	1.1599	-0.0293
1997	1.1524	1.1749	-0.0225
1998	1.2018	1.2131	-0.0113
1999	1.1558	1.1750	-0.0192
2000	1.2004	1.2239	-0.0235
2001	1.2414	1.2766	-0.0352
2002	1.2376	1.2725	-0.0349
2003	1.2298	1.2621	-0.0323
2004	1.2208	1.2552	-0.0344
2005	1.2448	1.2724	-0.0276
2006	1.2639	1.2821	-0.0182

Source: own calculations

## 4. Results

Table 2: Uncompensated price elasticity matrix, 1988.

	milk	cream	eggs	butter	margarine	appels	bananas	water	beer
milk	-0.4718	-0.0579	-0.1190	0.0355	-0.0712	-0.0053	-0.0253	-0.0280	-0.2353
cream	-0.1491	-0.8890	-0.0902	-0.0781	0.0361	0.0025	-0.0313	0.0163	0.3507
eggs	-0.2232	-0.0630	-0.2118	0.0245	-0.0940	-0.0955	-0.0221	-0.1082	-0.0977
butter	0.0679	-0.0503	0.0153	-1.0607	0.0449	-0.0969	0.0094	-0.0257	0.1535
margarine	-0.2900	0.0592	-0.2046	0.1454	-0.4237	-0.0159	-0.0330	0.0119	-0.0146
appels	0.0080	-0.0005	-0.1224	-0.1418	-0.0137	-0.7616	-0.0525	-0.0264	0.2387
bananas	-0.0322	-0.0265	-0.0197	0.0425	-0.0216	-0.0536	-0.6000	-0.0683	0.0390
water	-0.0214	0.0105	-0.0948	-0.0143	0.0022	-0.0152	-0.0457	-0.4641	-0.1814
beer	-0.3361	0.0744	-0.1055	0.0309	-0.0331	0.0472	-0.0329	-0.1644	-0.9226

Source: own calculations

## 4. Results

Table 3: Expenditure elasticities, 1988.

	$\eta_{it}$
milk	0.9606
cream	0.6929
eggs	0.8006
butter	0.8953
margarine	0.5709
appels	0.7663
bananas	0.5250
water	0.6787
beer	1.8089

Source: own calculations

## 5. Conclusion

- Reasons for the unusual result of negative substitution biases:
  - by assumption homothetic utility functions, otherwise dependency from the reference utility level
  - no substitution behaviour
  - no utility maximizing behaviour
- Data availability for COLI calculation week
  - no superlative index number calculation possible
  - possible solution: yearly expenditure survey on staple food goods

## 6. Work in Progress

- Non-parametric approach
- Blundell, Browning, Crawford (2003)
- Using revealed preference and non-parametric Engel curves to tighten the bounds around the COLI
  - no assumptions about specific form of the underlying utility function necessary
  - testing data for consistency with utility maximizing behaviour