

Examining the Welfare Costs of Inflation

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This research is unpublished and open to comment. Special thanks to the South African Reserve Bank for making this possible. However, this research does not represent any policy stance by the South African Reserve Bank

Outline

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Introduction

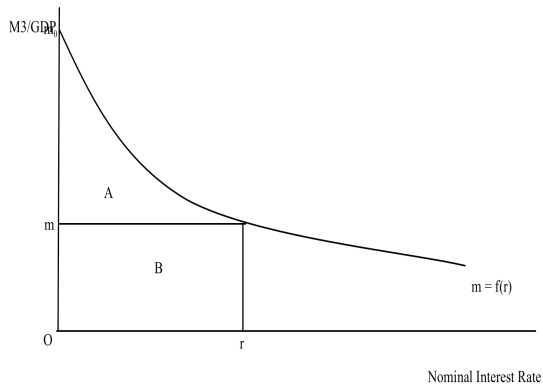
Theory

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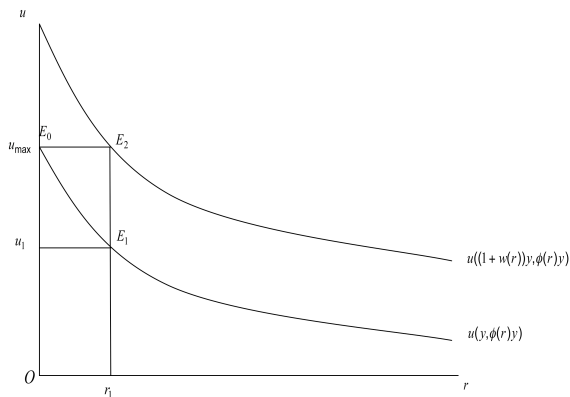
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Welfare Costs of Inflation - Bailey



Welfare Costs of Inflation - Lucas



Some Macro Estimates¹

- 0.1 - 0.18% of GDP for US (Fisher, 1981; Lucas, 1981,2000; Ireland, 2008)
- 0.15-0.35% of GDP for Canada (Serletis and Yavari, 2004)
- 0.2% for Germany
- 0.3% for Belgium
- 0.4% for Ireland
- 0.4% for Italy
- 0.1% for France (Serletis and Yavari, 2005, 2007)
- 0.45% for Austria
- 0.0-0.67% for South Africa (Gupta and Uwilingiye, 2008, 2009)

¹Thanks Rangan and Josine

Some Micro Questions

- How is that “gap” distributed across the population?
 - Koch and Bosch (2009) consider this.
 - Complicated modeling structure.
 - Richer hurt more - they spend more.
 - Difficulties with prices - a bit more work needs to be done.
- What is the welfare cost to society?
 - We consider that here.
 - Modeling structure is simple.
 - Does not require price data.
 - Aversion to inequality affects the outcome.
 - Result depends on demographics.
 - Stochastic dominance depends on level of expenditure.
- Very little South African evidence (Oosthuizen, 2007)
 - Depends a bit on weighting factor.
 - Overall effect is small and varied.

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A Simple Model of Welfare and Welfare Costs

The Literature

- Deaton (1987) - Chapter 5
- Newberry and Stern (1987)
- Newberry (1995)

Social Welfare

$$W = (\psi_1(x_1, \mathbf{p}), \psi_2(x_1, \mathbf{p}), \dots, \psi_1(x_J, \mathbf{p})) \quad (1)$$

- W is social welfare.
- ψ_j is indirect utility.
- x is expenditure (household).
- $j \in J$ is household marker.
- \mathbf{p} is a vector of goods prices.

Some Assumptions

Properties of ψ :

- 1 Homogeneous of Degree 0 in \mathbf{p} and x .
- 2 Non-increasing in \mathbf{p} .
- 3 Non-decreasing in x .

Inflation:

$$p_i^f = p_i^0(1 + \pi_i) \quad (2)$$

Therefore,

$$\frac{\partial p_i^f}{\partial \pi_i} = p_i^0 \quad (3)$$

Inflation Cost

$$\frac{\partial W}{\partial \pi_i} = \frac{\partial W}{\partial \psi_1} \frac{\partial \psi_1}{\partial p_i} \frac{\partial p_i}{\partial \pi_i} + \frac{\partial W}{\partial \psi_2} \frac{\partial \psi_2}{\partial p_i} \frac{\partial p_i}{\partial \pi_i} + \dots + \frac{\partial W}{\partial \psi_J} \frac{\partial \psi_J}{\partial p_i} \frac{\partial p_i}{\partial \pi_i} \quad (4)$$

$$= \sum_{j=1}^J \frac{\partial W}{\partial \psi_j} \frac{\partial \psi_j}{\partial p_i} p_i \quad (5)$$

$$= \sum_{j=1}^J \frac{\partial W}{\partial \psi_j} \frac{\partial \psi_j}{\partial x_j} \frac{\partial x_j}{\partial p_i} \left(\frac{\partial x_j}{\partial p_i} \right)^{-1} p_i \quad (6)$$

$$= \sum_{j=1}^J \frac{\partial W}{\partial \psi_j} \frac{\partial \psi_j}{\partial x_j} q_{ij} p_i \quad (7)$$

$$= \sum_{j=1}^J \eta_j x_{ij} \quad (8)$$

Defining η

Assume

$$W = \frac{1}{J} \sum_{j=1}^J \left(\frac{e_j}{1 - \epsilon} \right) \left(\frac{x_j}{e_j} \right)^{1-\epsilon} + \psi_j(\mathbf{p}) \quad (9)$$

Then

$$\sum_{j=1}^J \eta_j x_{ij} = \frac{1}{J} \sum_{j=1}^J \left(\frac{x_j}{e_j} \right)^{-\epsilon} x_{ij} \quad (10)$$

- e_j is adult equivalence from Yatchew et al (2003)
- x_{ij} is expenditure on good i by household j
- ϵ measures aversion to inequality
- (10) can be calculated with the data
- Our calculation is independent of prices - a benefit given our data

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The Data Source

- Expenditure and household characteristics: South African Income and Expenditure Survey, conducted in 2005 and 2006.
- Prices: CPI from March 2006: All expenditure values normed to March 2006.
- Some concerns:
 - Might be missing the top end of households. Many, including StatsSA folks, have suggested that security communities are not adequately included in StatsSA surveys.
 - Reporting methods: diary and recall.
 - In diary methods, small purchases are often not recorded.
 - In recall methods, certain types of purchases are often not included.
 - Illegal activities likely to be missed, regardless.

Data Aggregation and Cleaning

- CPI values exist for 36 product categories.
- Expenditure aggregated, initially, to match.
- Still too many zeroes, so further aggregated to 10 categories.
- Categories: grain, protein (meat, dairy, nuts), fruit and vegetables, other foods, clothing and shoes, housing (and imputed rent), housing consumption (fuel), communications and transport, entertainment, and general expenditures and investments in household members (health, education).
- Dropped: vehicles, furniture, appliances, household equipment and textiles, domestic services, and other household services.

Share Characteristics

SHARE	Poorest 40%	Middle 30%	Top 30%
Grain	0.114	0.079	0.029
Protein	0.128	0.122	0.076
Fruit and Vegetables	0.051	0.036	0.018
Other Food and Beverages	0.070	0.064	0.045
Clothing and Shoes	0.090	0.090	0.065
Housing and Imputed Rent	0.118	0.116	0.190
Other Housing	0.140	0.133	0.106
Transport and Communications	0.106	0.130	0.153
Health and Personal Care	0.108	0.152	0.153
Recreation and Other Goods	0.075	0.078	0.087
Observations	9324	6372	5176

Biggest difference in food shares, as we would expect.

Household Characteristics

VARIABLE NAME	Poorest 40%	Middle 30%	Top 30%
AE In X	8.645	9.389	10.638
Adult Equivalence	1.892	2.254	2.090
Male HH Head	0.506	0.531	0.693
African HH Head	0.887	0.827	0.472
Asian HH Head	0.001	0.008	0.043
Mixed Race HH Head	0.108	0.140	0.148
White HH Head	0.003	0.025	0.337
Rural Location	0.487	0.340	0.157
Metropolitan Location	0.228	0.291	0.375
Other Urban Location	0.284	0.369	0.467
HH Head No Education	0.259	0.188	0.047
HH Head Some Education	0.394	0.341	0.122
HH Head Completed Primary	0.270	0.306	0.244
HH Head More than Matric	0.076	0.161	0.562

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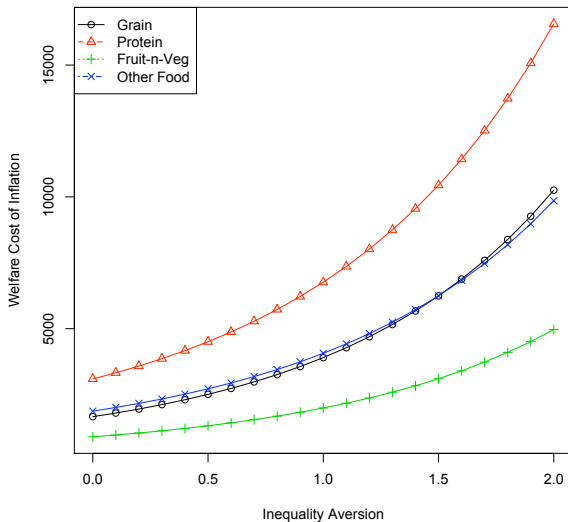
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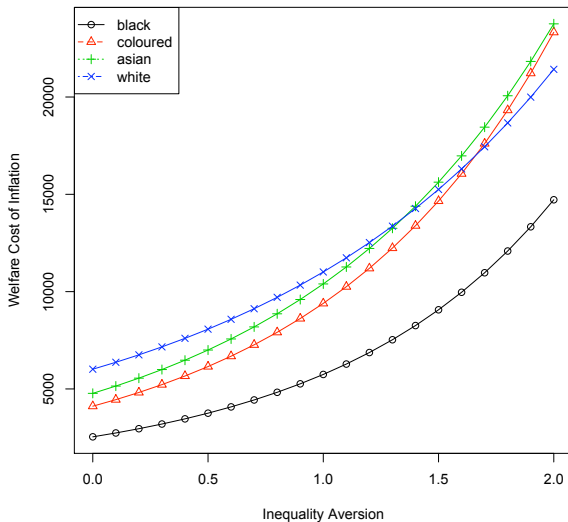
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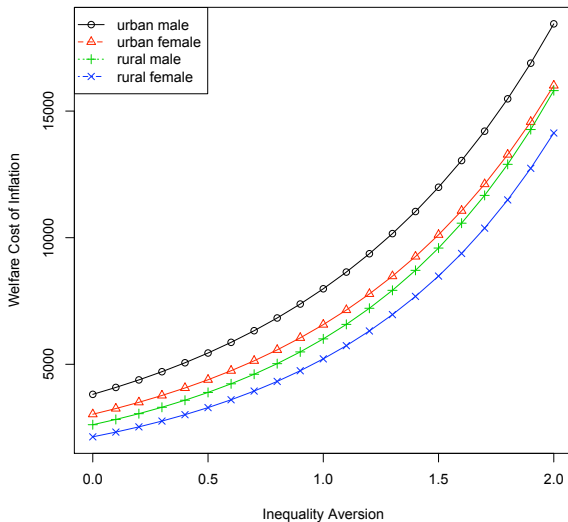
Welfare Cost of Food Related Inflation



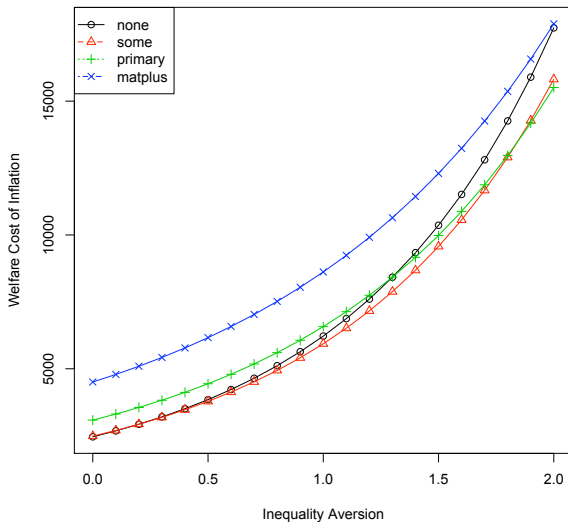
Welfare Cost of Protein Related Inflation



Welfare Cost of Protein Related Inflation



Welfare Cost of Food Related Inflation



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Summary

- We set out to calculate (estimate) welfare cost of inflation
- We only show some results
- We only look at food related inflation
- We have broken it down across demographics
- There is some evidence of stochastic dominance
 - In terms of food, protein goods have highest welfare cost
 - Lowest amongst black households
 - Highest amongst urban male headed households
 - Lowest amongst rural femal headed households
 - Highest amongst most educated households
 - Stochastic dominance “expected” due to relative expenditure on protein

THANKS