INCOME-SPECIFIC INFLATION RATES AND THE EFFECTS OF MONETARY POLICY: THE CASE OF NORTH MACEDONIA

Biljana Jovanovic
Marko Josimovski

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Introduction

- Research topic: The **distributional effects** of monetary policy on the **consumer price indices (CPIs)** specific for households which belong to different **income groups**
- Distributional consequences of macroeconomic policies – a relatively **new phenomenon** in academic research (originates from fiscal policy incidence analysis in high-income countries)
- Several theoretical channels through which monetary policy might affect income and consumption inequality (**income composition channel**, portfolio channel, financial segmentation channel, savings redistribution channel)
- Conventional and unconventional tools
- We investigate primarily the transimission mechanism proposed by **Cravino et al. (2018)**

Literature review

- Previous literature suggests that **inflation** is in fact **heterogeneous**, hence different socio-economic and demographic groups experience different levels of inflation (high vs. low-income people, young vs. elderly people, more educated vs. less educated people, borrowers vs. savers, etc.)

- Attempts for **different measures** of inflation for separate socio-economic groups, such as the elderly people (Amble and Stewart, 1994) and low-income people (Garner et al., 1996)

- Recent literature related to the distributional consequences of monetary policy argues that monetary policy decisions can result in **different effects** among different groups of **economic agents** (Auclert, 2017)

Literature review

- Cravino et al. (2018) find that following a **monetary policy shock**, inflation rates specific for **high-income** households react **less** compared to the inflation rates specific for **middle-income** households. This happens because of two reasons:

  - the effect of monetary shock on prices is heterogeneous across types of goods and services
  - consumption baskets differ across the income distribution.

Data

- Data from the **Household Budget Survey (HBS)** and the **CPIs** for a period of 11 years (2007-2017), published by the State Statistical Office (SSO)
- Also, a set of macroeconomic variables and survey data for the estimation of the FAVAR model
- HBS provides information on the consumption of **12 groups of products and services** (alcohol and tobacco, clothing, communication, culture, education, food, furnishing, health, housing, restaurants and hotels, transport and other goods and services), for each of the ten different income groups of households
- The data is used to compile **income-specific expenditure shares** for the **ten different income groups** of households
- We create the income-specific expenditure shares by dividing the specific decile group consumption for each group of goods and services with the total consumption of that decile group for each year
- Issue: macro vs. micro data

Stylized facts

- Expenditure shares are relatively **stable** throughout the years
- The expenditure share of **food** decreases as income **rises**, while the shares of other categories tend to increase (housing, transport, health, clothing)

Figure 1: Expenditure shares over household income deciles, 2007

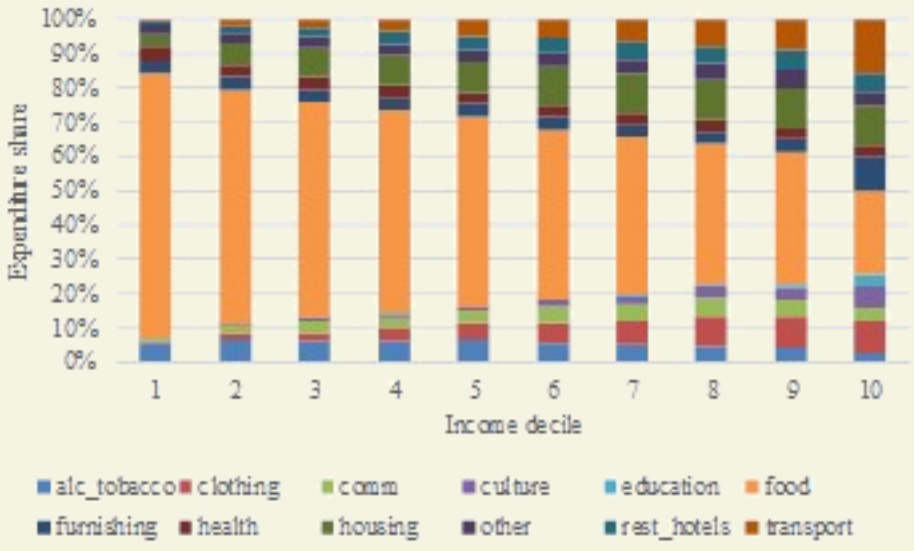
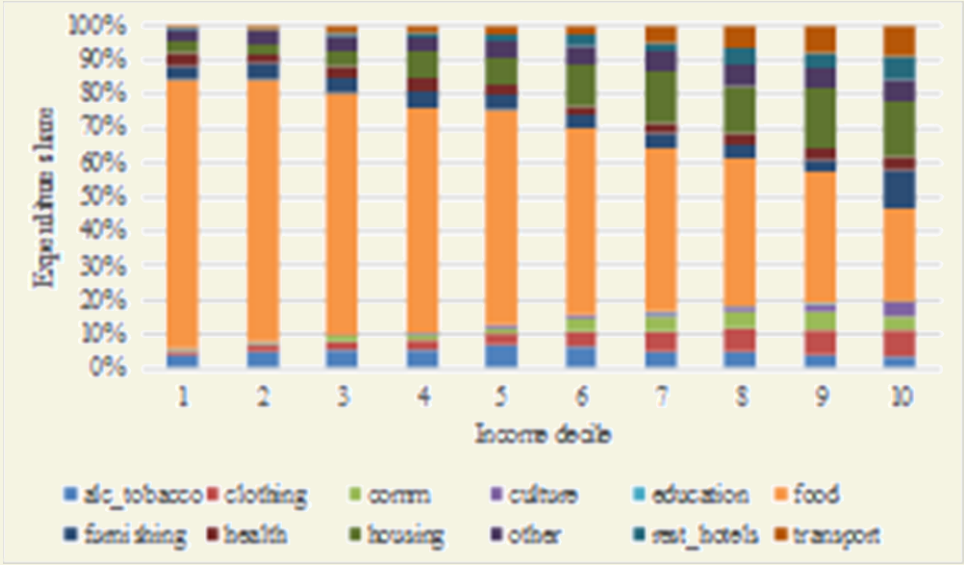


Figure 2: Expenditure shares over household income deciles, 2017

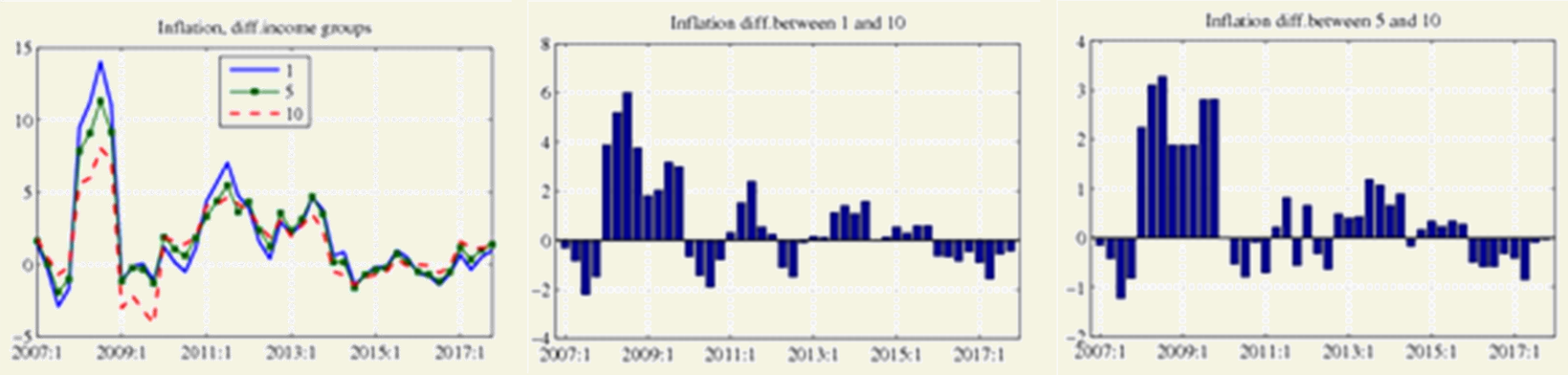


(Source: State statistical data and authors' own calculations)

Stylized facts

- Income-specific inflation rates are **highly correlated** and move in the same direction
- The **gap** between income-specific inflation rates **widens** in the presence of substantial **supply shocks** (end of 2007 and beginning of 2008, when global food and oil prices increased dramatically)

Figure 3: Inflation rate of 1st, 5th and 10th decile group



(Source: State statistical office data and authors' own calculations)

Stylized facts

- Income-specific weighted frequency of price changes for a specific year is calculated as:

$$\bar{\theta}_h = \sum_{i=1}^{n} w_i^h \theta_i$$

- $\bar{\theta}_h$ is the income-specific frequency of price changes, w_i^h is the income-specific expenditure share for each group of products and services, θ_i is the frequency of price changes
- We rely on Aucremanne and Dhyne (2004) who calculate frequencies of price changes for the Belgium economy

Stylized facts

- Lower and middle-income households have **higher** frequency of price changes and **higher** standard deviation of changes in the CPIs, relative to high-income households

Figure 4: Weighted frequency of price changes, average for the period 2007-2017

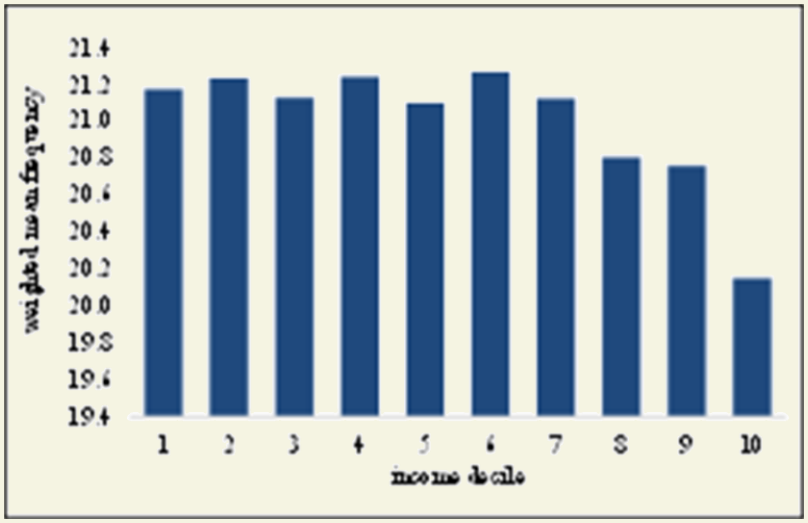
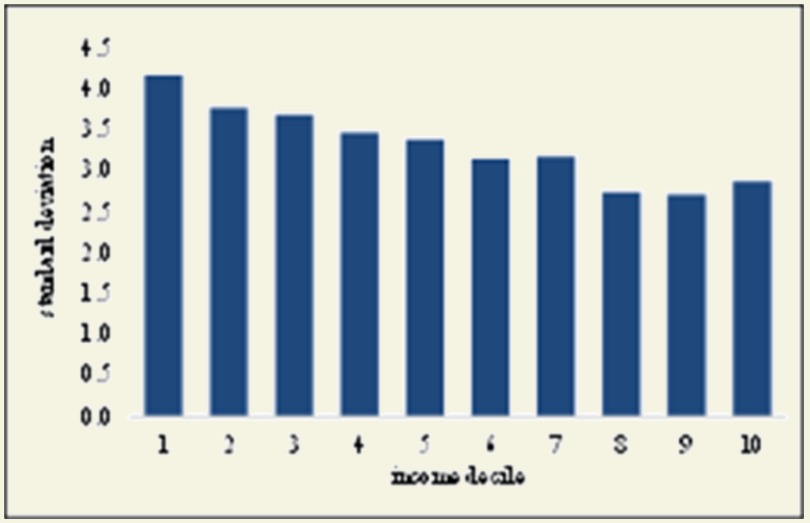


Figure 5: Standard deviation of the changes in the consumption price indices



(Source: State statistical office data and authors' own calculations)

Empirical analysis – FAVAR model

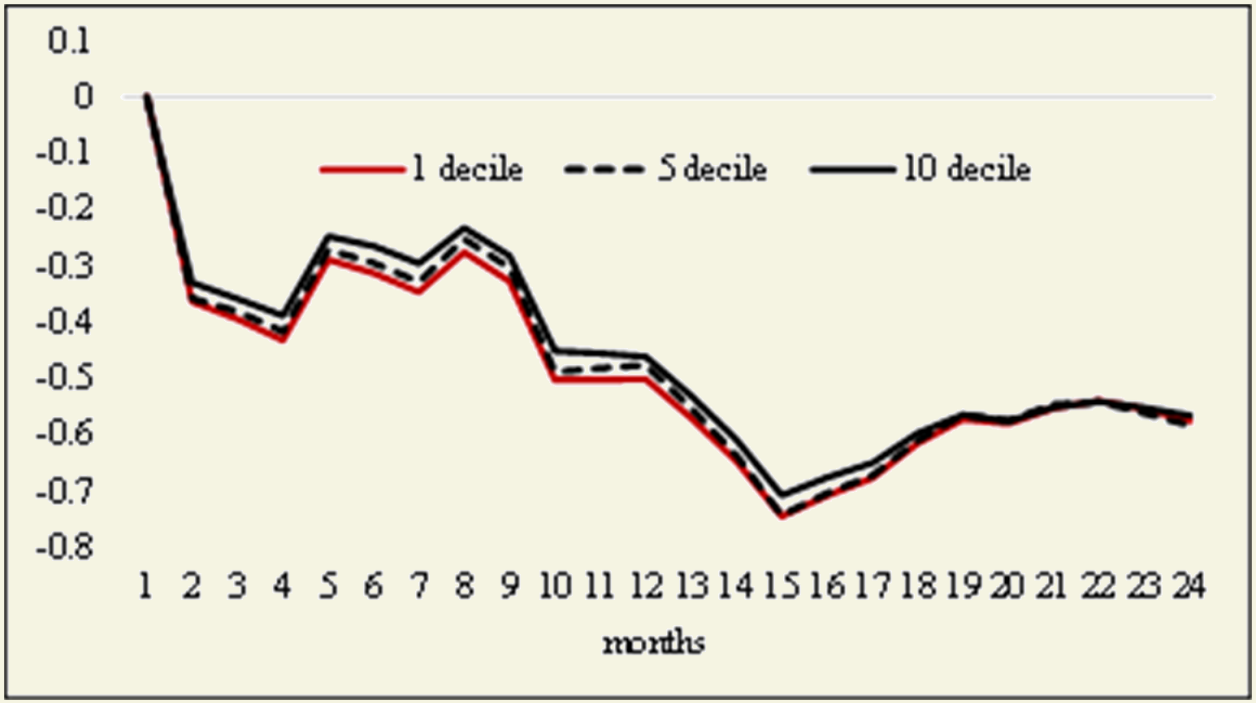
- FAVAR model (Bernanke, Boivin, and Eliasz , 2005 – BBE and Boivin, Giannoni, and Mihov, 2009)

  - vector **Xt** = **income specific price indices**, as well as the **additional variables**: sector-level producer price indices, sector-level industrial production, labour market indicators, credit and monetary indicators, external sector indicators, economic sentiment indicators and other relevant variables.
  - monthly data; period 2007m1-2017m12
  - all variables are seasonally adjusted and transformed in order to achieve stationarity

  - all information variables are classified in two groups - slow-moving and fast moving variables same as in BBE (2005)

Empirical analysis – FAVAR model

Income-specific CPI impulse responses to a monetary policy shock



Inflation of high income households responds less to a monetary policy shock compared to the inflation of the low-income households (15.3% and 7.9% lower response compared to low-income households after six and after 12 months, respectively). However, the difference is rather small.

Empirical analysis – Small scale model simulations

Small scale gap model that reflects the structure of the Macedonian economy (simplified version of MAKPAM model)

Phillips curves

$$\pi_t^h = \alpha_1^{\pi_{t+1}} \cdot \pi_{t+1} + \alpha_1^{\pi_{t-1}} \cdot \pi_{t-1} + \alpha_1^{\pi_t^{oil}} \cdot \pi_t^{oil} + (1 - \alpha_1^{\pi_{t+1}} - \alpha_1^{\pi_{t-1}} - \alpha_1^{\pi_t^{oil}}) \cdot \pi_t^{ef} + \alpha_1^{ygap} \cdot ygap_t + \varepsilon_t^{\pi_t}$$

$$\pi_t^{TOT} = \sum_h s^h \pi_t^h$$

IS curve

$$ygap_t = \alpha_2^{ygap\ t-1} \cdot ygap_{t-1} + \alpha_2^{qgap\ t-1} \cdot qgap_{t-1} + \alpha_2^{rgap\ t-1} \cdot rgap_{t-1} + \alpha_2^{yfgap\ t-1} \cdot yfgap_{t-1} + \varepsilon_t^{ygap\ t}$$

Empirical analysis – Small scale model simulations

Monetary policy

$$i_t = i_{star\ t} + risk_{premium} + \varepsilon_t^i$$

$$risk_{premium} = risk_{prem}^{SS} + risk_{prem}^{rsrgap}$$

$$risk_{prem}^{rsrgap} = \alpha_3^{riskprem} \cdot rsrgap_{t+4}$$

$$rsrgap_t = \alpha_4^{rsrgap\ t-1} \cdot rsrgap_{t-1} + \left(1 - \alpha_4^{rsrgap\ t-1}\right) \cdot \left[\alpha_4^{inf} \cdot \left(\pi_t^{TOT} - \pi_t^{ef}\right) + \alpha_4^{demand} \cdot \left(\alpha_4^{ygap\ t-1} \cdot ygap_{t-1} - \left(1 - \alpha_4^{ygap\ t-1}\right) * yfgap_{t-1}\right)\right] + \varepsilon_t^{rsrgap\ t}$$

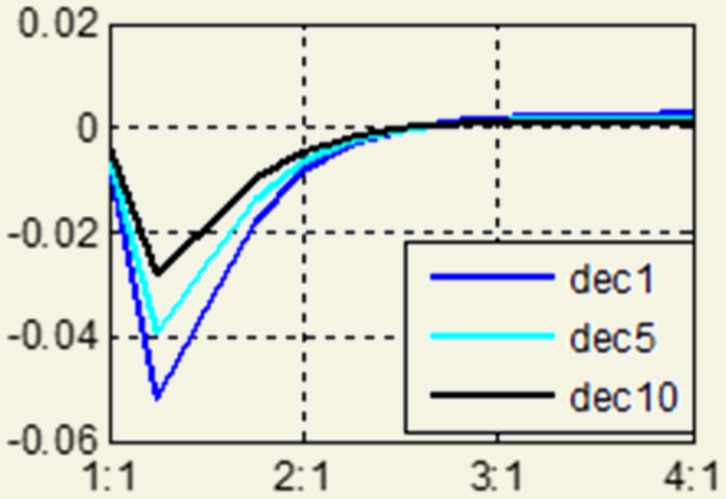
Empirical analysis – Small scale model simulations

To evaluate the distributional effects of monetary policy three scenarios were created:

- **baseline scenario**, where the monetary policy reaction is driven by the model structure and the assumptions of the exogenous variables (foreign inflation, foreign demand, oil prices and foreign interest rate)
- **two alternative scenarios**, in both of which we assume that monetary authorities decided to change interest rates because of some additional factor not anticipated in the model
  - the interest rate in the two-year period ahead is higher in comparison to the baseline (assumes that the interest rate will hover around 6%)
  - the interest rate in the two-year period ahead is lower in comparison to the baseline (assumes that the interest rate will hover around 0.5%)

Empirical analysis – Small scale model simulations

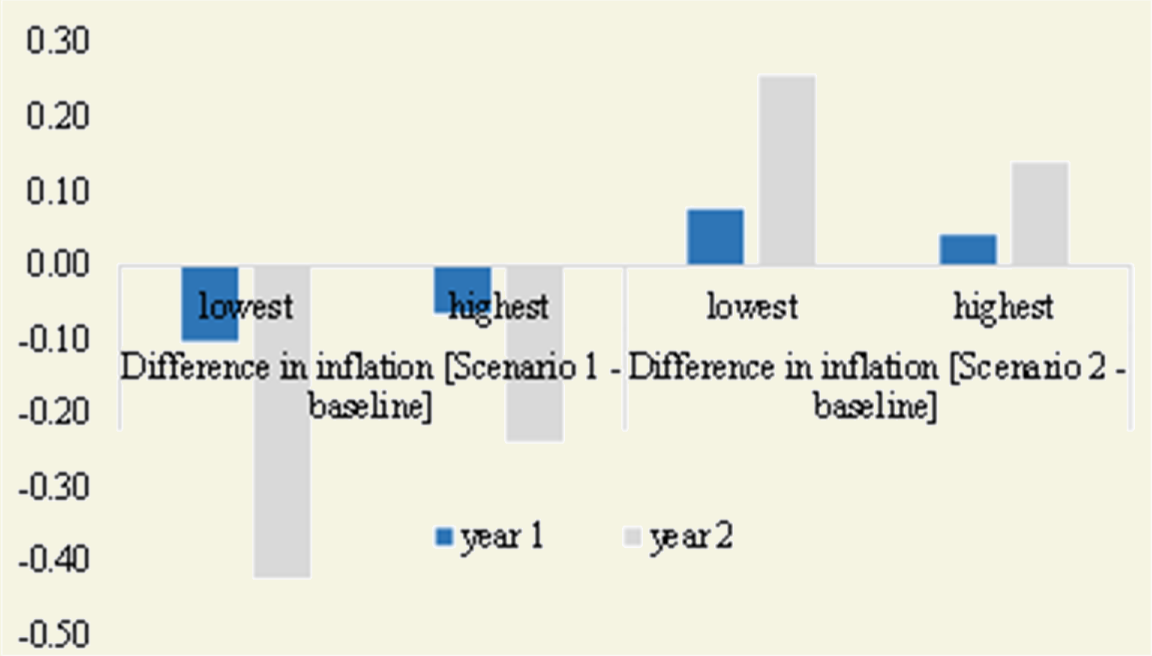
Impulse responses of household-specific CPIs to a monetary shock



- Monetary policy has a higher impact on the lower-income groups
- However, the impact is relatively small regardless of the income group.

Empirical analysis – Small scale model simulations

Difference in the inflation rates under different scenarios for the lowest and the highest-income decile group (in percentage points)



- Monetary policy has a higher impact (in both directions) on the lower-income groups
- However, the impact is relatively small regardless of the income group.

Conclusion and recommendations for future research

- Different income groups have different consumption baskets – lower-income households spend more for food relative to higher-income households.
- Income-specific inflation rates tend to diverge significantly in the presence of substantial supply shocks.
- Lower-income households are characterized with more flexible and more volatile prices relative to the prices of higher-income households.

- As the distributional impact of monetary policy is concerned, both the impulse response analysis and the model simulation exercise **indicate that the response of lower-income households' inflation rate is higher in comparison to higher-income households**, meaning that changes in the policy rate affect more the households on the left side of the income distribution line.
- However, given that the difference in the response between the income groups is relatively small, we can conclude that, in general **the monetary policy in the Macedonian case does not exhibit asymmetrical effect on different income groups of households.**

Conclusion and recommendations for future research

Recommendations for future research:

- Conducting the analysis by using the **HBS micro data** - disaggregated analysis on income-specific inflation rates, with a special focus on certain percentiles such as the top 1%, where a significant part of the income and wealth is concentrated.

- **Modification of the modelling framework** - DSGE model will allow to model income-specific price stickiness more consistently, model extension with different IS curves which will describe the behavior of the income variables for different households. This modification will be helpful in studying the direct impact of monetary policy stance on income distribution, as well as its distributional consequences.

Thank you!