LATVIJAS BANKA
EIROSISTĒMA

CGE-EUROMOD Model for Latvia: Focus on Shadow Economy

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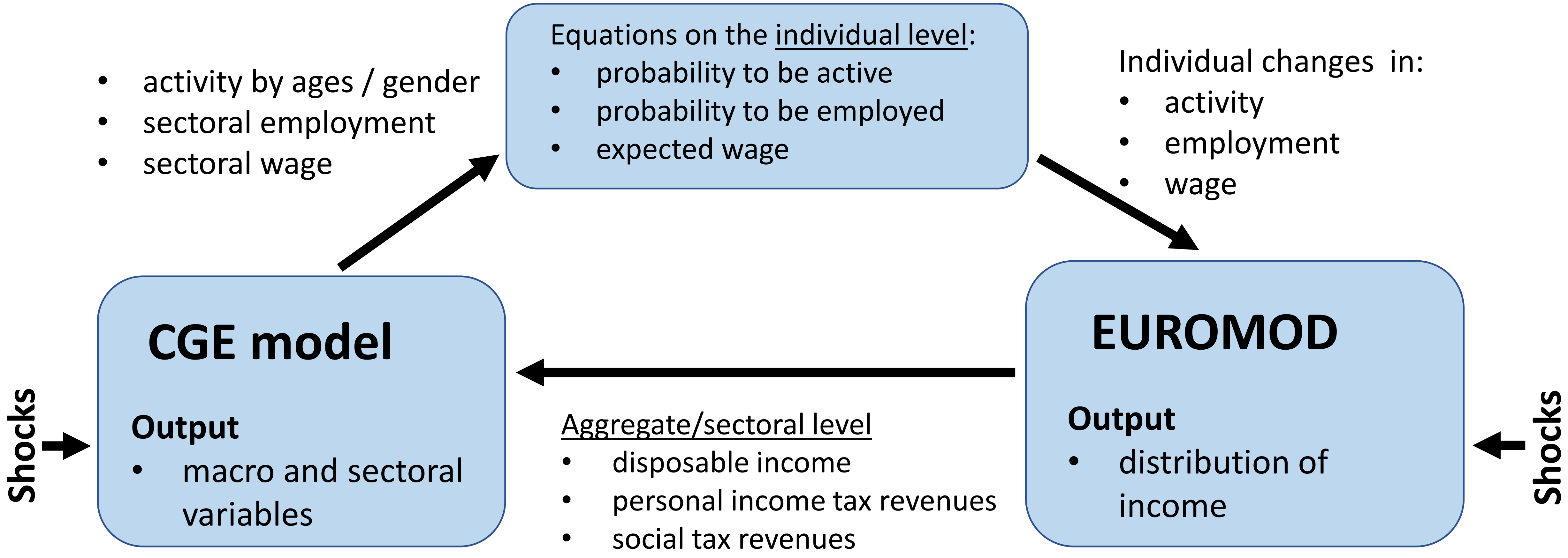
CGE and EUROMOD combination

- Both models are widely used for policy analysis in Latvia
- Advantages and drawbacks of each model type:
  - EUROMOD – static microsimulation model:
    - (+) accounts for the agents' heterogeneity and allows analyzing distributional effects of a reform
    - (-) partial equilibrium – first round effects
  - CGE model – sectoral level model based on input-output tables:
    - (+) account for general equilibrium effects of a reform – second round effects
    - (-) aggregate/sectoral model

Konstantins Benkovskis & Eduards Goluzins & Olegs Tkacevs, 2016. "CGE model with fiscal sector for Latvia," Working Papers 2016/01, Latvijas Banka.
Anna Pluta & Anna Zasova. EUROMOD Country Report Latvia 2017–2020. https://euromod-web.jrc.ec.europa.eu/sites/default/files/2020-12/Y11_CR_LV_Final.pdf

General scheme of the linked model(s):
Bottom-up-top-down approach



Shadow wage component

- CGE contains the endogenous informal sector (reacts to tax level and economic conditions)
- But Latvia's EUROMOD assumes no informality (official wages as reported from tax authorities)

  => possible problems converging and unrealistic results

⇒Important to estimate shadow wage component for EU-SILC data. How?

(a) use linked Employer-Employee database merged with the LFS database **3 steps**:

(b) use estimated equations for EU-SILC data

Step1:
Define the subsets of "clean" and "dirty" firms

Step 2:
Use logit regression to label firms paying envelope wages

Step 3:
Estimate wage equation to detect the potential wage and the size of the envelope payments

Konstantīns Benkovskis & Ludmila Fadejeva (2022, forthcoming) «Chasing the Shadow: the Evaluation of Unreported Wage Payments in Latvia», Discussion Papers 2022/01, Latvijas Banka

3 steps to estimate envelope wage

1) **Define the subsets of "clean" and "dirty" firms**

- «Clean firms» firms owned by foreigners from the countries high tax-paying culture do not involve into envelope wage payments. In addition, we assume that state-owned firms also do not involve into envelope wage payments.
- «Dirty firms» detect the employees with suspiciously low wages for the same occupation (4-digit, 412 unique occupations) and region (below 10th percentile in a respective occupation-region). Mark firm as «dirty» if the share of employees with suspiciously low wage was at least 50% from all classified employees.

2) **Label firms paying envelope wages**

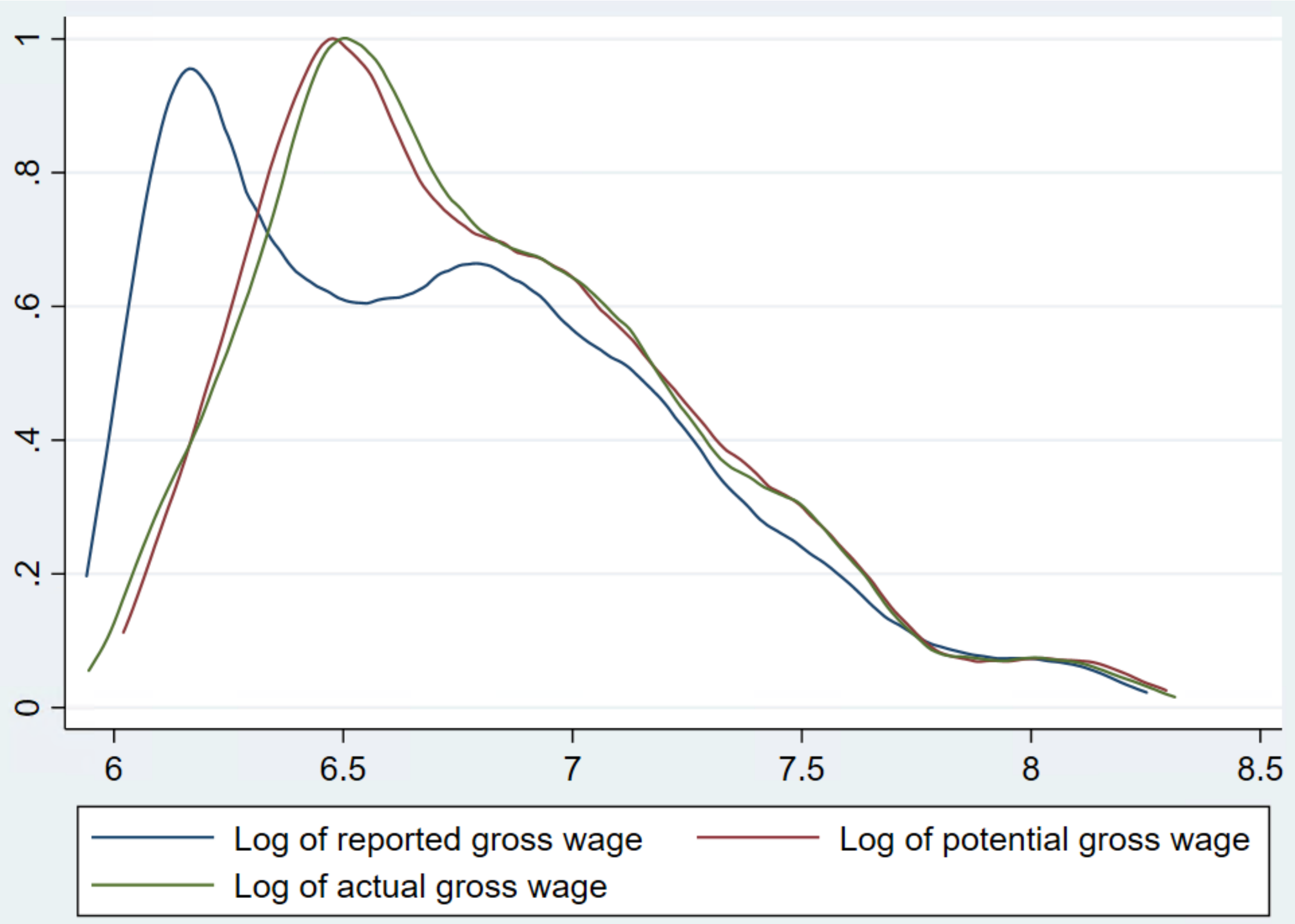
- Use simple probit model to estimate the probability of being involved into the shadow economy. The set of explanatory variables is kept relatively short and simple and avoids variables directly related to wage level (turnover, debt, cash holdings, profits, ownership, exporters / importers dummy, age of firm, year / region / sectoral fixed effects).

3) **Potential wage and wage gap estimation**

- The inefficiency term from the Stochastic Frontier Analysis (SFA) can be interpreted as potential gross wage deserved by a person according to its observed determinants, but not appearing in the legal wage. To estimate it we assume that the probability of a firm j to be involved into envelope payments determines the variance of inefficiency term.

Envelope payments affect the income distribution

Distribution of reported and potential gross wage in 2018
From LFS dataset



- We were able to evaluate the size of the envelope payments for (some) individual employees in LFS
- Distribution of wage notably shifts to the right
- How to account for that in the CGE-EUROMOD?

From LFS to EU-SILC data

EUROMOD uses EU-SILC dataset

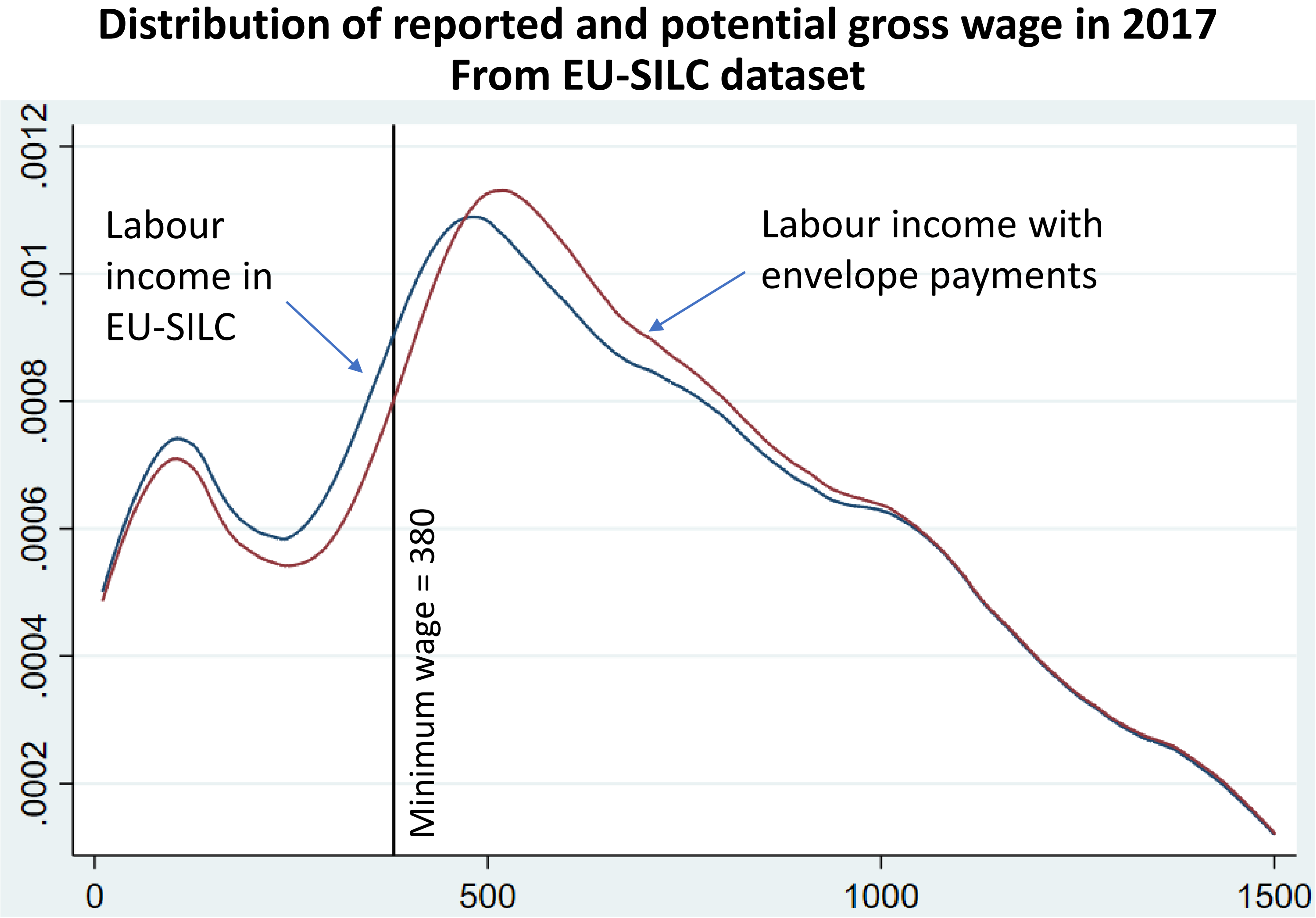
All evaluations of the envelope wage were done using LFS dataset augmented with SRS data

- Distant server, no way to merge it with EU-SILC data

The potential wage equations was re-evaluated using only those LFS and SRS variables that are also available in the EU-SILC dataset:

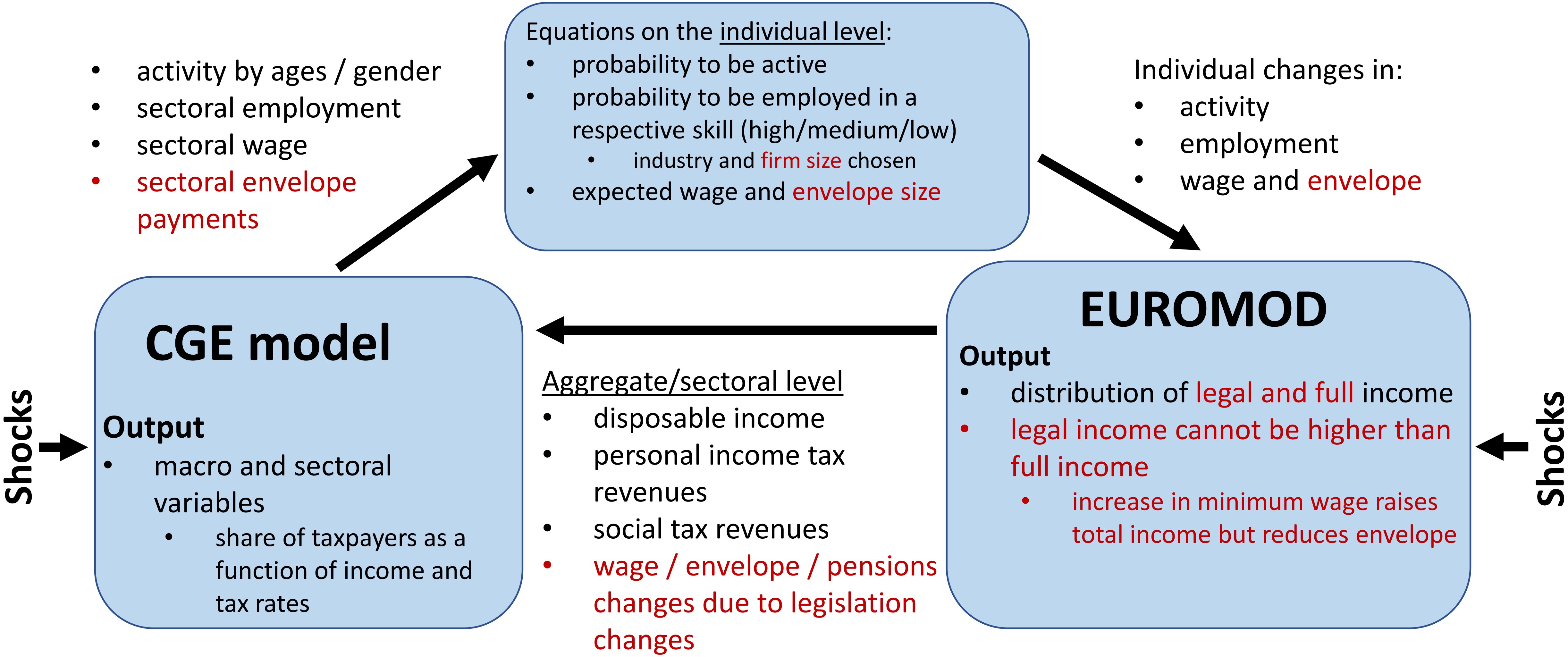
- Most employee specific variables: age, gender, citizenship, contract type, occupation (only 1-digit)
- Only few firm-level variables: industry, size
- Probability to evade is constant for a given industry / size class of the firm

Distribution on legal and actual labour income in EU-SILC

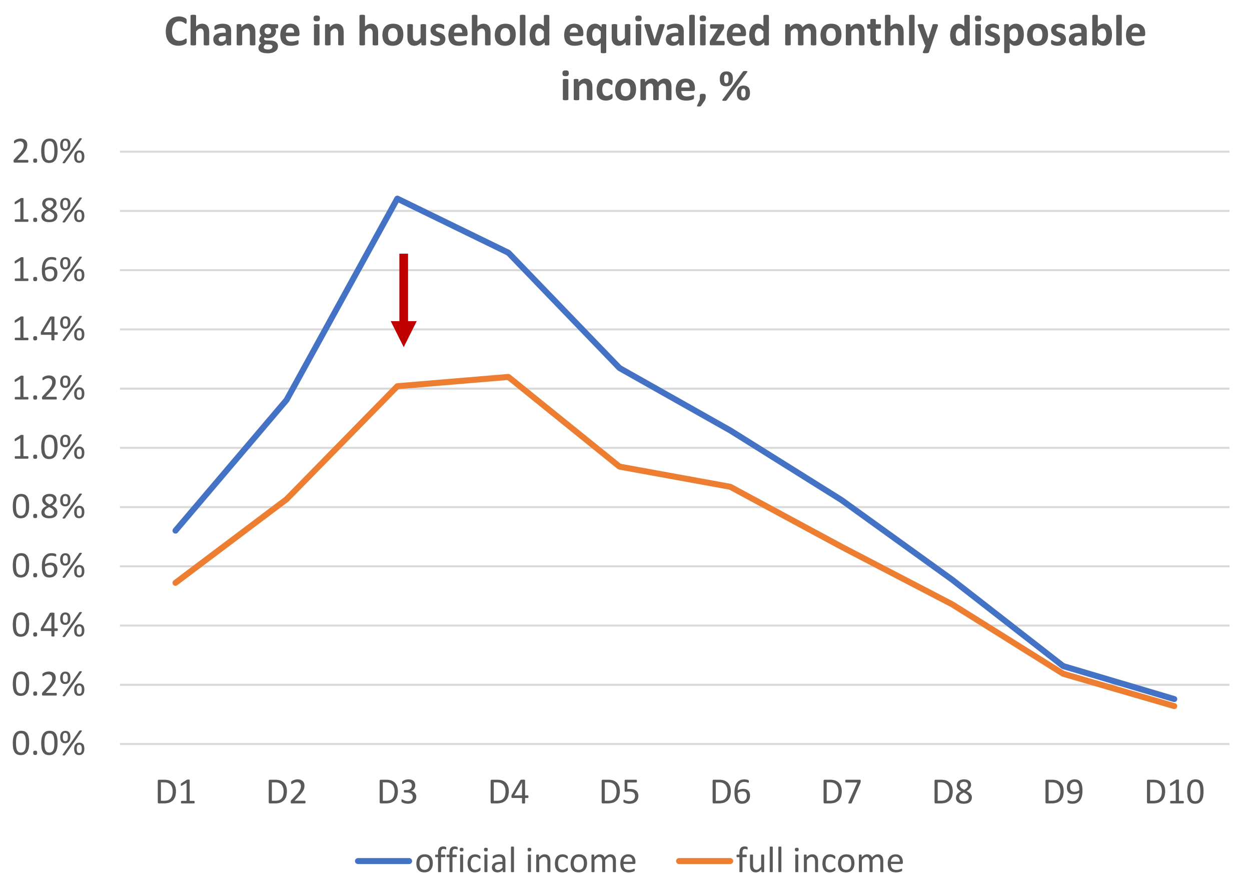


1. The probability to be employed in evading firm depends on the sector and size of the firm (the only information available at EU-SILC)
2. The size of the envelope wage is determined by the wage equation estimated on LFS data and applied to EU-SILC data
3. CGE-EUROMOD system predicts distribution of official and full wage for consecutive years

Necessary modifications to the CGE-EUROMOD model



Scenario: Distributional effects of minimum wage ↑



- **Gini:**

  official income ↓ -0.7% ; full income ↓-0.5%

- **S80/S20:**

  official income ↓ -0.8% ; full income ↓-0.6%

- **Share of people at risk of poverty (overall):**

  official income ↓ -0.8% ; full income ↑ 0.2%

- **Share of people at risk of poverty (Employed):**

  official income ↓ -3.9% ; full income ↓ -1.8%

Summary:

1) Estimated probability of firm to evade (pay envelope wages)

2) Estimated full wage (official + envelope) for people in the LFS database

3) Estimated full wage (official + envelope) for people in the EU-SILC database (main database for EUROMOD model), based on individual and firm characteristics using firm-employee combined database (firm-employee microdata + LFS)

4) Introduced envelope wages in the EUROMOD as a part of the CGE-EUROMOD model

5) Now it is possible to analyse the distributional effects of increase in minimum wage on equalised disposable income of households (full and official income, income inequality measures), on share of people in shadow economy and size of the envelope (by income deciles)

References :

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