New monthly EUROMOD for Croatia based on the "monthly" EU-SILC data

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EUROMOD and EU-SILC

EUROMOD =

(a) EUROMOD Software: used for programming and execution of tax-benefit models

(b) EUROMOD Model: tax-benefit model for the EU

EUROMOD is a yearly model

EU-SILC: yearly data on income
EUROMOD input data: yearly incomes divided by 12
(illusion that the model is monthly)

However, EU-SILC contains data on economic activity in each month of the year...

EU-SILC: monthly data

The **PL211*** variables:

PL211A (January), PL211B (February), ..., PL211L (December)

  1 Employee working full-time
  2 Employee working part-time
  3 Self-employed working full-time (including family worker)
  4 Self-employed working part-time (including family worker)
  5 Unemployed
  6 Pupil, student, further training, unpaid work experience
  7 In retirement or in early retirement or has given up business
  8 Permanently disabled or/and unfit to work
  9 In compulsory military or community service
 10 Fulfilling domestic tasks and care responsibilities
 11 Other inactive person
  0 (no info for persons aged up to 15 years)

(same as for PL031: current status)

Creation of monthly input datasets

Instead of 1 input dataset in the standard model…
…12+ datasets!

Monthly dataset:
(1) copy the variables from the standard dataset.

(2) Introduce some changes…

Employment variables (yem*)
Self-employment variables (yse**)
Pension variables (poa*, pdi*, psu*)
Unemployment variables (bunct*)
etc.

Creation of monthly input datasets

Example:

Person's activity vector is 551111111155
(1 = working full time; 5 = unemployed)

Standard dataset (EUR):

$\quad$ yem = 1,000 →   12 * yem = 12,000 (yearly wage)
$\quad$ yemmy = 8

But, the actual wage is 12,000 / 8 = 1,500

Imputation:

Person	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0	0	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	0	0

Software

Creation of input datasets: Stata

All microsimulation: EUROMOD (in the batch mode)

"Monthly model" = Stata .do file:

(a) prepares various input datasets,

(b) calls EUROMOD (*shell* command),

(c) imports model results

One-click run (i.e., automatized)

Currently: available for the year 2017

New EUROMOD systems, all based on the standard systems (HR_2017):

(1) HR_2017_mm

(2) HR_2017_my

Model algorithm (2017)

Step	What?	Where?
(1a)	Prepare input data for December 2016	Stata
(1b)	Run HR_2016	EM*
(1c)	Import results for December 2016	Stata
	↓	
(2a)	Prepare input data for January	Stata
(2b)	Run HR_2017_mm	EM
(2c)	Import results for January	Stata
	↓	
	...	
	↓	
(13a)	Prepare input data for December	Stata
(13b)	Run HR_2017_mm	EM
(13c)	Import results for December	Stata
	↓	
(14a)	Prepare input data for the 2017 finals	Stata
(14b)	Run HR_2017_my	EM
(14c)	Import results for the 2017 finals	Stata
(14d)	Prepare yearly output	Stata

* EUROMOD called from Stata using the command "shell"

Analysis of activity patterns

Original	Description	Decoded
1	Employee working full-time	
2	Employee working part-time	W
3	Self-employed working full-time (including family worker)	
4	Self-employed working part-time (including family worker)	
5	Unemployed	
6	Pupil, student, further training, unpaid work experience	
7	In retirement or in early retirement or has given up business	
8	Permanently disabled or/and unfit to work	X
9	In compulsory military or community service	
10	Fulfilling domestic tasks and care responsibilities	
11	Other inactive person	

For each person in the sample, create the "activity vector":

Person	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	W	W	W	W	W	W	W	W	W	W	W	W
2	X	X	X	X	X	X	X	X	X	X	X	X
3	X	X	X	W	W	W	W	W	W	W	X	X

Analysis of activity patterns

Subsample: persons aged 17-67

Pattern type		Pattern	% of persons
All 12 months in work		WWWWWWWWWWWW	49.7
All 12 months out of work		XXXXXXXXXXXX	41.9
Entered work	(e.g.)	XXXXWWWWWWWW	3.2
Abandoned work	(e.g.)	WWWWWWWXXXXX	1.7
Seasonal workers (non-winter)	(e.g.)	XXXWWWWWWWXX	2.3
Mixed / irregular	(e.g.)	XWXWWWWXWXWW	1.2

8.4% persons in the subsample changes the status between the work and non-work status (5.7% of all people)

Comparison with the standard model

quite small differences in total values of taxes and benefits
exceptions: Child benefit and Subsistence benefit

Child benefit

means tested benefit, received by HHs with children, whose income per member is below EUR 220 (in 2017)

Standard model: child benefit received by 129,000 of 412,000 HHs with children (persons aged < 18)

<u>Monthly model</u>

(1) All 129,000 of them still receive the benefit:

	HHs	difference
in the same amount	84,000	0%
in higher amount	9,000	+6%
in lower amount	37,000	−31%

(2) New 29,000 HHs obtain the benefit (!)

Child benefit

Means test threshold = 220 EUR

HH **1** = 2 spouses + 2 children (in EUR)

	Monthly model												Standard model
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Spouse 1's net wage	0	0	0	540	540	540	540	540	540	0	0	0	270
Spouse 2's net wage	625	625	625	625	625	625	625	625	625	625	625	625	625
Total net wage	625	625	625	1165	1165	1165	1165	1165	1165	625	625	625	895
Total net wage per HH member	156	156	156	291	291	291	291	291	291	156	156	156	224
Child benefit	53	53	53	53	0	0	0	0	0	0	53	53	0

Standard model: HH 1 does not obtain Child benefit because the average income is used, which is above the means-test threshold

Monthly model: HH 1 obtains EUR 6 * 53 = 318 of Child benefit

Child benefit

Means test threshold = 220 EUR

HH **2** = 2 spouses + 2 children (in EUR)

	Monthly model												Standard model
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Spouse 1's net wage	0	0	0	460	460	460	460	460	460	0	0	0	230
Spouse 2's net wage	625	625	625	625	625	625	625	625	625	625	625	625	625
Total net wage	625	625	625	1085	1085	1085	1085	1085	1085	625	625	625	855
Total net wage per HH member	156	156	156	271	271	271	271	271	271	156	156	156	<u>214</u>
Child benefit	53	53	53	53	0	0	0	0	0	0	53	53	53

Standard model: HH 2 obtains the benefit during the whole year because the average income is below the means-test threshold; EUR 12 * 53 = 636

Monthly model: HH 2 obtains EUR 6 * 53 = 318

Subsistence benefit: make-work-pay instrument

One half of beneficiaries are working-age people, able to work
If a person gets employed, the benefit disappears (for the whole household):
high Participation Tax Rate

Since 2014: make-work-pay instrument (MWPI) was introduced:
If a person begins (and continues to) work, the benefit amount is changed as follows:

1st month: no change
2nd month: 25-percent reduction
3rd month: 50-percent reduction
4th and afterwards: amount depends on the average income in the last 3 months

Not simulated in EUROMOD: certain eligibility-related information are unavailable
Even if assumptions were made about these variables: too complicated to simulate
(guesswork / imprecise / non-transparent)

However, with the monthly model: possible to simulate the instrument (in a precise way)

miCROmodAM

Best things about it:

- more realistic, because we live *on monthly level*

- more precise and transparent modelling of policies that depend on information from previous month(s)

- modelling of specific instruments (e.g., MWPI)

Worst things about it:

- Takes 200 seconds to run vs. 5 seconds for the standard model

- To maintain it: requires additional system modelling

Should we continue developing it?

Thank you for your attention!

More on our work:

AMMATSBC:
http://www.ijf.hr/eng/research/croatian-science-foundation-projects/1053/ammatsbc/1062/

ITBIDEE:
http://www.ijf.hr/eng/research/croatian-science-foundation-projects/1053/itbidee/1555/