

*Beamm : online, open-access tax-benefit  
microsimulation modeling*

Tom Truyts    Hugues Annoye

CAPE - UCLouvain Saint-Louis - Bruxelles

October 23rd - Statistiek Vlaanderen



# *CAPE?*

- Center for Applied Public Economics
  - At UCLouvain Saint-Louis Bruxelles
  - Youngest research center at USLB → founded 2019
  - 20-25 researchers → economics, statistics, mathematics...

# CAPE ?

- Center for Applied Public Economics
  - At UCLouvain Saint-Louis Bruxelles
  - Youngest research center at USLB → founded 2019
  - 20-25 researchers → economics, statistics, mathematics...
- Objectives CAPE
  - Principal objective : Beamm project
  - Secondary objective : scientific research + policy support → public finance + public policy evaluation

# Team beamm

- Professors :
  - Gilles Grandjean : Professor of Public Economics
  - Tom Truyts : Professor of Public Economics
  - Cedric Heuchenne : Professor of Statistics and Quantitative Methods
  - Koen Declercq : Professor of quantitative economics, labor economics
  - H el ene Latzer : Professor of macro-economics, policy evaluation
- Post-doctoral researchers
  - Francesco Pascucci : statistics, Beamm.brussels
  - Alexandre Jacquemain : Inequality analysis, statistics
  - (Elisabeth Leduc : Labor and education, public policy evaluation)
- Doctoral students :
  - Arnaud Dorsimont : Macroeconomic effects of fiscal policy
  - Hugues Annoye : Machine learning, statistics
  - Carlos Rodriguez Ameal : Machine learning, statistics
  - Jean Paul Madrigal Rodriguez : Transport-beamm, transport economics
  - Rory Green : Beamm, labour market
  - David J. Sonnewald : Beamm.brussels - labor market modelling
  - Audric De Bever : Consumption modelling, carbon taxes
  - Astrid Adam : Transport-beamm.brussels - transport economics
  - Daniel Coppens d'Eeckenbrugge : ETR, progressivity, redistribution
  - (Tom Van Zeebroeck : tax design and family dynamics)
  - Fran ois Meuwissen : Tax design, environmental economics
  - Soufiane Amzur : Social policy, poverty
  - L ea Jacquet : Tax design and family dynamics
  - Mathilde Pourtois : labor market, public policy evaluation
- + Research associates : Willem Sas, Malka Guillot

# *Today's menu*

1. **Beamm : motivation and intro**
2. Presentation beamm : model
3. Next steps

## *Beamm.brussels : motivation*



- “No taxation without representation”
- How to raise taxes, how to redistribute → cornerstones of role state & democracy

## *Beamm.brussels : motivation*



- BUT : assessing taxes, benefits, public policies = difficult !

## *Beamm.brussels : motivation*



- BUT : assessing taxes, benefits, public policies = difficult !
- technicality, institutional complexity, lack of accessible data & analytical skills
  - difficult to assess impact, see full picture
  - for policy makers, civil society, citizens
  - weakens democratic debate, hinders efficient policy making



# *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**

## *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**

## *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**
- **Micro-simulation** model : simulate tax-benefit system for at micro-level of individual citizens/households in representative sample of population

## *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**
- **Micro-simulation** model : simulate tax-benefit system for at micro-level of individual citizens/households in representative sample of population
- **Tax-benefit** : comprehensive and detailed model of taxes and social contributions and benefits → households

## *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**
- **Micro-simulation** model : simulate tax-benefit system for at micro-level of individual citizens/households in representative sample of population
- **Tax-benefit** : comprehensive and detailed model of taxes and social contributions and benefits → households
- **Online** : available on cloud servers → on fictitious data

## *Beamm ?*

- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**
- **Micro-simulation** model : simulate tax-benefit system for at micro-level of individual citizens/households in representative sample of population
- **Tax-benefit** : comprehensive and detailed model of taxes and social contributions and benefits → households
- **Online** : available on cloud servers → on fictitious data
- **Open access** : easy graphical user interface, fiscal alphabetization, community

## *Beamm ?*

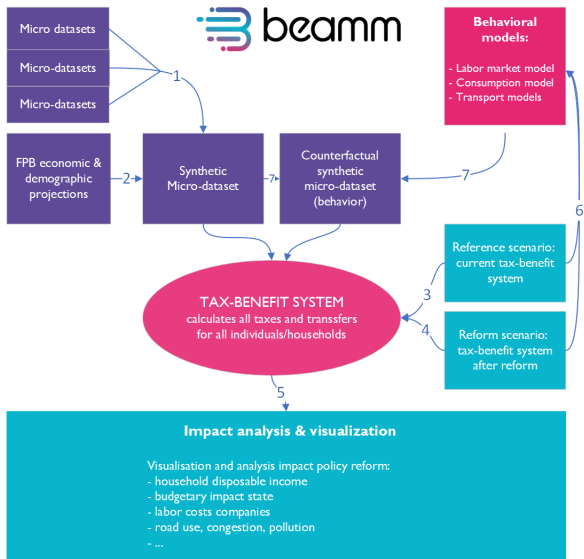
- **Belgian Arithmetic Microsimulation Model**
- **Beamm = an online, open-access tax-benefit micro-simulation model**
- **Micro-simulation** model : simulate tax-benefit system for at micro-level of individual citizens/households in representative sample of population
- **Tax-benefit** : comprehensive and detailed model of taxes and social contributions and benefits → households
- **Online** : available on cloud servers → on fictitious data
- **Open access** : easy graphical user interface, fiscal alphabetization, community
- *Beamm → 21th century technology for detailed & reliable impact assessments of public policy reforms, freely available to policy makers, civil society, citizens, media...*

# *Today's menu*

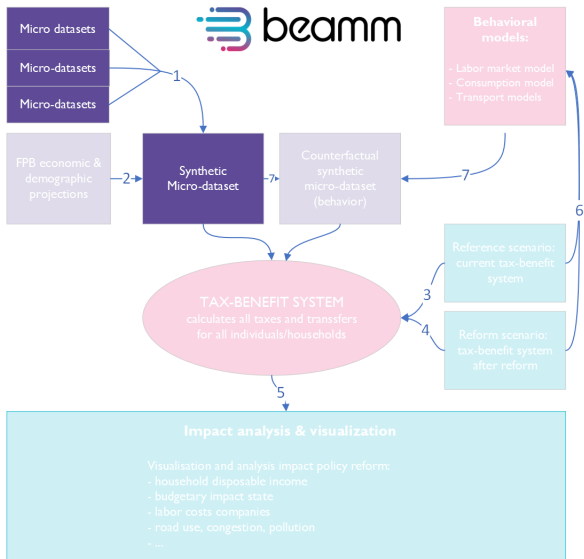
1. Beamm : motivation and intro
2. **Presentation beamm : model**
3. Next steps



# Model logic



# Step 1 : data - digital twin



## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data

## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data
- Administrative data : Demobel, Population census, IPCAL, vehicle data + social secretariate

## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data
- Administrative data : Demobel, Population census, IPCAL, vehicle data + social secretariate
- Surveys : HBS, EU-SILC, LFS, HFCS, Beldam, Monitor, Energy Consumption Survey, HETUS, Mobility Plans, etc.

## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data
- Administrative data : Demobel, Population census, IPCAL, vehicle data + social secretariate
- Surveys : HBS, EU-SILC, LFS, HFCS, Beldam, Monitor, Energy Consumption Survey, HETUS, Mobility Plans, etc.
- Challenge 1 : How to combine information different anonymous micro-datasets ?

## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data
- Administrative data : Demobel, Population census, IPCAL, vehicle data + social secretariate
- Surveys : HBS, EU-SILC, LFS, HFCS, Beldam, Monitor, Energy Consumption Survey, HETUS, Mobility Plans, etc.
- Challenge 1 : How to combine information different anonymous micro-datasets ?
- Challenge 2 : How to use highly sensitive data in online applications ?

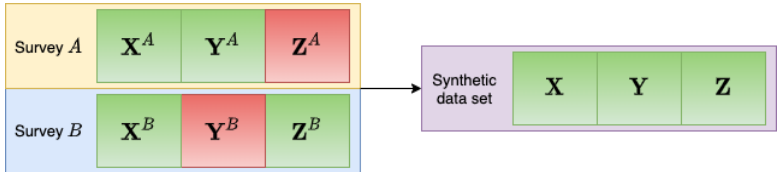
## *Step 1 : data - digital twin*

- Data = central to project → mix administrative + survey data
- Administrative data : Demobel, Population census, IPCAL, vehicle data + social secretariate
- Surveys : HBS, EU-SILC, LFS, HFCS, Beldam, Monitor, Energy Consumption Survey, HETUS, Mobility Plans, etc.
- Challenge 1 : How to combine information different anonymous micro-datasets ?
- Challenge 2 : How to use highly sensitive data in online applications ?
- Solution : machine learning algorithms - AI
  - Statistical matching → Statistically correct at aggregate level - fictitious at individual level
  - GAN : generation of 100% fictitious but very realistic data



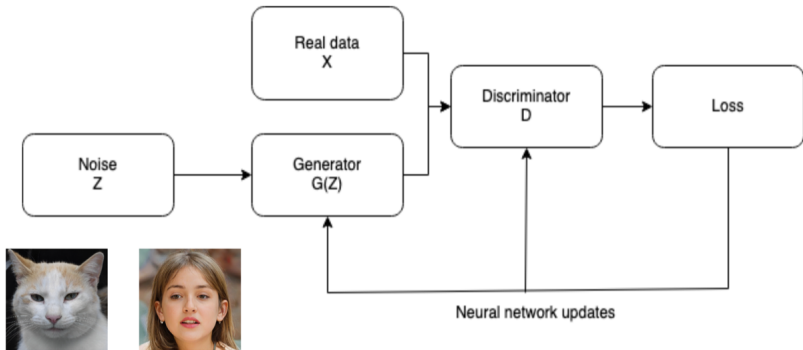
## *Step 1 : data - digital twin*

- Statistical matching → Development machine learning algorithms - AI
  - (Kernel Canonical Correlation Analysis, Super-Organizing Maps and Autoencoders-Canonical Correlation Analysis)
  - Statistical matching → Statistically correct at aggregate level - fictitious at individual level



## *Step 1 : data - digital twin*

- Generation fictitious datasets : Wasserstein Generative Adversarial Networks (WGAN)



## Results : Statistical matching

Measure	KCCA	A-CCA	Super-OM	CCA	MMLP	HD	REG
RwsMSE aver. cont. var.	0.60	0.64	0.62	0.63	0.63	1.23	0.58
RwsMSE aver. cat. var	0.95	0.94	0.95	0.94	0.90	1.03	0.87
RwsMSE aver. all var.	0.87	0.87	0.87	0.86	0.83	1.08	0.80
Multivariate $R^2$ (Jones)	0.63	0.58	0.59	0.59	0.58	-1.05	0.64
Average $\widetilde{CVM}$ NC	1.18	1.17	2.43	1.78	3.06	0.67	9.85
Average $\widetilde{CVM}$ Mixed	0.67	0.64	1.39	0.94	1.67	0.82	5.42

*Table* – Results (average over five folds) of the different statistical matching techniques applied to the SILC dataset only. KCCA : Kernel Canonical Correlation Analysis; A-CCA : Autoencoders Canonical Correlation Analysis; Super-OM : Super organizing maps; CCA : Canonical Correlation Analysis; MMLP : Multi-output Multilayer Perceptron; HD : Distance Hot-deck; REG : Multi-output regression. aver. cont. var., average for all continuous variables; aver. cat. var., average for all categorical variables; aver. all var., average for all variables.

## *Results : Generation fictitious datasets*

- Here we can find the results for the validation set for each method using the best hyperparameters.

	WGAN with GP	WGAN with WC	SDV (CopulaGAN) <sup>1</sup>
Wasserstein distance	<b>5.6116</b>	6.5685	8.352
Relative difference of the radius of a SVDD	<b>0.00098</b>	0.00652	0.01654
Time <sup>2</sup>	<b>2h</b>	2h	25h

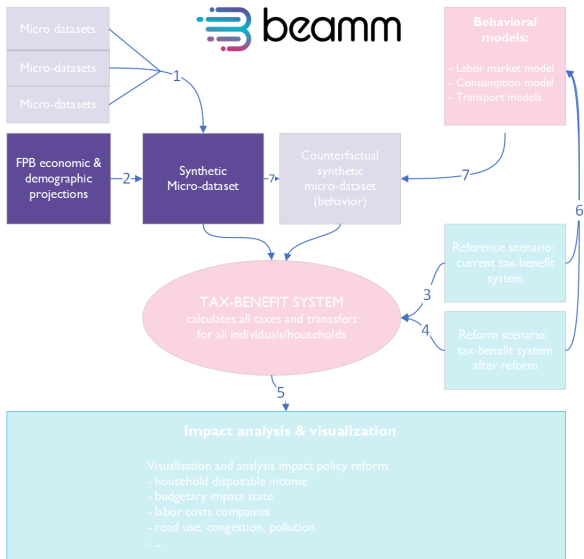
- The absolute value of the difference of correlations between all the variables is for more than 90% of the couples of variables smaller for WGAN with GP than for SDV (CopulaGAN).

---

1. SDV is a python package that provides functions to create synthetic datasets. CopulaGAN is one of their most advanced functions that combines GAN models with Copulas.

2. for one combination of hyperparameters

## Step 2 : projecting data



## *Step 2 : Nowcasting/forecasting data*

- Problem : data reflect situation in past, project evaluation now/future

## *Step 2 : Nowcasting/forecasting data*

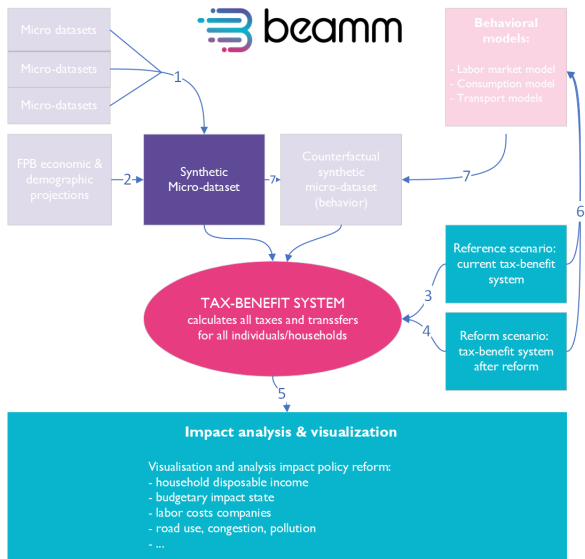
- Problem : data reflect situation in past, project evaluation now/future
- Solution : reweighting/uprating data in function of projections  
Federal Planning Bureau
  - demographic
  - economic

## *Step 2 : Nowcasting/forecasting data*

- Problem : data reflect situation in past, project evaluation now/future
- Solution : reweighting/uprating data in function of projections  
Federal Planning Bureau
  - demographic
  - economic
- (Work-in-progress → now : Fantasi-D, AI later)



## Step 3 : micro-simulation Model



## *Step 3 : tax-benefit micro-simulation*

- Simulating the rules of the tax-benefit system for each individual/household

## *Step 3 : tax-benefit micro-simulation*

- Simulating the rules of the tax-benefit system for each individual/household
- Scope :
  - Taxes/contributions : PIT (Fantasi), **Social Security Contributions**, VAT & excise duties, Inheritance taxes, Road/car taxes, Property taxes, Investment income taxes, Gift taxes
  - Benefits : birth allowance, **unemployment benefits**, income support, child benefits, **pensions**, parental leave

## *Step 3 : tax-benefit micro-simulation*

- Simulating the rules of the tax-benefit system for each individual/household
- Scope :
  - Taxes/contributions : PIT (Fantasi), **Social Security Contributions**, VAT & excise duties, Inheritance taxes, Road/car taxes, Property taxes, Investment income taxes, Gift taxes
  - Benefits : birth allowance, **unemployment benefits**, income support, child benefits, **pensions**, parental leave
  - Polyvalent platform → ad hoc instruments in function of projects

## *Step 3 : tax-benefit micro-simulation*

- Simulating the rules of the tax-benefit system for each individual/household
- Scope :
  - Taxes/contributions : PIT (Fantasi), **Social Security Contributions**, VAT & excise duties, Inheritance taxes, Road/car taxes, Property taxes, Investment income taxes, Gift taxes
  - Benefits : birth allowance, **unemployment benefits**, income support, child benefits, **pensions**, parental leave
  - Polyvalent platform → ad hoc instruments in function of projects
- Documentation tax-benefit system → plan : integration figures from data

## *Step 3 : tax-benefit micro-simulation*

- Online interface
  - Allow users to specify tax-benefit reforms
  - Present analysis & visualization of impact reform
  - All developed/managed in R

## *Step 3 : tax-benefit micro-simulation*

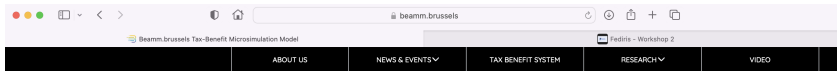
- Online interface
  - Allow users to specify tax-benefit reforms
  - Present analysis & visualization of impact reform
  - All developed/managed in R
- Family of online interfaces : running on same core model, different focus/scope
  - Beamm.brussels, Beamm.be, transport-beamm.brussels, tranport-beamm.be, social-beamm etc.

## *Step 3 : tax-benefit micro-simulation*

- Online interface
  - Allow users to specify tax-benefit reforms
  - Present analysis & visualization of impact reform
  - All developed/managed in R
- Family of online interfaces : running on same core model, different focus/scope
  - Beamm.brussels, Beamm.be, transport-beamm.brussels, tranport-beamm.be, social-beamm etc.
- Server side
  - Public cloud server → kubernetes cluster to dynamically adapt server capacity



# Online interface : *Beamm.brussels*



[HOME](#) [SIMULATION](#) [BEAMM](#) [CONTACT](#)

OPEN-ACCES TAX-  
BENEFIT  
MICROSIMULATION  
MODEL FOR THE  
BRUSSELS CAPITAL  
REGION

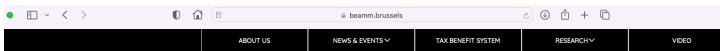
to simulation



**BEAMM.**

beamm.brussels is an online open-access tax-benefit  
microsimulation model for the Brussels Capital Region.

# Online interface : Beamm.brussels



HOME SIMULATION BEAMM CONTACT

Acknowledgments

1 Child Benefits

2 Gift Tax

3 Income Support

4 Inheritance Tax

5 Investment Income

6 Maternity Leave

6.1 Modelling Assumptions

6.2 Module Input

6.3 Module output

6.4 References

7 Pension System

8 Real property

9 Social Security Contributions - Employees and Em...

10 Social Security Contributions - Special

11 Social Security Contributions - Self-employed

12 Social Security Contributions - Non-Labour Income

13 Social Security Contributions - Flemish Care Insu...

14 VAT and Excise Duties

15 Wealth

## Chapter 6 Maternity Leave

Maternity leave benefit (*moederschapsrust uitkering / prestations de maternité*) is a benefit available to all new mothers. Different benefit schemes exist depending on whether the woman is employed, unemployed or self-employed. Employed and unemployed women are eligible for the benefit if they have worked at least 120 days in the six months prior to applying for the benefit and have paid sufficient social security contributions. Holidays and days of unemployment also count as working days. If the mother has a part-time contract, she has to have worked at least 400 hours in the last eighteen months. Self-employed mothers are only eligible if they have paid two quarterly social security contributions.

Employed and unemployed mothers are granted fifteen weeks of leave, of which at most six weeks can be taken before the expected date of birth. At the latest, the leave must start one week before the expected date of birth. If the birth takes place before the expected date of birth, the days between the actual and expected date of birth are lost. After the birth, the maternity leave has to last for at least nine weeks. If more than one child is born, the maternity leave period is increased by four weeks, of which two can be taken before the birth.

During the first thirty days of their leave, employed mothers receive 82% of their gross daily wage. The gross daily wage is calculated based on a six-day working week and the benefit amount is paid for six days per week. After the thirtieth day, they receive 75% of their gross daily wage, which is limited to the amount shown in Table 6.1.

Table 6.1: Maximum daily wage used for maternity leave benefit calculation

Type	Component	2016	2017	2018	2019	2020
Payment	Max. daily wage	135.91	138.63	139.74	142.53	144.10
Taxation	Withholding tax	11.11%	11.11%	11.11%	11.11%	11.11%
Taxation	SIC	no	no	no	no	no

For the first 30 days, unemployed mothers receive a basic amount equal to their unemployment benefit plus 19.5% of the wage on which their unemployment benefit was calculated, which is limited to the maximum daily wage shown in Table 6.1. After that the benefit is reduced to 15% of the wage on which unemployment benefit was calculated.

# Online interface : Beamm.brussels

The screenshot shows a web browser window with the URL `beamm.brussels`. The page title is "Simulation" and the user is logged in as "Fedris - Workshop 2". A sidebar on the left lists various tax categories, with "Principal Amount" selected at the bottom. The main content area explains that the 'Principal amount' is calculated as the basic tax due on aggregate taxable income, minus tax reductions for exempt income, replacement income, and foreign income. It then prompts the user to "Select a computation step:", with a dropdown menu showing "1. Computation of the basic tax". Below this, a paragraph states that the basic tax uses a progressive rate. A table illustrates the tax rate segments:

From (€)	To (€)	Tax Rate
0	11070	0,25
11070,01	12720	0,3
12720,01	21190	0,4
21190,01	38830	0,45
38830,01		0,5

At the bottom of the main content area, the text "Computation of the basic tax: an example" is displayed.

# Online interface : *Beamm.brussels*

Simulation Fedris - Workshop 2

ABOUT US NEWS & EVENTS TAX BENEFIT SYSTEM RESEARCH VIDEO

beamm.brussels HOME SIMULATION BEAMM CONTACT

(UNDER DEVELOPMENT. WARNING: this application is still under development and is running on dummy data. It is shown only for development purposes.)

INTRO INPUTS RESULTS

**Simulate a tax-benefit reform**  
After setting the parameters of your reform, click the 'Simulate' button, and sit back while beamm computes the impact of the reform.

**Reset the parameters**  
In order to reset the parameters to their default values, corresponding to the default (no reform) tax-benefit system, click the 'Reset' button.

SIMULATE RESET

Introduction  
Child Benefits

## Computation of the Principal Amount

The 'Principal amount' is equal to (1) the basic tax due on the Aggregate Taxable Income minus (2) the tax reduction implied by the tax-exempt income amount, (3) the tax reduction for employment income, and (4) the tax reduction...

# Online interface : Beamm.brussels



HOME SIMULATION BEAMM CONTACT

## Summary

Household income

State budget

Tax Burden

Tax Wedge

Inequality

Poverty

Redistribution

## Impact Overview

See here below the impact of the chosen reform on a number of summary indicators. For a more in-depth analysis, click on 'More details' or browse the thematic results pages through the menu at the left.



### Household income

The household income is the sum of any source of income (including benefits) minus taxes. As a result of the the chosen reform, the average disposable income

Increases from  
1.016.689,6  
to  
1.055.292,1  
by  
38.602,5



### Fiscal revenue

The fiscal revenue is the sum of all taxes levied by the public authority. As a result of the the chosen reform, the total fiscal revenue

Decreases from  
3,99 bn EUR  
to  
3,83 bn EUR  
by  
0,17 bn EUR



### Tax Burden

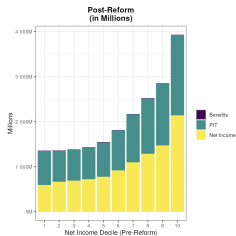
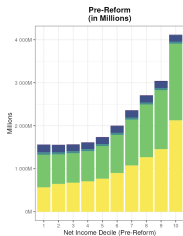
The tax burden is ratio between the amount of taxes paid (net of benefits received) and the total gross income. As a result of the chosen reform, the total tax burden

Decreases from  
56,5%  
to  
54,5%  
by  
2 percentage points

# Online interface : *Beamm.brussels*

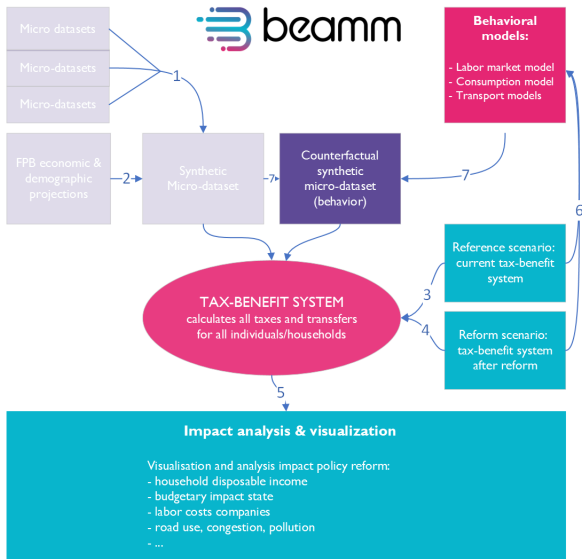
Average 0,071 0,447 0,022

## Before and After the Reform (in Millions)



## Before and After the Reform (in Percentage of Total Gross Income)

## Step 4 : behavioral modelling



## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions



## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions
- **Labor market** modelling : RuRo model
  - Collaboration with KU Leuven (team André Decoster)
  - Predicting labor market responses to tax-benefit reforms

## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions
- **Labor market** modelling : RuRo model
  - Collaboration with KU Leuven (team André Decoster)
  - Predicting labor market responses to tax-benefit reforms
- **Consumption** modelling : Demand systems modelling
  - exploring hybrid AI & structural equations methodologies...

## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions
- **Labor market** modelling : RuRo model
  - Collaboration with KU Leuven (team André Decoster)
  - Predicting labor market responses to tax-benefit reforms
- **Consumption** modelling : Demand systems modelling
  - exploring hybrid AI & structural equations methodologies...
- **Transport** modelling
  - Integration transport models : TML, U.Liège, KU Leuven

## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions
- **Labor market** modelling : RuRo model
  - Collaboration with KU Leuven (team André Decoster)
  - Predicting labor market responses to tax-benefit reforms
- **Consumption** modelling : Demand systems modelling
  - exploring hybrid AI & structural equations methodologies...
- **Transport** modelling
  - Integration transport models : TML, U.Liège, KU Leuven
- **Family dynamics** (TAXFAM project)
  - Fiscal unit : individual vs couple

## *Step 4 : behavioral modelling*

- Microsimulation as such → only 'day after' effect = no behavioral reactions
- **Labor market** modelling : RuRo model
  - Collaboration with KU Leuven (team André Decoster)
  - Predicting labor market responses to tax-benefit reforms
- **Consumption** modelling : Demand systems modelling
  - exploring hybrid AI & structural equations methodologies...
- **Transport** modelling
  - Integration transport models : TML, U.Liège, KU Leuven
- **Family dynamics** (TAXFAM project)
  - Fiscal unit : individual vs couple
- ...

# *Today's menu*

1. Beamm : motivation and intro
2. Presentation beamm : model
3. **Next steps**

## *Beamm : next steps*

- Co-creation with key actors
- Beamm.brussels : Test version online → validation, error tracking, finalizing interface

## *Beamm : next steps*

- Co-creation with key actors
- Beamm.brussels : Test version online → validation, error tracking, finalizing interface
- Creation video content, social media, tour of key users (cabinets, administrations, civil society platforms...)



## *Beamm : next steps*

- Co-creation with key actors
- Beamm.brussels : Test version online → validation, error tracking, finalizing interface
- Creation video content, social media, tour of key users (cabinets, administrations, civil society platforms...)
- Beamm launch party this winter

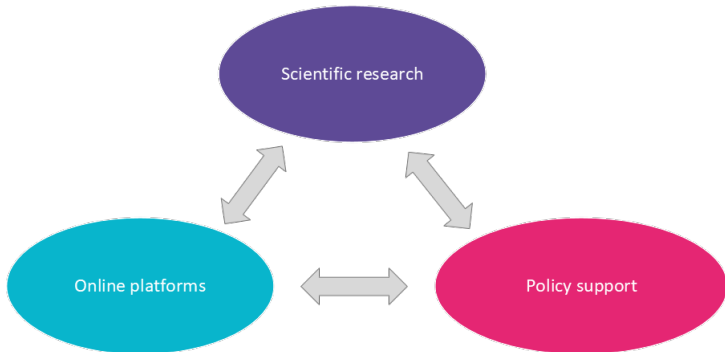
## *Beamm : next steps*

- Co-creation with key actors
- Beamm.brussels : Test version online → validation, error tracking, finalizing interface
- Creation video content, social media, tour of key users (cabinets, administrations, civil society platforms...)
- Beamm launch party this winter
- Sister platforms
  - transport-beamm.brussels → focus on mobility
  - beamm.be → generic model for Belgium
  - social-beamm, etc.

## *Beamm : next steps*

- Co-creation with key actors
- Beamm.brussels : Test version online → validation, error tracking, finalizing interface
- Creation video content, social media, tour of key users (cabinets, administrations, civil society platforms...)
- Beamm launch party this winter
- Sister platforms
  - transport-beamm.brussels → focus on mobility
  - beamm.be → generic model for Belgium
  - social-beamm, etc.
- Beamm = long term project → continued investment/development over coming years/decades..

# *Beamm Trinity*



*And finally..*

- **Smarter together than alone...**
  - Open for collaboration
  - Beamm = building block
  - Longer term : networked simulation platforms

## *And finally..*

- **Smarter together than alone...**
  - Open for collaboration
  - Beamm = building block
  - Longer term : networked simulation platforms
- In that light : Vlaamse Overheid and CAPE
  - Open for further collaboration, reciprocity
  - Participate or present in our workshops ?
  - Feel free to reach out !

Questions ? Interested ?

Contact us :

[tom.truyts@uclouvain.be](mailto:tom.truyts@uclouvain.be)

[cape-slb@uclouvain.be](mailto:cape-slb@uclouvain.be)

Sites : [Tom Truyts](#), [CAPE](#)



## *Use cases : examples (1)*

- Mobility : Smartmove (BCR), Fiscal instruments towards greening mobility (Flanders), Societal value public transport
  - Distributional analysis
  - Estimation of behavioral responses
  - Revenue recycling



## *Use cases : examples (1)*

- Mobility : Smartmove (BCR), Fiscal instruments towards greening mobility (Flanders), Societal value public transport
  - Distributional analysis
  - Estimation of behavioral responses
  - Revenue recycling
- Tax design : personal income tax
  - Towards optimal personal income tax → trade off equity-efficiency
  - Calculation elasticity of taxable income, calculation elasticity labor supply

## *Use cases : examples (1)*

- Mobility : Smartmove (BCR), Fiscal instruments towards greening mobility (Flanders), Societal value public transport
  - Distributional analysis
  - Estimation of behavioral responses
  - Revenue recycling
- Tax design : personal income tax
  - Towards optimal personal income tax → trade off equity-efficiency
  - Calculation elasticity of taxable income, calculation elasticity labor supply
- Socio-economic impact carbon taxes
  - Distributional impact, compensating measures,
  - Estimation behavioral reactions → consumption and investment in durables

## *Use cases : examples (2)*

- Tax design and family dynamics TAXFAM ARC project
  - Impact assessment, budgetary costs reform scenarios, distributional impact...
  - What is the fiscal unit : household vs individual ?
  - Costs of living couples vs singles → fairness fiscal unit
  - Behavioral models of household dynamics : childcare and labor supply, divorce

## *Use cases : examples (2)*

- Tax design and family dynamics TAXFAM ARC project
  - Impact assessment, budgetary costs reform scenarios, distributional impact...
  - What is the fiscal unit : household vs individual ?
  - Costs of living couples vs singles → fairness fiscal unit
  - Behavioral models of household dynamics : childcare and labor supply, divorce
- Fantasi project
  - Development Fantasi - microsimulation model Personal Income Tax
  - With Financiën en Begroting, Vlaamse Overheid

## *Use cases : examples (2)*

- Tax design and family dynamics TAXFAM ARC project
  - Impact assessment, budgetary costs reform scenarios, distributional impact...
  - What is the fiscal unit : household vs individual ?
  - Costs of living couples vs singles → fairness fiscal unit
  - Behavioral models of household dynamics : childcare and labor supply, divorce
- Fantasi project
  - Development Fantasi - microsimulation model Personal Income Tax
  - With Financiën en Begroting, Vlaamse Overheid
- Calculation Interregional Financial Transfers
  - For Treasury Flanders

## *Use cases : examples (2)*

- Tax design and family dynamics TAXFAM ARC project
  - Impact assessment, budgetary costs reform scenarios, distributional impact...
  - What is the fiscal unit : household vs individual ?
  - Costs of living couples vs singles → fairness fiscal unit
  - Behavioral models of household dynamics : childcare and labor supply, divorce
- Fantasi project
  - Development Fantasi - microsimulation model Personal Income Tax
  - With Financiën en Begroting, Vlaamse Overheid
- Calculation Interregional Financial Transfers
  - For Treasury Flanders
- (IBSA-BISA support, Spending reviews, budget predictions ; participatory democracy,...)