### Lecture 1: Static microsimulation models

#### Antoine Bozio

Paris School of Economics (PSE) École des hautes études en sciences sociales (EHESS)

> Master PPD Paris – January 2019

### Outline of the course

#### I. Tax and benefit microsimulation models

- 1 Static microsimulation models (MSM)
- **2** Tutorial (1) : using python for microsimulation
- 8 Behavioural responses and dynamic MSM
- **4** Tutorial (2) : microsimulation in practice

#### II. Modelling macro shocks and policies

- Evaluating the impact of macro shocks and policies on poverty and income distribution
- 2 Computable General Equilibrium models
- **3** Integrating CGE and Microsimulation models
- 4 Tutorial : Integrating CGE and Microsimulation models

### Outline of the lecture

- I. Why microsimulation?
- II. Typology of modelling techniques
- III. Static microsimulation models
- IV. Example : TAXIPP model for France

# I. Why microsimulation?

#### Evaluation

- Ø History
- 3 Modelling complexity

I. Why microsimulation? Evaluation of public policies

### Objectives

- Inform policy makers on the impact of policy
- Contribute to academic knowledge
- Part of the democratic process

### • Methods of evaluation

- Ex post evaluation methods
  - RCT
  - Natural experiments
  - Econometrics
- Ex ante evaluation methods
  - Macrosimulation
  - Microsimulation

I. Why microsimulation? Evaluation of public policies

#### • Microsimulation : definition

- Simulation-based tool with micro unit of analysis
- · Simulate actual or counterfactual policies

#### • Objective

- Ex post evaluation of complex policies
- Computer-based laboratory for running policy experiment (ex ante evaluation)

• Guy Orcutt (1917-2006)



Guy Orcutt, American Economist and Econometrician, Prof. at Harvard, Wisconsin and Yale. He joined the Urban Institute to develop DYNASIM, the dynamic microsimulation model of the Institute.

 "Existing models of our socio-economic system have proved to be of rather limited predictive usefulness. This is particularly true with respect to predictions about the effects of alternative governmental actions"

- Orcutt (RESTAT, 1957; AER, 1960)
  - Criticism of representative agent models common in macroeconomics
  - Criticism of sectorial modelling (a la Leontief)
  - Non-linear relationship at the individual level cannot be estimated at the aggregated level
  - Distribution of variables across household is of major interest

### • Main objectives

- Modelling at the unit of decision (individuals, households, firms, etc.)
- Simulation of the economy with computer power
- Very ambitious project for the time

- Slow beginnings
  - Lack of computer power
  - Lack of micro-data
  - Few attempts in the 1970s, in demographics
- Take-off of the field
  - 1980-90s development of personal computer
  - Explosion in computer power
- From academia to administrations
  - Development of models in academia (1980s)
  - Administrations have incorporated these models (need for significant resources)
  - Specialized institutes (Urban Institute, NATSEM, IFS, DIW, ZEW, CPB, etc.)

#### • Microsimulation : a tool for public debate

- Debate around budget decisions
- Debate around election platforms

### • IFS and the Green Budget (U.K.)

- TAXBEN model used for post-budget analysis
- Green Budget : pre-budget discussions

### • CPB (Netherlands)

• Analysis of election platforms

### • CBO (U.S.)

Impact evaluation of policy proposals

#### TABLE 1: Some static microsimulation models

Country	Model	Institution	Software
Australia	STINMOD	NATSEM	SAS
Belgium (Flanders)	MEFISTO	Leuven Univ.	Euromod ; Java
E.U.	EUROMOD	Essex Univ.	.NET
Finland	TUJA	-	
France	INES	Insee/Drees/Cnaf	SAS
France	SAPHIR	DG Trésor	SAS
France	TAXIPP	IPP	Stata/Python
Germany	IZAΨMOD	IZA	Stata
Germany	MIKMOD	Min. of finance	Java
Ireland	SWITCH	ESRI	C++
Luxemburg	LuxTaxBen	LISER	SAS
Sweden	FASIT	Statistics Sweden	SAS
Sweden	SWEtaxben	Univ. of Gothenburg	SAS
U.K.	TAXBEN	IFS	Delphi/Stata
U.K.	Euromod	Essex Univ.	.NET
U.K.	FORTAX	A. Shephard	FORTRAN
U.S.	TRIM3	Urban Institute	C++
U.S.	TAXSIM	NBER	FORTRAN

Sources : Li et al., Table 3.1, p. 53, with additions.

# I. Why microsimulation? Modelling complexity

### Population complexity

- Complex units of decisions (individuals, couples, family, firms, etc.)
- Distribution of characteristics (income, demographics, occupation, etc.)
- Joint-distribution of all these variables

### Policy complexity

- Non-linear tax and benefit schedules
- Interaction between benefits/taxes
- Need modelling to assess impact of changes in policy

# I. Why microsimulation? Modelling complexity

- Behavioural complexity
  - Different margins of behavioural responses (labour supply, savings, education, etc.)
  - Heterogeneous preferences, information set
  - Difference in behavioural responses at the individual level

#### Temporal complexity

- Policy can depend on life-cycle history (e.g., pensions)
- Behavioural responses can be dynamic
- Historical analysis vs projections

### • Spatial complexity

• Location can matter for policy/behaviour/population heterogeneity

# II. Typology of microsimulation models

- Hypothetical models
- 2 Static models
- **3** Behavioural responses
- Oynamic models
- 6 Agent-based modelling

#### Definition

- Construct ideal/synthetic individuals/households
- Focus on policy complexity

#### Objectives

- Illustrative purpose
- Validation
- Cross-country comparisons
- Communication with the public

### • Example : OECD Taxing Wages

- Annual publication to analyse labour taxation in OECD countries
- 8 different households types :
  - Marital status
  - Number of children
  - Earnings

#### • Focus on tax wedge

- Personal income tax + employee and employer social security contributions + any payroll tax
- cash transfers

#### TABLE 2: OECD Household types

Marital status	Children	Earnings (' Principal	% of average) Secondary
Single individual	No children	67%	
Single individual	No children	100%	
Single individual	No children	167%	
Single individual	2 children	67%	
Married couple	2 children	100%	33%
Married couple	2 children	100%	67%
Married couple	no children	100%	33%

Sources : OECD, Taxing Wages, 2011, Tab. IV.5.

#### FIGURE 1: Average tax wedge decomposition in France



Note : Level of gross earnings expressed as percent of the average wage. Source : OECD, Taxing Wages, 2011, p. 116.

FIGURE 2: Average tax wedge decomposition in Germany



Note : Level of gross earnings expressed as percent of the average wage. Source : OECD, *Taxing Wages*, 2011, p. 117.

FIGURE 3: Average tax wedge decomposition in the U.K.



Note : Level of gross earnings expressed as percent of the average wage. Source : OECD, Taxing Wages, 2011, p. 138.

#### Limitations

- Lack of representativeness
- Limited heterogeneity in population
- Can focus on meaningless features of policy
- Will often disregard detailed aspects of policy that matters a lot

e.g., tax credits or tax reliefs

- Cannot get aggregate effects of policy
- International comparisons inherently difficult
  e.g., different earnings distribution : average gross earnings different

#### Definition

- Micro-data as baseline
- Modelling of policy
- Static or arithmetical (tax and benefit simulator)

#### Advantage vs disadvantages

- Provides "day after reform" effects
- Provides aggregate estimates
- Provides redistribution impacts

#### • Large diffusion

- Very developed for tax and benefit
- France : TAXIPP, INES, SAPHIR
- Europe : EUROMOD

#### Limitations

- No behavioural responses
- No time dimension

II. Typology of microsimulation models Behavioural responses

### • Definition

- Static model as baseline
- Modelling of policy impact on behaviour
- Estimate the second-round effects

### • Specific margins of behavioural responses

- Mostly labour supply (extensive or intensive)
- Or taxable income elasticity responses
- More rarely substitution or avoidance margins
- Many possible behavioural responses (education, fertility, entrepreneurship, etc.)

II. Typology of microsimulation models Behavioural responses

- Dynamic scoring debate in the U.S.
  - Debate in the U.S. around simulations of tax reforms by CBO
  - Whether or not to incorporate macroeconomic effects
  - Auerbach (JEP 1996, AER 2005); Caroll and Hrung (AER 2005)

#### Trade-offs

- See Adam and Bozio (2009)
- High degree of uncertainty around the dynamic scoring estimates
- How to deal with that uncertainty?

# II. Typology of microsimulation models Dynamic models

#### • Definition

- Incorporate time dimension
- Dynamics of changes in population (ageing, careers, etc.)
- Cohort vs cross-section

#### Advantages

- Projection of population into distant future
- Analysis of pensions, elderly care, education policies

# II. Typology of microsimulation models Agent-based models

### • Definition

- Agent-based Computational Economics (ACE)
- Development from artificial intelligence field
- Modelling of interactions between agents in economics environment

#### Advantage vs disadvantages

- Adapted to simulate emergence of organisation, market structure, matching
- Key focus on market equilibrium
- · Limitations in calibration and empirical test

### III. Static models

- 1 Structure of static models
- 2 Baseline data
- 3 Coding policy
- Incidence
- Static ageing

### III. Static models

### Structure of static models

### 1 Data

- Micro-data representative
- Aggregate data on population
- Aggregate data on policy outcomes

### 2 Policy

- Parameters
- Formulas
- Incidence

### 8 Reforms

- Counterfactual policy simulations
- Representation of the impact

# III. Static models Baseline data

### Baseline data

- Household surveys (links between individuals)
- Administrative data (tax, social security)
- Representativeness vs detailed characteristics

#### Grossing-up

- Re-weighting based on aggregated data
- Get aggregate values for key variables
- Careful exercices (O'Donoghue, Sutherland and Utili, 2000)

# III. Static models Coding policy

### • Policy scope

- Tax and benefits
- Indirect taxation often separate
- Excluded usually : pension benefit, unemployment insurance
- Household level : exclusion of taxation at firm level

#### From law to code

- Parameters
- Formula

#### • Gathering information

- Complex set of parameters
- Not easy to find for past years

# III. Static models Coding policy

# $\mathbf{FIGURE}$ 4: IPP tax and benefit tables : Pension SSCs in the private sector

Date d'effet	Salaire sous plafond		Sur tout salaire		Références législatives
	Salariés	Employeurs	Salariés	Employeurs	References regislatives
01/01/2016	6,90%	8,55%	0,10%	1,60%	Décret 2012-847 du 02/07/2012, art. 5
01/01/2015	6,85%	8,50%	0,10%	1,60%	Décret 2012-847 du 02/07/2012, art. 5
01/01/2014	6,80%	8,45%	0,10%	1,60%	Décret 2012-847 du 02/07/2012, art. 5
01/11/2012	6,75%	8,40%	0,10%	1,60%	Décret 2012-847 du 02/07/2012, art. 5
01/01/2006	6,65%	8,30%	0,10%	1,60%	Décret 2005-1657 du 26/12/2005
01/07/2004	6,55%	8,20%	0,10%	1,60%	Décret 2004-858 du 24/08/2004
01/02/1991	6,55%	8,20%		1,60%	Décret 91-91 du 23/01/1991
01/01/1989	7,60%	8,20%			Décret 88-1234 du 30/12/1988
01/07/1987	6,60%	8,20%			Décret 87-453 du 29/06/1987
01/08/1986	6,40%	8,20%			Décret 86-876 du 29/07/1986
01/01/1984	5,70%	8,20%			Décret 83-1198 du 30/12/1983
01/01/1979	4,70%	8,20%			Décret 78-1213 du 26/12/1978
01/10/1976	3,45%	7,70%			Décret 76-894 du 29/09/1976
01/01/1976	3,25%	7,50%			Décret 75-1273 du 29/12/1975

SOURCE : Barème IPP - prélèvement sociaux

# III. Static models Coding policy

- Model
  - Set-up tax/transfer functions depending on input variables X

$$T = f(X)$$

### Simplification

- f(X) is complex
- Policy complexity often too high
- Decreasing return to accuracy

### • Data and approximation

- Missing information in data
- Imputation of tax and benefit
- Imputation of characteristics x

### III. Static models Incidence

### • Statutory/formal incidence

• It is the legal liability of a tax (what the law says).

### • Economic/effective incidence

• It describes who actually bears the tax burden, i.e., who is worse off as a result of the tax.

# • Static microsimulation relies on incidence assumptions

- Usually exclusion of firm taxation
- Indirect taxation incident on consumers (on prices)
- Employer SSCs incident on employees (or consumers)

### III. Static models Incidence

### • Employer social security contributions (SSC)

- Debate on whether incident on consumers (higher prices) or employees (lower wages)
- Obvious long vs short term incidence
- It has consequences for analysing policy of reduction of SSC on low earners.

#### Indirect taxes

- Usual analysis lead to most indirect taxes are paid by consumers
- Detailed analysis (Carbonnier 2007, 2009) suggest part is paid by factors

## III. Static models Incidence

#### • Corporate income tax (CIT)

- Standard view : CIT paid by shareholders
- Modern finance view : likely to be paid by capital owners at large
- Some studies suggest that CIT is paid mostly by consumers or wage earners
- Huge implications in terms of redistribution analysis!

#### • Undistributed corporate profits

- Undistributed profits are part of national income
- CIT is imposed on them
- Problem : who receive this income?
- Shareholders are the likely recipients
### III. Static models Static ageing

#### Needs for updated data

- · Simulate proposed reforms for next years' budget
- Delay in getting updated micro data (often 2-3 years lag)

#### Static ageing

- No modelling of dynamic processes
- Use macro-aggregates to update population characteristics (income, employment status, etc.)
- Problematic when far away from baseline data

- A French tax and benefit model developed at the *Institut des politiques publiques* (IPP)
- Currently all tax systems from 1997 to 2019

#### • A classic arithmetical model

- A static model
- A module of behavioural response (still limited)

#### Specificities

- 1 Based on administrative data
- 2 Incorporating top incomes

#### • Language

- Originally written in Stata (versions 0.x)
- Transcription into Python (from versions 1.0)

#### Version control

- TAXIPP 0.5 last Stata version
- TAXIPP 1.0 python version
- TAXIPP 2.0 under way

#### Documentation

• IPP Methodological Guides

#### • Part of larger set of models in development

- PENSIPP : dynamic microsimulation model of the French pension system
- TAXIPP-LIFE : over the life-cycle

- 1 French tax and benefit system
- 2 Data sources
- 3 Measuring redistribution
- 4 Example studies

#### • The main components

- Social security contributions
- Income taxation
- Benefits
- Wealth and transfer taxation
- Corporate taxation
- Indirect taxation

#### • The main input characteristics

- Types of income (earnings, capital income, etc.)
- Sector or type of occupation
- Household composition (age and number of children, etc.)
- Housing situation (renter vs owner)
- Wealth

#### • Social security contributions

- Different Social Security schemes
- SSCs based on hourly gross wage
- Schedule depends from Social Security Threshold (SST)

#### Very complex schedule

- postcode of employer (transport tax)
- whether in Alsace-Lorraine or not
- prevalence of work accident by occupation
- size of firm
- share of earnings from bonus (in the public sector)

#### • Contribution sociale généralisée (CSG)

- Flat rate income tax to fund health care
- Larger tax base than income tax or SSCs

#### • Deductability vs non-deductability

- Part of CSG is deductable for income tax
- Part is non-deductable
- Result : taxable income in France is higher than net earnings !
- In some countries taxable income = gross earnings

### IV. TAXIPP model for France French legislation

FIGURE 5: From labour cost to taxable income



### IV. TAXIPP model for France French legislation

TABLE 3: From labour cost to disposable income

Included	Cost of labour	Gross earnings	Taxable income	Net income	Disposable income
Payroll tax (TS)	$\checkmark$				
Employer SSC	$\checkmark$				
Employee SSC	$\checkmark$	$\checkmark$			
CSG deductible	$\checkmark$	$\checkmark$			
Non ded. CSG and CRDS	$\checkmark$	$\checkmark$	$\checkmark$		
Income tax	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	
Benefits	$\checkmark$	$\checkmark$	$\checkmark$	<ul> <li>✓</li> </ul>	$\checkmark$

#### Income tax

- Progressive schedule with marginal rates
- Income pooled at tax unit level : joint taxation
- Size of the household taken into account for assessing progressivity : "quotient familial"

#### • Complex tax base estimation

- Large number of tax reliefs (e.g., child care cost, gifts, etc.)
- Complex rules for capital income (e.g., duration of ownership for capital gains)

- Family Benefits
  - Universal family benefits (depends on age, and rank of child)
  - Benefits for covering child care
  - Means-tested benefits for education costs

#### Housing benefits

• Subsidy for renters based on location, rent level, income and household composition

#### Income support

- RSA : for 25-64 year-olds
- ASPA for 65 +
- Other minima for unemployed, or disabled individuals

### IV. TAXIPP model for France Data sources

#### Micro-data

- Household survey *Revenus fiscaux* : French Labour force survey matched to tax and benefit data
- Household survey Budget des familles
- Household survey Patrimoine
- Household survey Logement

#### Administrative data

- Income Tax returns (FELIN from DGFip)
- Housing tax returns (FIDELI from DGFip-Insee)
- Earnings data declared by employers (DADS)

# IV. TAXIPP model for France Data sources

#### • Aggregate data

- Demographics
- National accounts
- Detailed tax revenues
- Benefits spending and beneficiaries

### IV. TAXIPP model for France Example : tax revenues

#### FIGURE 6: French income tax revenues 2008

1 I TRAITEMENTS, SALAIRES, PRIME POUR L'EMPLOI, PENSIONS ET RENTES					
	VOUS	CONJOINT	1º PERS. À CHARGE	2* PERS. À CHARGE	
TRAITEMENTS, SALAIRES	L				
Revenus d'activité	449 222 906 276	BI 110 458 196 681	1 298 997 422	130 351 022	
Autres revenus imposables nrénetraite chomâge	AP 20 167 521 927	BP 4 800 053 360	CP 52 972 635	DP 5 763 514	
Frais réels liste détaillée sur papier libre	AK 20 252 123 911	BK 5 464 550 987	CK 41 167 849	DK 3 179 242	
Demandeur d'emploi de plus d'un an	AI ·	BI	ci ·	DI	
Revenus d'heures supplémentaires exonérés	AU 10 172 520 837	BU 1 421 551 142	CU 6 552 015	DU 732 968	
POUR RECEVOIR LA PRIME POUR L'EMPLOI <i>Pour obtenir la prime par virement, joignez un RIB si vous ne l'avez pas déjà communiqué</i> Vous avez exercé une activité à temps plein toute l'année 2008;					
cochez la case	AX	BX	cx	DX	
Sinon, nombre d'heures payées dans l'année	AV 3 924 689 184	BV 1 677 010 608	CV 88 799 803	DV 8 440 683	
y compris les heures supplémentaires exonérées PENSIONS, RETRAITES, RENTES Y COMPRIS PENSIONS ALIMENTAIRES					
Pensions, retraites, rentes	AS 191 707 190 233	BS 36 299 202 033	CS 143 382 679	DS 30 268 006	
Pensions alimentaires percues	AO 4 613 648 919	BO 316 630 305	CO 336 603 954	DO 126 904 013	
RENTES VIAGÈRES À TITRE ONÉREUX					
Total des rentes perçues par le foyer pour chaque âge	MOINS DE 50 ANS	DE 50 Å 59 ANS	DE 60 Å 69 ANS	À PARTIR DE 70 ANS	
d'entrée en jouissance.	AW 32 333 277	BW 120 322 785	CW 499 961 096	DW 429 214 609	

SOURCE : www.impot.gouv.fr

### IV. TAXIPP model for France Matching data sources

#### • Principle

- Literature on data fusion
- Select common variables (age, sex, household composition, income, types of income)
- Create a score and minimize distance

#### Practice

- Main source is income tax records from FELIN
- Matched with Revenus fiscaux
- Matched with housing information from FIDELI
- Matched with consumption data from Budget des familles

### IV. TAXIPP model for France Imputing top incomes

#### • Limitation of survey sources

- Top of the distribution not well represented
- Too few observations, under-reporting
- Generally explains the under estimation of aggregate values

#### Solution

- Using tax data from administrative sources
- Estimation of top income distribution (Piketty and Saez, 2001; Atkinson and Piketty, 2010)
- Impute top incomes based on these distributions
- Or matched with administrative data when available

### IV. TAXIPP model for France Weighting-up to aggregate data

#### • Principle

- Systematic comparison between aggregates from micro data and macro data
- Run the model to get estimates of tax revenues by type of revenues
- Re-base variables on macro-data

#### Discrepancies

- Earnings :
  - Good fit for private sector
  - No identification of bonuses in public sector
  - 10% lower estimate than NA (black market, fringe benefits)
- Other income : much lower estimate of dividends and other capital income estimates

### IV. TAXIPP model for France Weighting-up to aggregate data

TABLE 4: Ratio of simulated gross earnings to aggregate estimates from CSG tax base and national accounts (NA)

	Gross	earnings	(simulate	ed) /
Year	CSG tax base		NA tax base	
	private	public	private	public
2004	99,6%	98,9%	91,9%	89,9%
2005	99,4%	99,2%	90,9%	90,9%
2006	99,4%	101,4%	90,8%	92,4%
2007	99,5%	103,0%	90,5%	93,6%
2008	98,5%	105,7%	91,0%	95,5%
2009	97,1%	102,6%	91,8%	93,0%
2010	100,7%	104,1%	91,8%	93,0%

#### Measuring contributive capacity

#### • Types of income

- Net incomes are not a good measure
- Economic income : income before all taxes
- Need to add all taxes to net income including imputed indirect taxes

#### • Primary vs secondary income

- Primary income : income before transfer and taxes
- Secondary income : income before all taxes but including transfer income (pensions, unemployment) but net of SSC funding these transfers
- Primary income  $\simeq$  national income

#### Measuring contributive capacity

#### Income vs consumption

- Income might not be a good measure of permanent income
- Temporary variations in income are frequent e.g. unemployment : primary income drops to zero
- Consumption might be a better measure of permanent income
- Except that consumption does not capture systematic difference in savings over the life-cycle

#### Income vs wealth

• Income and wealth are not completely correlated

#### Philosophical backgrounds

- Social welfare functions depend on utilities
- Utility is derived from income, consumption, wealth...

### IV. TAXIPP model for France Household vs individual

#### • What unit of reference?

- Individuals : income
- Household : income is totally pooled among household members
- Partly a philosophical choice

#### • How to account for household size?

- Assessment of needs represented by each member
- OECD equivalence scale

### IV. TAXIPP model for France Life cycle issues

#### Cross-section is misleading

- Data source essentially cross-section
- Redistribution analysis is misleading

#### • Life-cycle issues

- Redistribution through contributory pensions/unemployment
- Age earnings profile explains part of the earnings inequality

#### Income variability

- Income shocks from one year to the other
- Bottom of the distribution : the "poor" are the unemployed or people at the minimum wage?

### IV. TAXIPP model for France Representation issues

#### • Choice of redistributive capacity

- Current income
- Measure of permanent income
- Consumption

#### • Choice of unit of reference

• Individuals, households, consumption unit

#### • Scale of the distribution

- Quintile, decile, percentile
- Absolute values

### IV. TAXIPP model for France Representation issues

FIGURE 7: Average tax rate on primary income by deciles (2010)



SOURCE : TAXIPP 0.3, Bozio, Guillot et Lafféter (2014).

### IV. TAXIPP model for France Representation issues

FIGURE 8: Average tax rate on primary income by percentiles (2010)



SOURCE : TAXIPP 0.3, Bozio, Guillot et Lafféter (2014).

### IV. TAXIPP model for France Incidence assumptions

FIGURE 9: Variants to incidence assumptions



SOURCE : TAXIPP 0.3, Bozio, Guillot et Lafféter (2014).

### IV. TAXIPP model for France Conflicting sources

- Measuring tax bases
  - Advantage of TAXIPP is to measure the extent of pre-tax income
  - Assessment of the largest tax bases
  - Methodology rests on accuracy of aggregate data

#### Conflicting sources

- National accounts and tax records do not always match well
- In particular for capital income
- Tax optimisation/measurement error?

#### • Large implications for measurement

- Capital income very concentrated in top incomes
- Error for these incomes matter a lot in the top

### IV. TAXIPP model for France Conflicting sources

FIGURE 10: Average tax rates (excl. contributive contributions) – variants about dividends imputations.



NOTE : In scenario 1 aggregate dividends are based on national accounts, in scenario 2 dividends are based on tax records. 64/81

### IV. TAXIPP model for France Simulating reforms

#### • Building a baseline

- Assumption about growth rates
- Large implications in terms of tax revenues

#### No behavioural case

- Apply the change in tax system
- Make comparative statistics

#### • With behavioural response

- Imbed an elasticity of the tax base to a change in tax rate
- Currently only done ad hoc for labour supply

### IV. TAXIPP model for France Issues

#### Interactions between tax bases

- Tax bases of one tax depends on other changes
- e.g. increase in SSC  $\Rightarrow$  lower taxable income  $\Rightarrow$  lower income tax

#### Inconsistency

- No behavioural response is inconsistent
- e.g. increase in income tax ⇒ lower consumption or/and lower savings
  - $\Rightarrow$  lower VAT or/and lower capital taxation

#### Data set-up

- Income and consumption appear under-reported in *Budget* des familles
- Need to scale them up to aggregate data

#### • Case study where choice of earning capacity matters

- Regressive taxation based on current income
- Flat taxation based on consumption level

TABLE 5: Consumption under-reporting in Budget desFamilles

Survey Year	Consumption from BdF	Consumption from NA	%
1995	569,1	660,97	86,1%
2000	670,8	782,19	85,8%
2005	784,5	946,12	83,0%

Note : in billion of euros.

Sources : BdF 1995, 2000 and 2005.

TABLE 6: Income under-reporting in Budget des Familles

Survey	Disposable income	Disposable income	%
Year	from BdF	from NA	
1995	600,9	784,84	76,6%
2000	709,7	913,35	77,7%
2005	801,3	1108,69	72,3%

 $\ensuremath{\textit{Note}}$  : in billion of euros. Disposable income includes imputed rents.

Sources : BdF 1995, 2000 and 2005.

FIGURE 11: Share of indirect taxes in consumption and net income in 2005, by decile of disposable income



#### • VAT reduction for restaurants

- July 2009, reduction from 19.5% to 5.5%
- After a long debate with EU authorities

#### • Contract with restaurant unions

- VAT reduction should be shifted into prices for 7 products
- Restaurants should create 40'000 jobs
- Open wage negociations

FIGURE 12: Evolution of prices


### IV. TAXIPP model for France Indirect taxation

#### TABLE 7: Gain in VAT reduction by decile

Consumption	Average	Share	VAT	VAT
Decile	spending	restaurant	reduction (1)	reduction (2)
1	123	1,1 %	14	14
2	218	1,3 %	26	24
3	314	1,6 %	37	35
4	429	1,8 %	51	48
5	480	1,7 %	57	54
6	608	1,8 %	72	68
7	851	2,2 %	100	95
8	808	1,8 %	95	90
9	989	1,8 %	116	111
10	1266	1,6%	149	142
Total	618	1,7 %	73	69

Note: Price elasticity of restaurant demand is 0 in case 1 and 1 in case 2.

Sources : Rapport IPP no 1, 2012.

### IV. TAXIPP model for France Indirect taxation

### • Effect on prices

- 2-3% of price reduction
- 30 to 45% of VAT cut shifted unto prices

### • Redistribution effects

- · Regressive effects of the reduction in prices
- But 55-70% not accounted : higher profits? higher wages? more jobs?



### INCOME TAX REFORM

#### Measures

- Distribution effects
- Tax base vs tax rates



Antoine Bozio Brice Eahre Jonathan Goupille Quentin Lafféter

#### www.ipp.eu



The Institut des politiques publiques (IPP) is analysis and evaluation of public policy using





### ERENCH BUDGET 2013 1

#### Summary

Income tax reform is central to the French 2013 Budget. The goal is to increase tax revenues while restoring a "fiscal justice" judged to have been undermined in recent years. The guiding principle of the reform is to align capital income taxation with that imposed on labour income.

This note studies the redistributive implications of the announced tax reforms, by comparing the change in taxes imposed in 2012 and 2013. The new regulations will increase income tax receipts by seven billion euros and concentrate a large part of the tax burden on the most comfortably-off. Nevertheless, the alignment of taxation on capital and labour incomes is imperfect and may even create new distortions, which could reduce actual tax revenue and limit the redistributive impact of the reforms.

- The income tax reforms will increase taxation revenue by seven billion euros in 2013 - an increase in total tax receipts of 11 per cent
- . This tax increase applies mainly to those on the highest incomes, but half of all tax-payers will see their taxes increase.
- . Far from simplifying and equalising the tax schedule, the reforms may create new distortions.
- . Those distortions risk reducing actual tax revenues and weakening the redistributive effects of the reforms.

FIGURE 13: The effect of 2019 budget (Oct. 2018 version)



SOURCE : TAXIPP, 1.0; IPP budget conference Oct. 2018.

FIGURE 14: Decomposition of 2019 budget (Oct. 2018 version)



SOURCE : TAXIPP, 1.0; IPP budget conference Oct. 2018.

FIGURE 15: Effect of 2019 budget for active pop. (Oct. 2018 version)



FIGURE 16: Effect of 2019 budget for retired pop. (Oct. 2018 version)



# References (1/2)

- Adam, S. and Bozio, A. (2009) "Dynamic scoring : attractions, challenges and trade-offs" in OECD Journal of Budgeting, Vol. 9, No. 2, pp 10–24.
- Auerbach, A. (1996), "Dynamic Revenue Estimation", Journal of Economic Perspectives, Vol. 10, No. 1 (Winter), pp. 141-157.
- Auerbach, A. (2005), "Dynamic Scoring : An Introduction to the Issues", American Economic Review, Vol. 95, No. 2, pp. 421–425.
- Atkinson, Anthony B., F. Bourguignon, and P.-A. Chiappori. "What Do We Learn about Tax Reform from International Comparisons? France and Britain". *European Economic Review* 32, no. 2 (1988): 343-52.
- Atkinson, Anthony B., F. Bourguignon, and P.-A. Chiappori. "Fiscalité et Transferts : Une Comparaison Franco-Britannique". Annales d'Économie et de Statistique, no. 11 (1988) : 117-40.
- Atkinson, Anthony B., F. Bourguignon, C. O'Donoghue, H. Sutherland, and F. Utili. "Microsimulation of Social Policy in the European Union : Case Study of a European Minimum Pension". *Economica* 69, no. 274 (2002) : 229-43.
- Barlet, Muriel, Didier Blanchet, and Thomas Le Barbanchon. "Microsimulation et modèles d'agents : une approche alternative pour l'évaluation des politiques d'emploi", Économie et Statistique 429, no. 1 (2009) : 51-76.
- Blanchet, Didier, Cyrille Hagneré, François Legendre, and Florence Thibault. "Introduction Microsimulations Statique et Dynamique Appliquées Aux Politiques Fiscales et Sociales : Modèles et Méthodes". Économie et Statistique, no. 481 (2015) : 5-30.
- Blundell, Richard, Alan Duncan, Julian McCrae, and Costas Meghir. "The Labour Market Impact of the Working Families' Tax Credit". *Fiscal Studies* 21, no. 1 (2000) : 75-104.
- Bourguignon, François, and Amedeo Spadaro. "Les Modèles de Microsimulation dans l'analyse des politiques de Redistribution : une brève présentation". Économie & Prévision, no. 4 (2003) : 231-38.
- Bourguignon, François, and Amedeo Spadaro. "Microsimulation as a Tool for Evaluating Redistribution Policies". The Journal of Economic Inequality 4, no. 1 (April 2006) : 77-106.

# References (2/2)

- Callan, Tim, and Holly Sutherland. "The Impact of Comparable Policies in European Countries : Microsimulation Approaches". European Economic Review, 41, no. 3-5 (April 1997) : 627-33.
- Carroll, R. and W. Hrung (2005), "What Does the Taxable Income Elasticity Say about Dynamic Responses to Tax Changes?", American Economic Review, Vol. 95, No. 2, pp. 426–431.
- Creedy, John. "Tax Modelling". Economic Record 77, no. 237 (June 2001): 189-202.
- Legendre, François, Jean-Paul Lorgnet, and Florence Thibault. "Les Modèles Socio-économiques de Microsimulation [Panorama et état Des Lieux Pour La France]". *Recherches et Prévisions* 66, no. 1 (2001) : 11-31.
- Li, J., O'Donoghue, C., Loughrey, J. and Harding, A. (2014) "Static Models" in O'Donoghue (ed.) Handbook of Microsimulation Modelling, Emerald.
- Orcutt, Guy H. "A New Type of Socio-Economic System". The Review of Economics and Statistics 39, no. 2 (1957): 116-23.
- Orcutt, Guy H. "Simulation of Economic Systems". The American Economic Review 50, no. 5 (1960): 894-907.
- Sutherland, Holly. "Constructing a Tax-Benefit Model : What Advice Can One Give?" Review of Income and Wealth 37, no. 2 (June 1991) : 199-219.
- Sutherland, Holly. "Les modèles statiques de microsimulation en Europe dans les années 90". Économie et statistique 315, no. 1 (1998) : 35-50.
- Watts, Harold W. "Distinguished Fellow : An Appreciation of Guy Orcutt". The Journal of Economic Perspectives 5, no. 1 (1991) : 171-79.