

Recalculation and microsimulation



EU-CHINA SOCIAL PROTECTION REFORM PROJECT – June 13th, 2017



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Column

Preface

I - Standard case model

- ▶ Static standard case model
- ▶ Dynamic standard case model

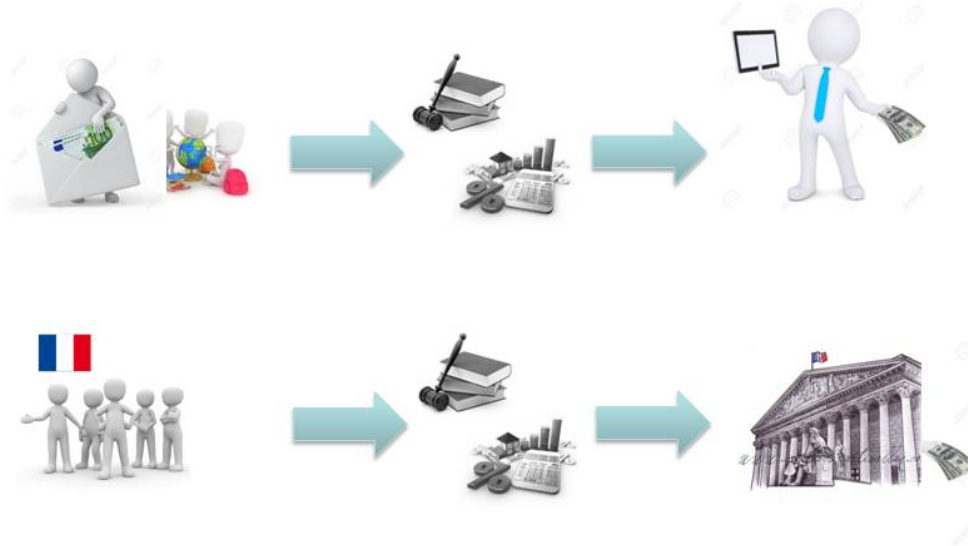
II –micro simulation

前言



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Preface — How micro simulation works



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Preface — The role of the recalculation and microscopic simulation

- ▶ Laws and regulations in France are complicated
 - ▶ The amount of the allocation is based on the following conditions:
 - Beneficiaries themselves (age, degree of disability, housing, residence, etc.)
 - The family structure of beneficiaries (partner, the number of family members needed to be taken care of and their characteristics)
 - The income of beneficiaries from all sources
 - ▶ Such characteristics are likely to change over time.
- ➔ Under this circumstances, how to adjust the allocation ?

Preface



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Preface — The role of micro simulation

- ▶ Micro simulation helps simulate individual cases. According to the identified characteristics, the tool can simulate the total social security fees paid by the beneficiaries and the amount of allocation received.
- The micro simulation can calculate the disposable income (the income that the family actually use for living).
- Micro simulation can compare beneficiary's family structure with income.

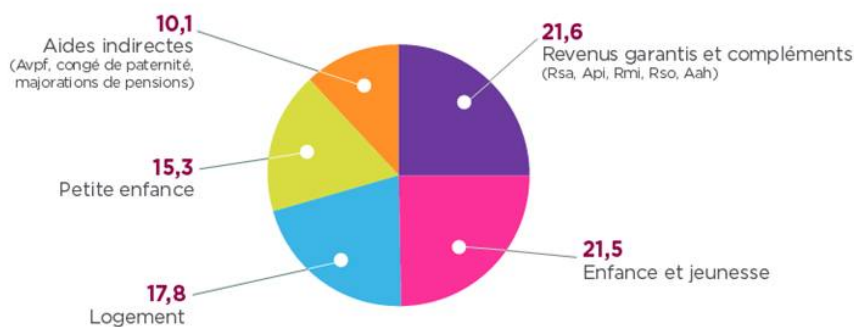
前言



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Preface — Expenditure of CAF

The amount of allocation funded by or paid by CAF in 2015
(1 billion euros)



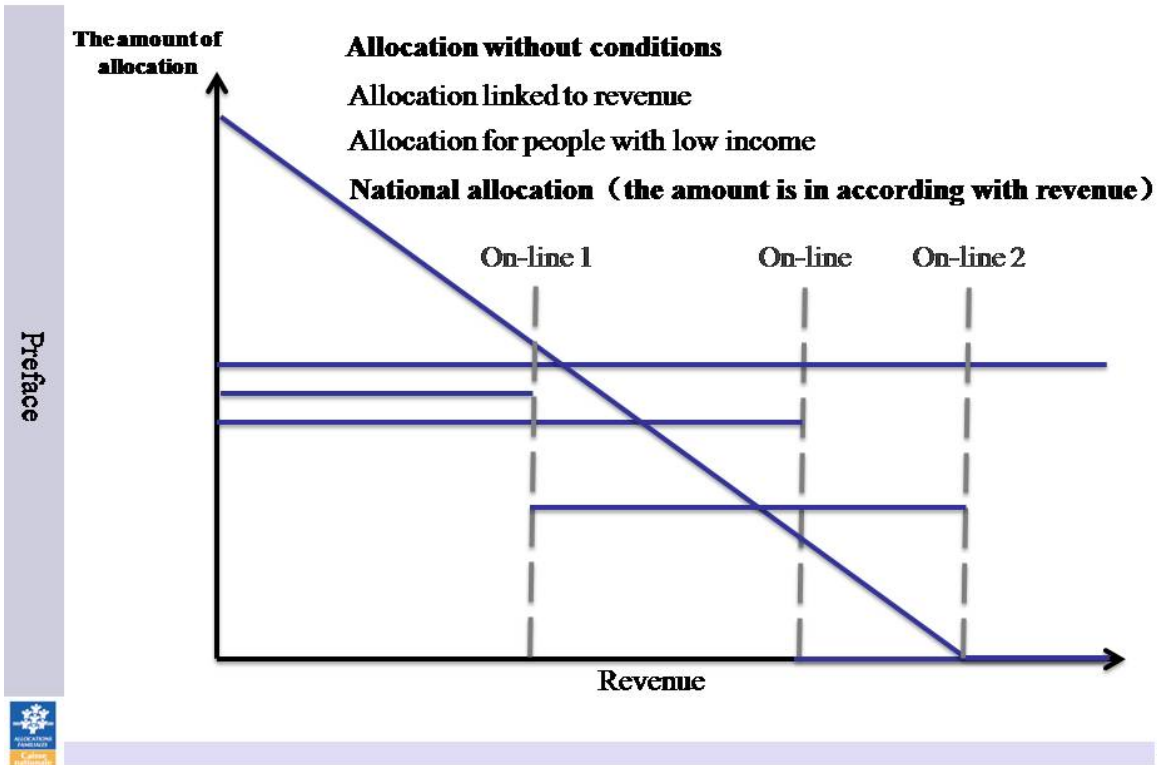
信息来源：社会保险家庭补助局2015年账目：减少赤字、认证与监管政策

前言



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Preface — The role of micro simulation



Preface — Relationship between allocation and revenue

Preface

	Allocation without conditions	National allocation (the amount is in according with revenue)	Allocation for people with low income	Allocation linked to revenue	Revenue reference years ⁺⁺
Family allocation (AF), extra supplementary allocation linked to income and age		√			N-2 years
Family supplementary allocation (CF)				√	N-2 years
Schooling allocation (ARS)				√	N-2 years
Family support allocation (ASF)	√				-
Bonus for newborn babies and adoption				√	N-2 years
Basic allocation (AB)				√	N-2 years
Supplementary allocation for free choice of job (CLCA/ COLCA)	√				N-2 years
Supplementary allocation for freely choose the way of taking care of children (CMG)		√			N-2 years
Education allocation for the handicapped children (AEEH)	√				-
Housing allocation [*]			√	√	N-2 years
Adult allocation for the disabled(AAH)			√	√	N year and N-2 years
Revenue of solidarity allocation(RSA)			√		N year
Employment bonus			√		N year

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Column

Preface

I - Standard case model

- ▶ Static standard case model
- ▶ Dynamic standard case model

II –micro simulation

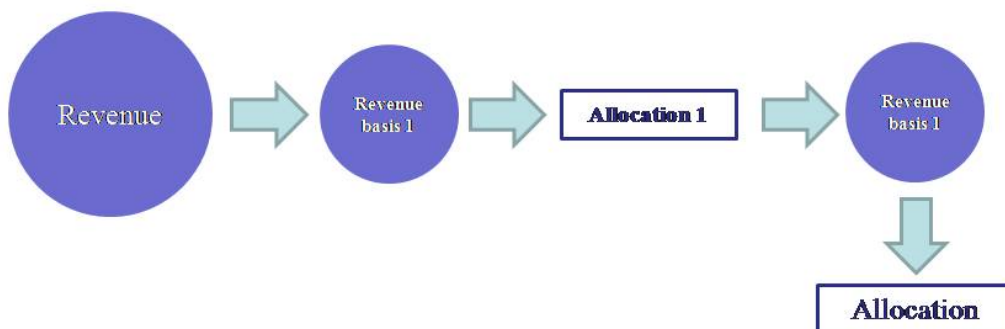
Preface



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I – Standard case model

The so-called standard case is simulating a fictitious, non-typical beneficiary. With it, one can observe the position of beneficiary in social tax system and understand the relationship among different allocations.



Preface

- Static standard case model
→ Only observe the changes in income, the overall situation remains stable.
- Dynamic Standard Case
→ Income and other characteristics (family structure, etc.) changes over time.



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Standard case model is favorable to evaluate and analyze

Standard case model

Understand the practical role of law in a particular family structure and income level:

- Understand the complex interactions among different allocation mechanisms
- Highlight the characteristics of the target of legal reform
- But this simulation model is based on simplified assumptions, it can not replace the analysis using representative data

Applicable to multiple areas, concerning family and social inclusion:

- Disposable income structure
- Profit earned from employment and the self-financed amount left from enjoying child care allocation
- Analyze complex employment process (unemployment, reemployment) and understand the changes of allocation in the process

Assist the government in making decisions:

- One of the indicators in the budget plan
- Analysis of the request from the third party:
 - Igas Youth Social Protection Bureau
 - Housing (Auditorium)
- Simplification



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How to use static model

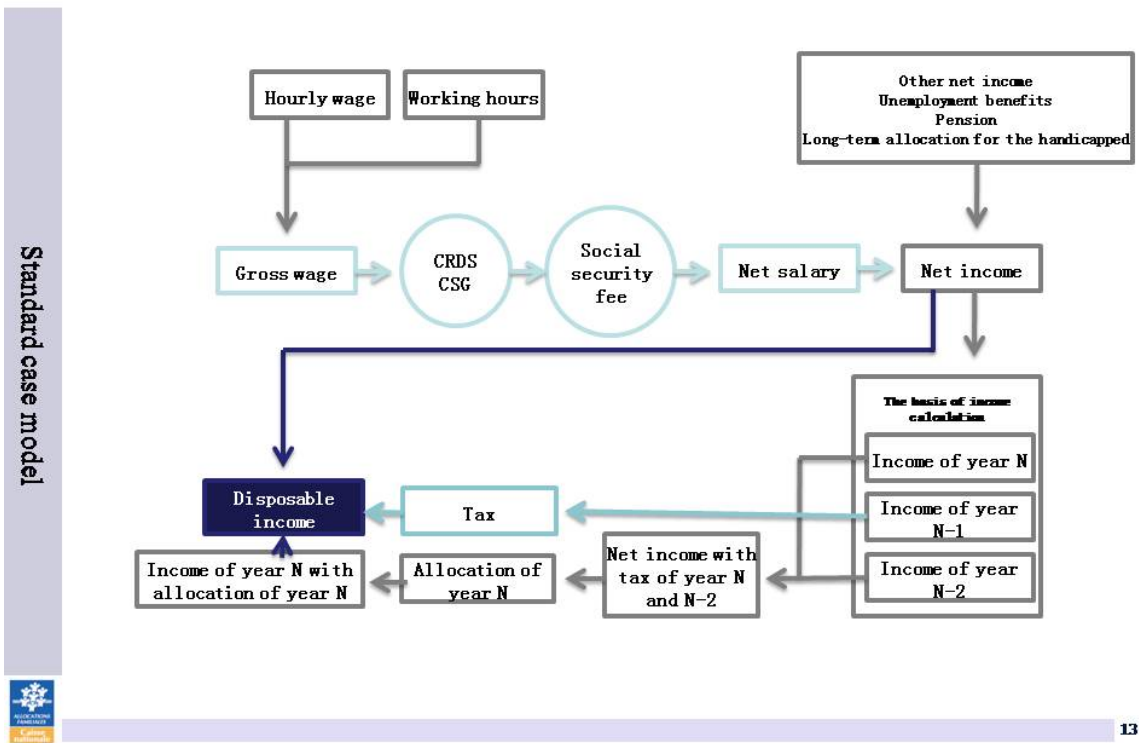
Standard case model

- The model is designed on the Microsoft Excel spreadsheet
- The first step is to select the family structure (marital status, number of children)
- We can enter income of different jobs for each family and understand the impact of different income on the same family. Each line on the spreadsheet represents a specific income.
- The standard case is different from recalculation software, which uses statistical data, instead it is virtual and simplified.
- Standard case can help understand the impact of law on a particular situation, but the result is not representative (which is different from statistical data analysis and micro-simulation)
- Standard case is generally limited to the most common family structure and only take into account the basic conditions of certain allocations.



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Revenue referred in the model



How to use static model

Hypothesis

1	A remplir	Loyer 1 Loyer plafond	Revenus
2	Situation familiale	1	Individu 1 (revenus variables)
3	1 Seul/2 En couple	2	Maximum (en part de Smic)
4	Zone d'habitation	2	Statut: 1 non cadre
5	Nombre d'enfants	2	2 cadre
6	Âge des enfants		3 non cadre <PSS puis cadre
7	1er enfant	2	CLCA
8	2ème enfant	11	Individu 2 (revenus fixes)
9	3ème enfant	-1	Temps de travail
10	4ème enfant	-1	Salaire horaire
11	5ème enfant	-	Statut: 1 non cadre
12	6ème enfant	-	2 cadre
13	Enfant à naître	0	3 non cadre <PSS puis cadre
			CLCA

Calculation standard

Allocation de rentrée scolaire	2012	2013	2014	2015
Âges limites				
Age limite inférieur inférieur	6	6	6	6
Age limite tranche 1	10	10	10	10
Age limite tranche 2	14	14	14	14
Age limite supérieur	18	18	18	18
Plafonds de ressources				
Montant de la base annuelle du plafond ARS pour les parents sans enfant	17846	18221	18567	18997
Surcroît de plafond ARS par enfant à charge (en % de la BARS)	30	30	30	30
Seuil de non versement	15	15	15	15
Montant				
tranche 1 (6-10 ans)	358	362	364	364
tranche 2 (11-14 ans)	378	382	385	385
tranche 3 (15-18 ans)	391	394	398	398

Calculation on the amount of allocation

Salaire en part de Smic	Transferts sociaux					Impôts		Revenu disponible	
	Ménage	Prestations familiales		AL	RSA	IRPP			
	Revenus d'activités nets du ménage	Allocations familiales	Allocation de base de la Paje	ARS totale	Aides au logement	RSA total	IRPP y compris PPE	PPE	
1,0	1138	129	184	32	316	152	0	0	1952
1,2	1366	129	184	32	255	66	-19	19	2051
1,4	1593	129	184	32	185	0	-101	101	2225
1,6	1821	129	184	32	118	0	-112	112	2397
1,8	2049	129	184	32	52	0	-114	114	2559
2,0	2276	129	184	32	0	0	-116	116	2737
2,2	2504	129	184	32	0	0	-71	71	2920
2,4	2732	129	184	24	0	0	-61	61	3130
2,6	2959	129	184	0	0	0	-61	61	3333
2,8	3187	129	184	0	0	0	-33	61	3533
3,0	3415	129	184	0	0	0	11	61	3717

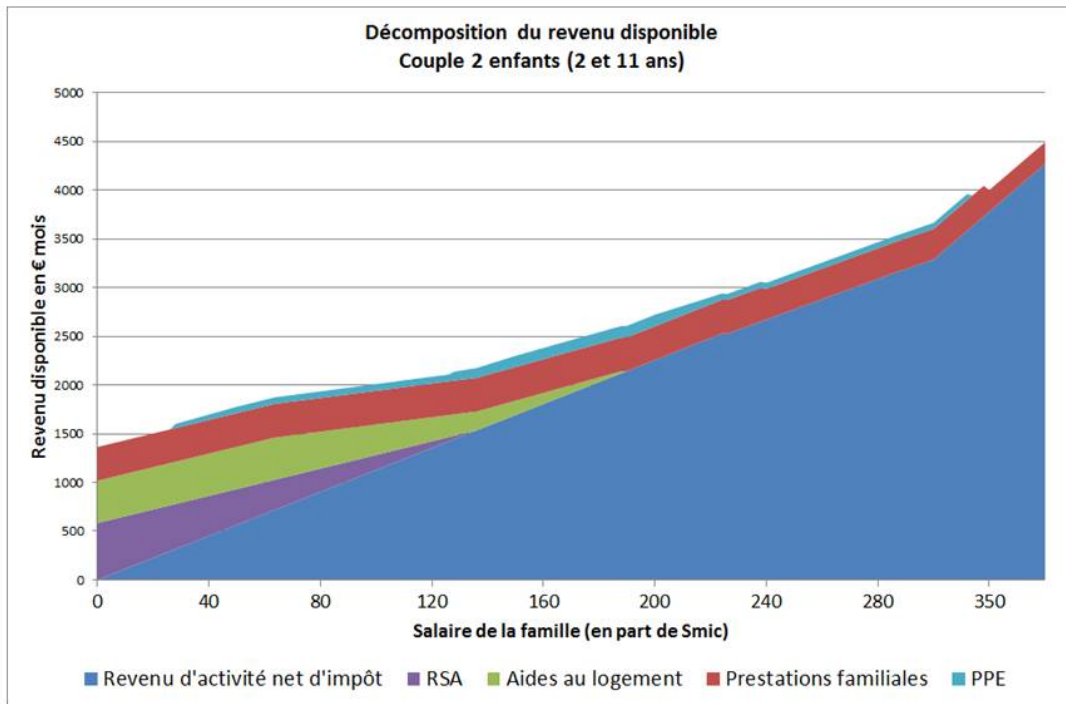
Standard case model

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The percentage of family allocation in disposable revenue

Standard case model



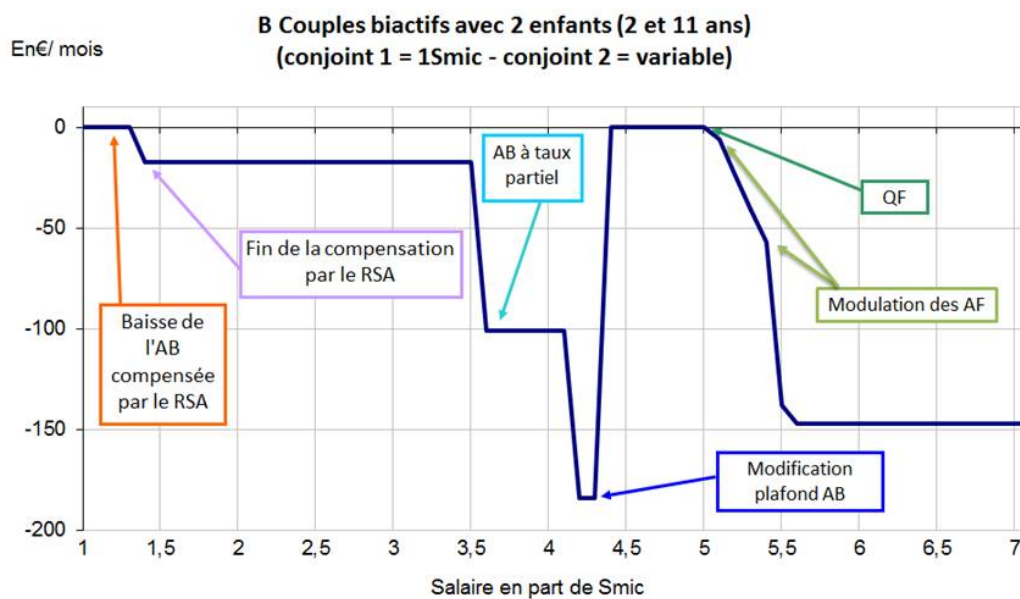
Cnaf DSER, Cas-types

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Impact of family policy reform

Changes of disposable income caused by family policy reform between 2011 and 2016

Standard case model



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Limited scope, extension of model

Standard case model

- ▶ The analysis of static standard case does not take into account the changes of family condition.
 - ▶ The tools we use can not meet the demands
 - Changes of family conditions are not taken into account in static standard case
 - When using allocation simulation tool, only single allocation is referred, thus the interaction between different allocations cannot be understood
 - The statistics only reveal monthly condition, one cannot understand the behind reasons of allocation adjustment
- Thus, we invent dynamic model



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Allocation will adjust in accordance with the changes of family condition

Dynamic standard case model

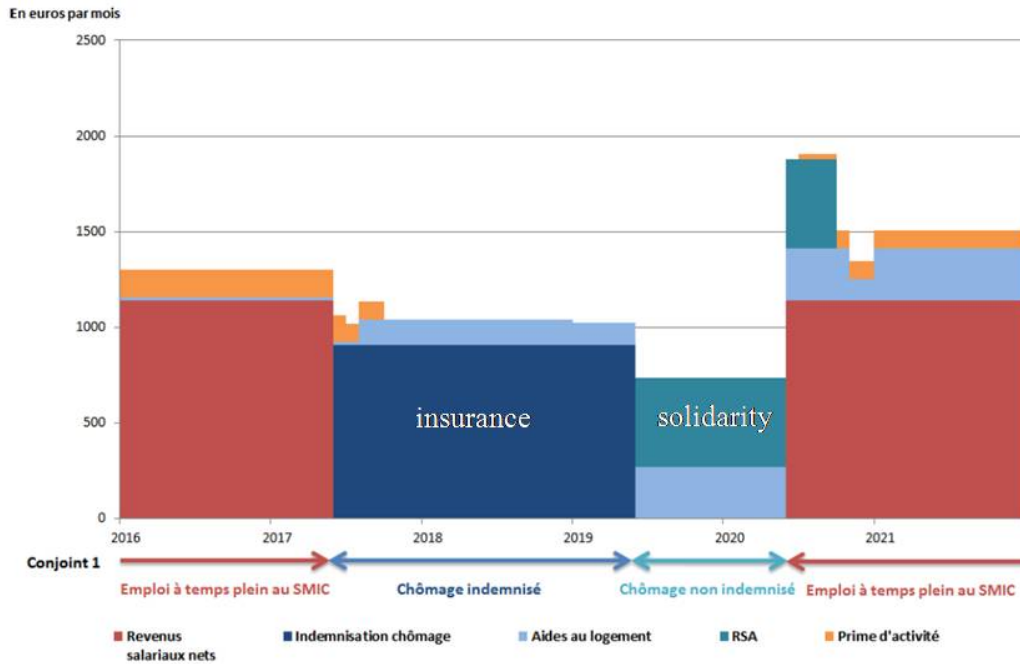
- ▶ The mobility of beneficiaries' family condition and career is growing
 - 26.8% of the beneficiaries will experience at least one change
 - 19.9% of them have experienced career changes
 - 10.8% of them have experienced changes in family conditions(Reference range: CAF beneficiaries both at the beginning of 2015 and at the end of the year)
- ▶ Life changes taken into account in allocation calculation:
 - Reduced income and no access to allocation for zero income (eg: unemployment but not eligible, cannot receive unemployment benefits, beyond allocation term)
 - Receive income alternatives (unemployment benefits, pensions, etc.)
 - Reemployment
 - Major events: birth, death, marriage, divorce
- Income is reduced, and can not receive income loss subsidies (for example: unemployed but not eligible, can not receive unemployment benefits, benefit period expires, etc.)
- Receive income alternatives (unemployment benefits, pensions, etc.)
- Re-employmentLife events: birth, death, marriage, divorce



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Case: employment – unemployment – living alone

Dynamic standard case model



2016年法律

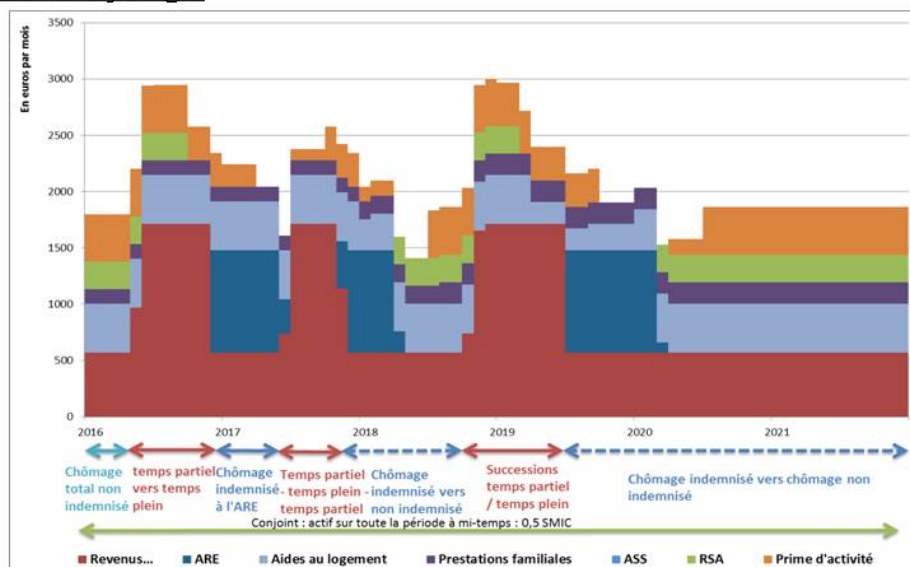
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How to analyze social security system ?

► **Analysis of job-seekers, Unemployment fund management organization Unedic**

Couple with two children over three years old, of the two, one's revenue is about 50% of statutory wages

Dynamic standard case model

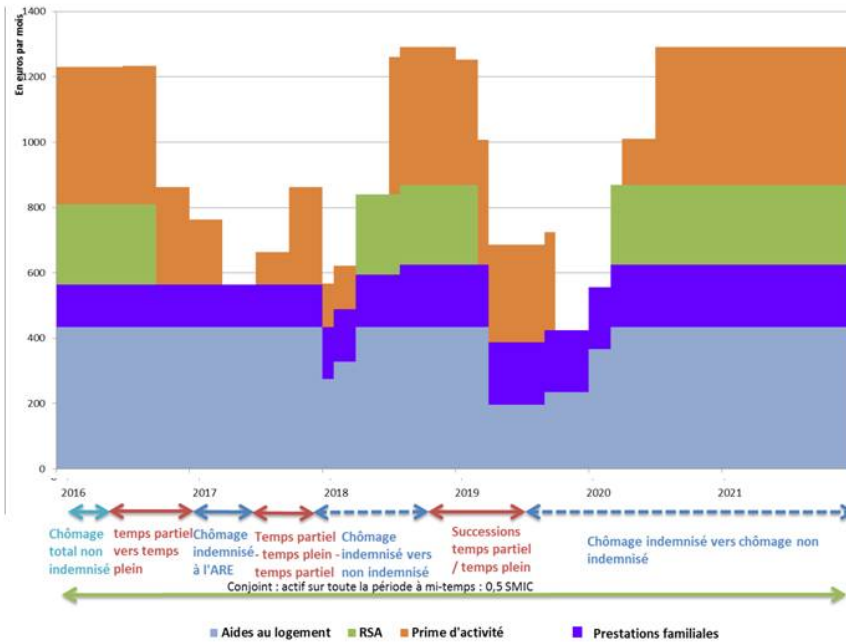


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CAF family allocation

Dynamic standard case model

Couple with two children over three years old, of the two, one's revenue is about 50% of statutory wages

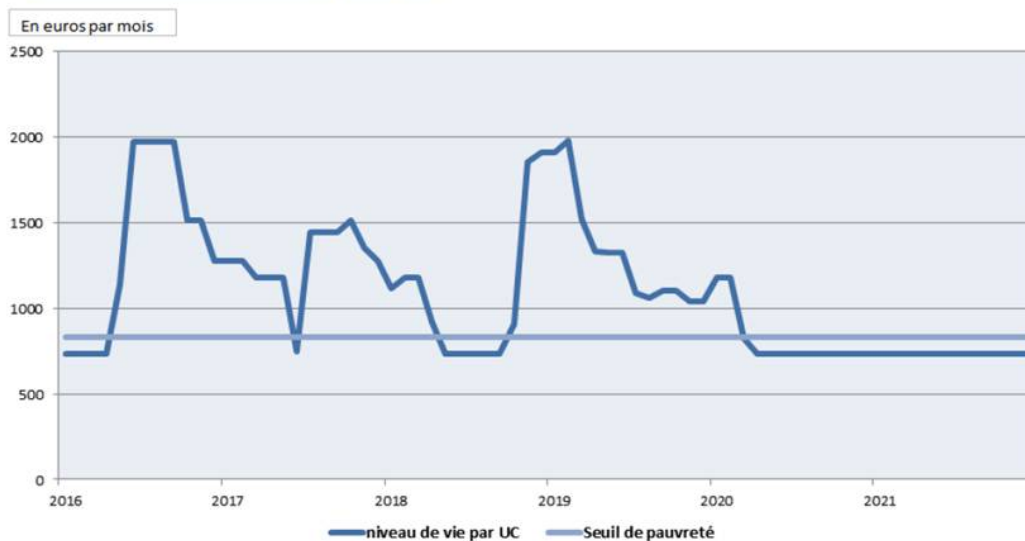


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Impact on fighting poverty

Dynamic standard case model

▶ Couple with two children over three years old, of the two, one's revenue is about 50% of statutory wages



Poverty threshold: 60% of median income

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Analysis result

Dynamic standard case model

- “There is no hole in the racket”
 - Through the so-called “neutralization mechanism”, RSA plays the role of social buffer mechanism
 - Subsequently, housing allocation would be neutralized
 - Even if the beneficiary experience income change during the process of employment, unemployment, stop receiving unemployment allocation, he/ she still have access to allocation.
- It is the same with stable allocation mechanism. Besides, with neutralization mechanism, one can continue to enjoy allocation even when frequently experiences major changes
- The constant adjustment of allocation leads to its instability.
- “Excessive” allocation
 - End of month effect: Neutralization mechanism would provide allocation to the unemployed person even if he/ she cannot receive unemployment allocation because he/ she fails to meet then standard at the end of the month
 - Deferred payment: employment bonus



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Summary

Dynamic standard case model

- The standard case model helps to understand the relationship and interactions among allocations, observe the status of standard beneficiaries, and anticipate the impact of reform on the overall structure of allocations.
 - The dynamic standard case model helps to observe how the allocation system responds to changes in family conditions. It also helps to understand which conditions would increase the risk of poverty.
 - Nonetheless, the standard case is not representative:
 - How many families are enjoying the allocation?
 - What is the impact of allocation on public finances?
- ➔ In order to answer these questions, it is necessary to adopt a micro simulation model utilizing comprehensive data information



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Advantage of micro simulation model

Micro simulation model

It is a model with population representation, which reveals:

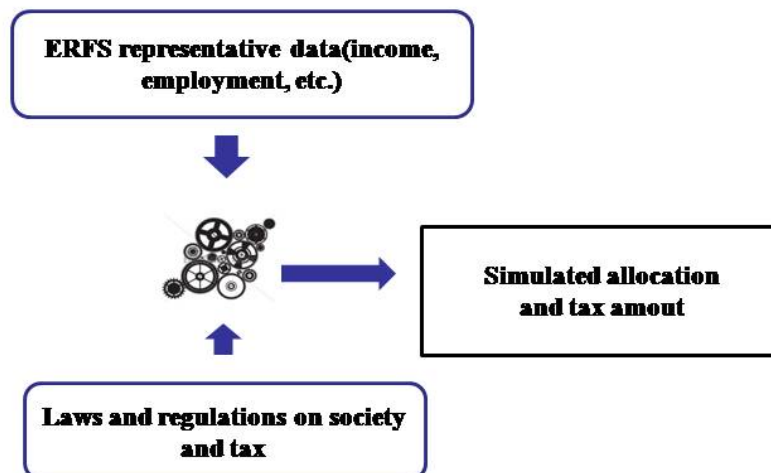
- All social allocations (family allocation, Dibao, pension) and tax (income tax)
 - help to understand the so-called overall income
 - disposable income, poverty line
- French ordinary families (beneficiaries and non beneficiaries):
 - income level
 - family structure
 - employment structure and characteristics
- Information from the survey (employment survey) and administration
- Institution (tax, social security administrative institution)



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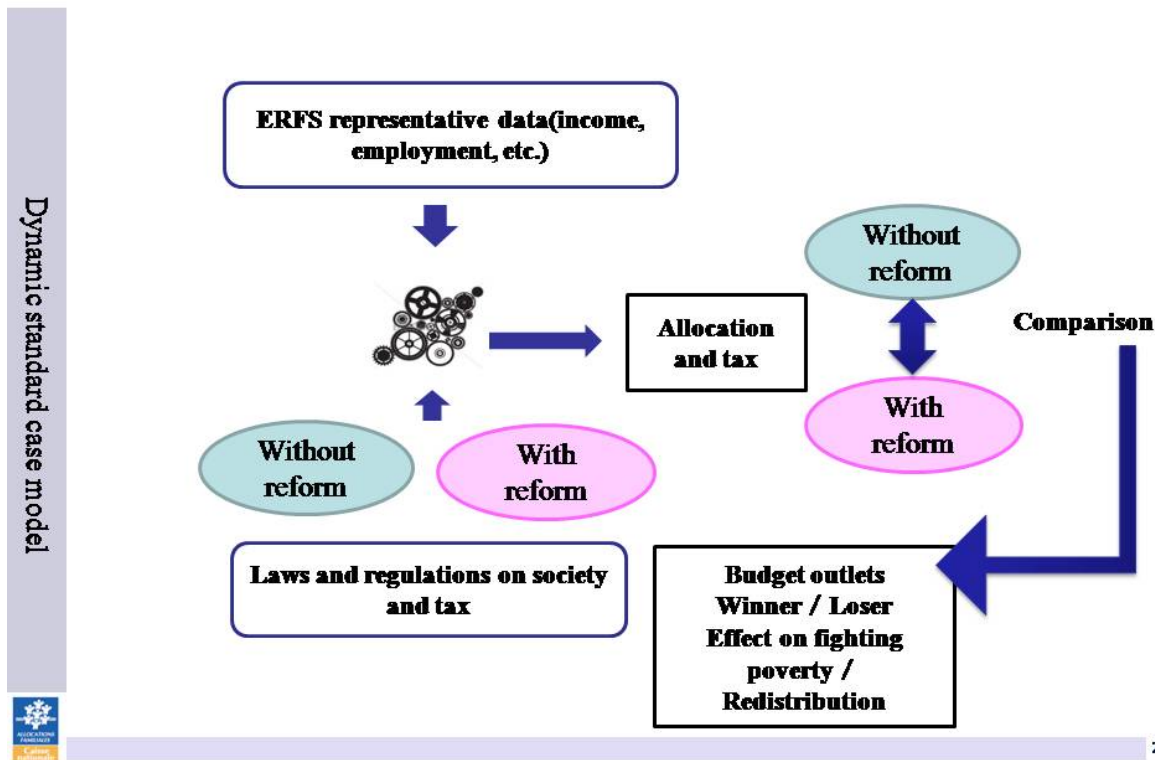
Principle of micro simulation model

Dynamic standard case model



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Impact of simulation reform with micro simulation



Reform simulation tool: Myriade

Evaluation tool of reform

- Simulate the reform to understand the role of its resources redistribution
 - Who are the winners and losers? How many of them?
 - Horizontal redistribution: Which families are involved?
 - Longitudinal redistribution: What are the living standards of these families? What is the impact of the reform on fighting poverty?
- Define the impact of reform on budget expenditure
 - Evaluation before implementation to set up scope and intensity
- Better anticipate and understand the impact of reform on allocation
- The tool is used:
 - at the request of third parties: request from government departments, working groups, family higher committee and other organizations
 - Internal work and simplified working group

But with limited functions:

- Does not contain behavior effect (is static model)
- Lack of accuracy from a statistical perspective
- A series of hypothesis is a must for implementing data and arranging timesheet

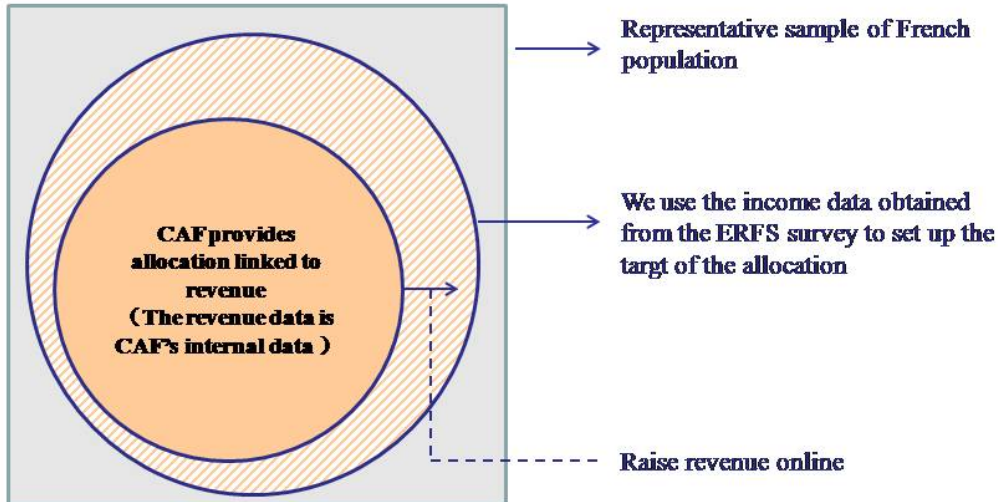
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Advantage of Myriade: Spillover effect

Dynamic standard case model

- ▶ **Spillover effect:** When one criteria of the allocation qualification changes, it would lead to more targets of the allocation

eg: Create a more favorable new allocation (raise on-line)



Advantage of Myriade : Composition effect

Dynamic standard case model

- ▶ **Composition effect:** The evaluation capability of tax and social allocation and the capability of taking into account the relationship among all measures.
- ▶ the ability to describe taxation and social subsidies for the same goal, and the ability to take into account the relationship between all measures.
- ▶ eg: Impact of increasing social security premiums on income



Micro simulation model

Dynamic standard case model

- CNAF applies Myriade micro simulation model based on ERFS
 - 2 commissioners
 - C++ mode (classification, speed)
- In September, it will apply the new model as other administrative institutions:
 - INES model with Sas language invented by INSEE and DREES
 - Will reach critical scale of the model
- The above 2 models are based on the same survey and have similar structures, while they have different programming language.



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Composition of micro simulation model

Dynamic standard case model

- ▶ Receive and process representative survey
 - Survey would provide further information on allocation qualification (revenue, employment, family structure and other conditions)
 - Processing survey help the understanding of the allocation coherency (individual allocation, couple allocation, comprehensive family allocation, etc.)
 - Updated information reflects current situation (It takes 2 year to complete the investigation)
 - If necessary, information should be adjusted (changes in the amount of allocation, changes in age pyramid)→ calculate the weighted average
- ▶ Calculate the amount of allocation and tax according to models
 - Have standard tables
 - Must consider the order of administrative payment (One must acknowledge the amount of other allocations before calculating some allocations)
 - Take into account the impact of different allocations and the paying unit
 - Collect the amount of allocation and tax



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Current application range

Dynamic standard case model

- ▶ Impact of reform on family policy
- ▶ Evaluate the impact of new allocation:
 - Employment bonus
 - Single allocation, national basic revenue
- ▶ To what extent support youth disposable income?
- ▶ Simulate cases on single allocation replacing different allocations
- ▶ The impact of declaring less income on the amount of allocation



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Case on employment bonus: Evaluation before the implementation of new allocation

Dynamic standard case model

- ▶ How to set up standards to comply with budget constraints (under the circumstances that the budget does not increase)?
 - Fixed budget (€ 4 billion)
 - Identify the number of beneficiaries
 - Set up the target on the number of applicants (application is necessary to receive allocation, but not all potential beneficiaries would apply)
 - 50% of potential beneficiaries would apply
 - Under these restrictions, what should the amount of allocation be set?
- ▶ Impact on families
 - Who benefits from it? Who suffers from loss?
 - Describe family structure and income
- ▶ Impact on the workload of payment organizations
 - How many new applicants
 - How many identified beneficiaries?
 - How many staff in payment organization should be mobilized for this?

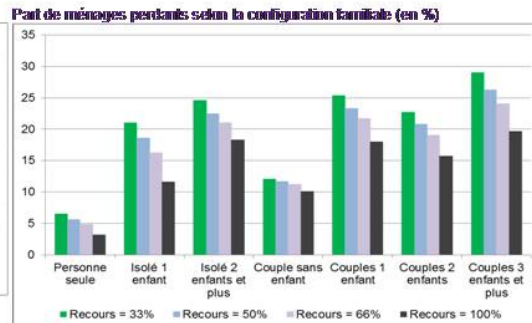
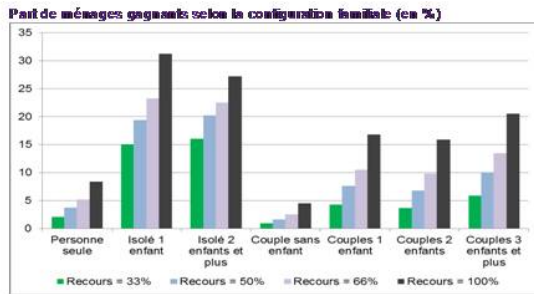


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Case on employment bonus: Evaluation before the implementation of new allocation

► **Percentage of family structure and allocation application: percentage of winner and loser**

Dynamic standard case model



Source : CNAF – DSEF, modèle Myriade, ERFS 2011 – législation 2015.

The disposable income of the winner's family would increase at least 1 euro per month.

On the other hand, the loser's would decrease at least 1 euro per month.

Interpretation of this figure: When potential beneficiaries are applying for allocation, the winner's percentage:

a single parent with one child reaches 19%, and a couple without children reaches 2%.

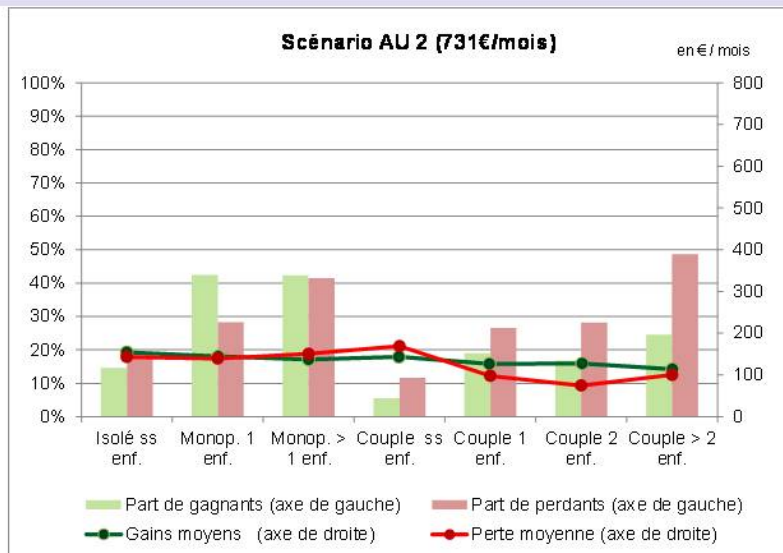
Publish on CNAF Science magazine

- http://www.persee.fr/doc/cnf_2431-4501_2015_num_121_1_3133
- **The redistribution effect of employment bonus and the impact of not applying for allocation, author: Adèle Favrat Vincent Lignon Vincent Roluron**
- **Social and Family Policy Magazine, 2015, Vol. 121, No. 1, pp. 27-41**



The redistribution effect of a single allocation

Dynamic standard case model



Source: Myriade – ERFS2011, 2015 law (except employment bonus).

Scope: French ordinary families. The calculation of percentage is in accordance with the living standard before reform

Please refer to the single allocation case

