AN EX ANTE EVALUATION OF THE REVENU DE SOLIDARITÉ ACTIVE BY MICRO-MACRO SIMULATION TECHNIQUES

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Abstract
This paper aims to investigate the effects of the introduction of an active welfare state measure, the Revenu de Solidarité Active (RSA), in France. The RSA replaced the old system of social minima, comprised by RMI and API. By using a micro-macro simulation model we characterize the effects on households' disposable income, labour supply, wages, GDP, deficit, and other micro and macroeconomic aspects. We find that, although increasing public expenditure, RSA largely repays its cost by reducing involuntary unemployment, increasing labour supply and private consumption, and thus improving GDP and the deficit/GDP ratio. Poverty and inequality are also reduced significantly.

JEL codes: I38, C63, C68, J22, H31
Keywords: revenue de Solidarité active, RSA, active welfare state, microsimulation, CGE, micro-macro, labour supply, policy evaluation

List of Acronyms and fiscal instruments

Acronym	*Name of the device (in French)*	*Description in English*
RMI	Revenu minimum d'insertion	Minimum income
RSA	Revenu de solidarité active	Minimum income
	Prime de Retour à l'Emploi	Forfeit given after 12 months of RMI
API	Allocation Parent Isolé	benefit for single women with children in charge
PPE	Prime pour l'Emploi	tax credit for low wage workers
SMIC	Salaire minimum interprofessionnel de croissance	Minimum wage for full-time workers
	Pensions alimentaires	transfers for families after a divorce or for people who live outside the fiscal unit
	Prestations Familiales	Households' benefits
AL	Allocation Logement	Housing benefits
PAJE	Prestation Accueil Jeunes Enfants	Set of benefits for families with more than 2 children
APJE	Allocation Pour Jeunes Enfants	Set of benefits substituted by PAJE after 2005
ARS	Allocation Rentrée Scolaire	Family benefit for families with children going to school
	Prestations en nature	Transfers in kind
	Indemnités journalières, maladie	Reimbursements provided by work contracts in case of accident
	Assurance maladie	Health insurance
	Assurance accidents du travail	Insurance scheme provided by employer for work accidents
AES	Allocation Education Spéciale	Family benefit for children with disability
RAP	Revenus Activités Professionnelles	Income from work
	Revenus Nets Catégoriels	Net income from work
	Allocation Chômage	Unemployment benefit
AAH	Allocation aux adultes handicapés	Household's benefit for invalid people
AEEH	Allocation Education Enfants Handicapés	Household's benefit for families with invalid children

1 INTRODUCTION

In this paper we aim to study the micro and macroeconomic implications of the implementation of an active welfare state reform in France, the Revenu de Solidarité Active (RSA). RSA is a modification of the pre-existent minimum income scheme which has been adapted in 2009 after experimentation and has substituted the Revenu Minimum d'Insertion (RMI) and the Allocation Parent Isolé (API). To this aim we use SYSIFF 2006, a micro-macro simulation model for the French fiscal system.[1]

The international crisis, together with Euro-zone recession, has put lot of pressure on the nature and structure of welfare state, particularly with regards to minimum income schemes. Governments are therefore trying to react in order to design policy instruments more adapt to answer the needs for a modern and inclusive active welfare state which, at the same time, does not produce negative effects on labour supply with the beneficiaries trapped into a sort of never-ending job instability.

More or less all 27 EU countries have a national minimum income scheme, providing to recipients a monetary buffer to cope with period of unemployment. Only Greece and Italy do not have such a scheme, while for other countries the financing of these measures is based on general taxes collection. The duration of minimum income schemes varies but it is normally limited in time.

Following a classification proposed by Frazer and Marlier (2009), we can identify basically four different types:

1 Universalistic *measures* as simple and comprehensive schemes (AT, BE, CY, CZ, DE, DK, FI, NL, PT, RO, SI, SE) open to all potential applicants with insufficient means to support themselves. In some countries (e.g. AT, DE) unemployment benefits and social assistance schemes are separated, whereas in others (e.g. PT, SE) just one tool covers both needs.

2. A '*basic and discretionary measure*': Some countries (EE, HU, LT, LV, PL, SK) have quite simple and non-categorical schemes, with rather restricted eligibility and coverage of people in need, often due to the low income level at which the means test is set.

3. An '*integrated network of different categorical measures'*: other Member States (ES, FR, IE, MT, UK) have developed a complex network of different, often categorical, non contributory schemes supporting specific target groups such as lone parents, the ill or disabled, the unemployed, carers, survivors and pensioners and low-paid workers. In some cases these categorical measures are accompanied by a general scheme of last resort.

4. Finally, there are Member States (BG, EL, IT) who have very '*limited, partial or piecemeal arrangements*' which are in effect restricted to quite narrow categories of people and do not cover many of those in urgent need of income support.

With regards to Italy, no widespread minimum income mechanisms have been created at a national level, even though innovative examples of local welfare systems exist through experimentations; however, they are often weakened by a fragmented and inefficient legal framework for social protection, together with the targetization to specific characteristics.

Getting deeper into the details of French case, The Revenu de Solidarité Active (RSA), is a household benefit which has been introduced in France on July 2009[2] in order to reduce the administrative costs and the inefficiencies enlightened in point 3 of the previous classification. RSA is therefore projected to rationalize the French system of social minima, which was composed before by RMI (Revenu Minimum d'Insertion, with the integration of Prime de Retour a l'Emploi), API (Allocation Parent Isolé) and PPE (Prime Pour l'Emploi).

RMI and API are a source of minimum income respectively for people not working (but in search for a job) and for singles with one or more children in charge. PPE, instead, works as a tax credit giving an extra-amount of money to low income workers (its level is computed as a function of the working time and of the salary of the employee).

Again, the idea of RSA is to unify the two pre-existing public transfers (RMI and API) in a single measure which provides beneficiaries with a minimum set of resources and will constitute an incentive for people to exit unemployment and find a new job as income complement.

Since the first phase of implementation, PPE has been coexisting with RSA. That is to say, the mechanism is such that potential beneficiaries of the two measures have been entitled to ask for the highest between them. The instruments work almost as substitutes: the idea is to create more incentives for low-wage workers. Nonetheless, there are relevant differences between the two:

[1] See Canova et al. (2009) and Magnani et al. (2013) for a detailed description of SYSIFF 2006.

[2] Projet de Loi généralisant le revenu de solidarité active et réformant les politiques d'insertion, n°7 Sénat Session Ordinaire de 2008-2009.

1) RSA works as an income complement, while PPE, being a tax credit, is paid to the beneficiary after 18 months;
2) RSA is really for low incomes (up to about 0.91 times SMIC[3] for a childless single), while PPE is available also to better paid jobs (up to almost 1.4 times the SMIC);
3) PPE increases with labour income up to a certain threshold, about 12,500 € per year, which corresponds to around 950 € of benefit. In contrast the amount of RSA decreases with income from work, and is about 620 € for a salary of 12,500 €;
Figure 1 illustrates these differences by depicting the amount of RSA and PPE that are due to a childless single worker in relation to his salary as a proportion of the SMIC. Although the overlapping area can be larger or smaller depending on the family composition, it is clear that the two instruments address different work incentive targets: PPE aims to favour full-time employment, while RSA makes part-time work more attractive respect to not working at all. In the long run the proposal is to eliminate PPE from the set of available measures.

[Figure 1 about here]

It is also worth noting that although RSA is clearly appealing with respect to RMI as an active welfare state measure because its implicit marginal tax rate (due to the benefit reduction as long as income increases) is lower, 38 percent with respect to 50 or 100 percent depending on the situation.
There exist also other relevant benefits for low-income households that need to be acknowledged. Most notably the Aide Logement (AL),[4] an housing benefit provided to low-income families who pay a rent. The AL is a fixed amount upon a certain income threshold that depends on household composition, but then reduces as household income grows, by about 35 percent, thus adding to the implicit marginal tax rate. As shown by Figure 2, the implicit marginal tax rate is much larger in the labour income range corresponding to about 37 to 77 percent of SMIC, thus reducing the work incentive in this range.

[Figure 2 about here]

Two are the fundamental objectives of this policy: to create incentives for people to exit unemployment and to alleviate poverty, by reducing the number of people below the poverty line by one third[5]. The "RSA activité" increased the median income per consumption from 699€ to 825€ per month at the end of 2009. The effective gain may nonetheless be overestimated due to the concurrent decrease of PPE. Estimates show that poverty rate (measured as the percentage of households below 60 per cent of the median income) would be 0.3 percentage points higher without the implementation of RSA[6], which corresponds to 135 thousand people out of poverty in contrast with the projection of 700 thousands. Of course the adverse effect of the crisis played and plays still a crucial role in affecting this trend.
The rest of the paper is organized as follows. Section 2 sums up what literature has produced so far in terms of empirical evaluation of costs of RSA. Section 3 describes the mechanisms to compute the fiscal instruments under investigation, namely RMI, API, PPE, and RSA. Section 4 presents SYSIFF 2006, the micro-macro simulation model used to perform the reform simulations. Section 5 reports the results and Section 6 concludes.

2 EMPIRICAL EVALUATIONS OF THE COST OF RSA: THE PREVIOUS LITERATURE

The crisis has determined a huge impact on the number of potential beneficiaries of RSA: in September 2010, 1.8 million of households (which corresponds to 3.8 million of individuals, or about 6 percent of total population). 1.1 million of households benefited from basic RSA – the full benefit given to the unemployed-,

[3] In June 2008, the SMIC (Salaire minimum interprofessionnel de croissance, or gross minimum wage), was set to 1321.02 € per month.
[4] Although AL is part of SYSIFF 2006 and thus is taken into account for all our calculations, we will not discuss it in details since it is not affected by the RSA reform.
[5] Argumentaire of RSA, Livre Vert sur le RSA.
[6] Comitè d'Evaluation RSA (2010)

which is in line with the coverage of previous measure, RMI. The crisis led to a sharp increase in people eligible for this minimum income scheme, in the order of 20 per cent in the first year.
Numbers in June 2011 showed a stable path for RSA beneficiaries (1.87 million of households and 3.9 million of people) with a slowing down in the increase (3.7%) but a significant boost of families which get the basic RSA, (substituting RMI (1.4 millions)).
But statistics worsened again at the end of 2013, with RSA beneficiaries which rose to 2.3 million of households (4.9 million of people), 7% of the whole population (Cazain, 2014).
Most of the beneficiaries are in the cohort 25-34 years old (36%), while recipients in the 50-65 population constitute 21 per cent of the entire sample. About 75% of RSA recipients have benefited from the scheme for more than 1 year, while 33% is still getting this transfer after 3 years[7]. 1 out of 3 people, therefore, does not exit unemployment.
In terms of the impact of RSA on labour supply and labour market, any evaluation is extremely complex and therefore only qualitative investigations are available so far from the government side. Data from the report 2011 show that RSA beneficiaries find more often temporary or part-time jobs. On average, 3% of the beneficiaries find a job each month but, overall, recipients seem to be trapped in a long term unemployment path.
RSA implementation took place during the crisis and thus more time is needed for its full assessment. Thibault (2014) criticized the results of the experimentation because of confounding effects in the payment schedule and duration of the transfers compared (API and RMI vs. RSA).
A few empirical works tried to evaluate the effects of RSA on employment: Simmonet and Donzin (2012) found that RSA increase the opportunity to exit unemployment only for single women with children.
Bargain and Vicard (2012), using yearly data from INSEE including a representative sample of French population over the period 2004-2011, assessed the effect on employment of over 25 years old, finding that RMI had a slight positive impact on employment, while RSA did not produce any significant effect in 2010-2011.
A final study, by Domingo and Pucci (2012) has been devoted to people who, even if eligible for the RSA in 2011, do not get the transfer or the total amount available. The research paper finds out that more than 400 thousands people would have exited poverty if RSA had been received by all potential beneficiaries.

3 COMPUTATION OF RMI, API, PPE AND RSA

One of the objectives of the RSA reform is to simplify the computation of the benefit itself, especially as to the exit mechanism, which under the previous scheme was rather complicated. In what follows we describe in details how RMI, API, PPE and RSA are computed.

3.1 RMI

Each year the government established a maximum amount of RMI depending on household composition. In 2008 this amount is defined by Table 1.

[Table 1 about here]

So, for example the maximum amount of RMI for a couple with two children is 940.61 € per month.
The maximum amount of RMI is paid to the unemployed for a maximum period of 12 months. If an unemployed entitled for RMI starts working the benefit is reduced according to the following rules.
For part-time workers[8] the amount of the benefits received is regulated by the following mechanism: for the first 3 months, RMI is fully cumulated with income from work; from the 4th month to the 11th, RMI is computed curtailing 50% of the RAP (Revenus d'Activité Professionel – income from work); after 12 months, 100% of RAP is curtailed from the benefit. Even though it may seem a contradiction that RMI lasts for a maximum of 12 months and the 100% rule applies after 12 month of work, it should be noted that a person is entitled to ask for RMI even though he has been working for more than 12 months.

[7] OECD (2011) A simplified benefits system. France country policy briefs
[8] Part-time workers are defined as those working less than 78 hours per month.

For full-time employees, instead, the rule is the following: for the first 3 months, the maximum amount of RMI is given regardless of the RAP; from the 4th month to the 12th, RMI is substituted by a monthly *forfeit* of 150 € for a single and 225 € for larger families.
The mechanism of computation of RMI is summarized by Table 2.

[Table 2 about here]

A "prime de retour à l'emploi" (a sort of award for having found a job) of 1000 € is given to full-time workers at the end of the entitlement period (12 months).
The income resources that enter in the RAP include[9]: *indemnités journalieres*; *allocations chômage*; pensions of each type; *prestations familiales*; *allocation aux adultes handicapés*; revenues from real estate and from capital; income from work; *Aide au Logement* (reduced by a *forfeit*[10] according to the household's size).
The resources which do not enter the RAP are: APJE (*Allocation Pour Jeune Enfant*) for the period of pregnancy till the first month after child's birth; *Allocation rentrée scolaire*, and *Allocation Education Speciale*; scolarships; *Prime de retour a l'emploi*.
There are thresholds which are fixed by law in terms of maximum possible amounts and the following table sums up the values for 2008.

3.2 API

API is an allowance provided to single parents (or divorced, or widows) who have in charge one or more children. The maximum monthly amount of API is 566.79 € for a pregnant women plus 188.93 € from the birth and for each additional child. Similar to the RMI, the benefit is means tested and is reduced if the parent earns some RAP. If a beneficiary of it exits unemployment and starts working, the same *dispositif d'interessement* as that for RMI is applied. So RMI and API work exactly in the same way, except that the maximum amounts are different.

3.3 PPE

The PPE is a tax credit which is given to low income workers[11]. In terms of RAP, the ceiling must respect the following thresholds: from 3743 € to 17451 € for singles, divorced or widows without dependent children or for bi-active couples; up to 26572 € for singles, divorced or widows growing up alone their children or for mono-active couples.
The amount of PPE is computed as follows: 7.7% of the amount of RAP up to 12475 €; 19.3% times the difference between 17451 € and the amount of RAP above 12475 €; 5.1% times the difference between 26572 € and the RAP above 24950 €. A benefit supplement is provided for specific cases: 36 € for each person in charge for singles, bi-active couples and mono-active couples up to 17451 €, or 36€ independently of the persons in charge for mono-active couples above 17451. The mechanism for the computation of PPE is summarized by Table 3.

[Table 3 about here]

3.4 RSA

The computation of RSA is simpler than those of RMI and API and is synthesized by the following formula

[9] See the list of acronyms for a short description of each voice.
[10] 53.75€ for singles; 107.50€ for couples; 133.03€ for households of three persons or more.
[11] For *revenus nets categoriels* 2007, the resources to be taken into consideration are the following: the fiscal income of the requiring household must be below 16251 € for singles, widows and divorced and below 32498 € for couples which signed a PACS. The limits are increased by 4490 € for each additional person in charge.

$$RSA = RSA_{max} - 0.38RAP,$$

Where RSA_{max} is the maximum amount computed exactly by the same values that apply for RMI and API. The new system provides a fix withdrawal rate of 0.62. This means that, if a person exits unemployment, for each earned euro from work, she can save 0.62 € of RSA.
An important difference with RMI is the elimination of *dispositif d'interessement* and of the limit of 12 months of entitlement. The amount of RSA varies in time, according to the income from work of the beneficiary but there is no change in the formula. Differently from PPE, it acts directly as an income complement since there is no delay in the payment.

3.5 RSA VS. RMI FROM A WORK INCENTIVE PERSPECTIVE

In this section we analyse the effect of the two systems on disposable incomes and work incentives. To this aim we use area graphs based on pseudo-data, plotting disposable income on months worked for stylised types of households and different contracts (Figure 3). In particular we focus on singles part-time with wage rate at 50% of SMIC, since this is the most favourable case to RMI.

[Figure 3 about here]

This type of analysis is useful for the purpose of comparing the two systems, because it is possible to verify which of the instruments determines a net gain for the beneficiary household. Because of the *dispositif d'interessement* that we presented in Section 2.1, if we compare RMI and RSA, in the very first months of work the old benefit implies a better financial situation for the recipient, due to the possibility of cumulating 100% of work income with the public transfer. But, as depicted below, there is a relative advantage of RSA in time for two reasons. First, after the first three months the RSA has a withdrawal rate larger than RMI (62% vs 50%) and second the RSA does not have time limits, while RMI stops after 12 months.
This kind of comparison also allows determining the break-even point, that is to say the month after which the cumulated disposable income with the new benefit becomes greater than with the old one. Figure 3 shows the amount of disposable income for each month of work since the start of a new job. Hence the sum over time determines the cumulated available income for the time period considered.
The RSA is winning against RMI after the 3rd month of work, when the 100% accumulation of income from work and RMI stops. Difference from the 4th to 12th month is just of 60 euros monthly but becomes even higher when entitlement to RMI finishes, after one year. From that point on, the advantage of RSA is even greater with a monthly gain of 267€. The cumulative advantage of RSA starts at the 9th month.
Beneficiaries of RMI who have been working continuatively since 12 months are always better off after the introduction of RSA. On the other hand, if the recipient has been working for less than three months, RMI wins against RSA because of the possibility of accumulating the household's benefit with 100% of income.
Due to the *dispositif d'interessement*, RMI guarantees to the recipient an advantage in terms of income only in the very first period. RSA, instead, is more long-term oriented with a fix withdrawal rate of 62% and a benefit that continues over time.
To get an idea of how relevant the *dispositif d'interessement* is, Table 1 show the proportion of RMI beneficiaries in each of the three possible states: 0 months of work, 1-3 months of work and 4-11 months of work. As shown by the table, almost 32% of RMI beneficiaries, according to our simulations, are likely to be temporary workers and the relevant question is: is this a sustainable working condition in the long run?

[Table 4 about here]

Due to the nature of RMI itself, people who get minimum income may find convenient to be employed for a short time to exploit the *dispositif d'interessement* and, at the same time, not to lose entitlement to get RMI.

This is possible if RMI recipients continue to enter and exit unemployment with temporary contracts, perhaps with the help of the informal sector.
For these workers, RMI works as a sort of perverse inactivity trap, in the sense that the minimum income constitutes the real stable source of income and temporary job salaries represent just a complement.
On the contrary, RSA is thought to have an opposite nature and determines a situation for which the most convenient strategic behavior is to exit unemployment and find a stable job. This is true independently from the choice of working part-time or full-time. In fact part-time workers benefit from a higher income complement but will possibly choose to have a stable contract. In this sense, part-time is facilitated. For example, think about a single mother with a young child, she could prefer a part time job and save on the child care expenses. With RSA she will receive a noticeable income complement (higher than if she would choose to work full-time), facilitating her choice.
It has been argued that RSA could create a sort of part-time trap[12] but it is rather unluckily that full-time workers will choose to downgrade to part-time, while currently (voluntary) unemployed could decide to switch to a part-time job since RSA increases this opportunity value. Moreover, in order to guarantee some labour market flexibility, part-time jobs should be preferred to temporary jobs since at least they do not imply the uncertainty of the next job and the costs related to a continuous job search. However, much of this discussion depends on a behavioural response of labour supply which we discuss in more details in Section 4.

4 THE SYSIFF 2006 MICRO-MACRO SIMULATION MODEL

SYSIFF 2006 is a combination of a behavioural microsimulation model for the French tax-benefit system tightly integrated into a multi-sectorial static Computational General Equilibrium (CGE) model. While a detailed description, including all estimation results and all CGE equations, can be found in Magnani et al. (2013), a short summary of the main characteristics is provided below.

4.1 THE SYSIFF 2006 BEHAVIOURAL MICROSIMULATION MODEL

SYSIFF 2006 (Système d'Imposition Fiscale Français) is an arithmetical microsimulation model for the French fiscal system integrated with two behavioural models concerning consumption and labour supply decisions. It is a microsimulation model since it is based on micro data on a sample of families representative of the French population (the *Budget des Familles* 2006 – the household budget survey provided by INSEE). The arithmetical part of the model simulates, for each of these families, social contributions, income taxes, VAT, local taxes and social benefits due or to be received by the state. The behavioural part includes two different microeconometric estimations: a quadratic almost ideal demand system for consumption decisions and a discrete-choice labour supply model with involuntary unemployment.

The SYSIFF 2006 model includes a VBA macro that is the heart of the whole Micro-Macro model. The Micro-Macro model is composed by separate independent modules: the arithmetical microsimulation model, the dataset, the consumption module, the labour supply module and the CGE macro model. The VBA macro links all the modules together allowing for the complete micro-macro integration. It is responsible of loading the micro data into SYSIFF 2006, to read the results of the arithmetical microsimulation model and pass them to the labour supply and then consumption modules, which in turns provides the respective behavioural reactions that are passed, together with arithmetic variations, to the CGE that computes macroeconomic variations. These data are then passed to the arithmetic model again, and so on until the variations of all relevant variables are sufficiently stable. In other words, iterations stop when variations of variations are below a certain convergence criterion.

[12]This is the position of Thomas Piketty, for example: http://www.liberation.fr/economie/2009/11/13/le-rsa-contribue-a-favoriser-l-emiettement-du-travail_593459

The estimation of consumption demand is based on the Almost Ideal Demand System proposed by Deaton and Muellbauer (1980) and extended by Banks et al. (1997) with the introduction of a quadratic income term in the demand functions that fulfils the necessity of having a higher rank demand system (useful when Engel curves are non-linear). Along with the quadratic extension, we also introduce demographic heterogeneity through an income translating function, firstly introduced by Gorman (1976). The system of demand equations is estimated simultaneously by Full Information Maximum Likelihood, and a generalized Heckman correction for zero expenditures is applied (Shonkwiler and Yen, 1999).

A standard way to estimate labour supply is to consider that individuals choose the optimal number of hours worked in order to maximize their well-being under a budget constraint. The non-linearity and non-convexity of the budget constraint, due to the characteristics of the tax system, implies the impossibility to derive an explicit solution to this standard utility maximization problem. For this reason, the best option for estimating labour supply behaviour is that of discrete choice models à la Van Soest (1995). This approach allows to directly estimate the utility function parameters without the need of a Marshallian labour supply function. In particular, discrete choice models have the advantage of capturing behavioural changes in corner solutions, accounting for market rigidities and avoiding the computational and analytical difficulties arising from non-linear and non-convex budget constraints, since the budget constraint is computed by the microsimulation model and introduced directly into the utility function.

The analysis of the distribution of the work alternatives has led to the choice of four work alternatives: not to work (0 hours), 50% part-time (18 hours), 80% part-time (28 hours), and full time (36 hours). The estimates of labour supply are performed on a sub-sample of potential wage earners separately for single men, single women and couples. In particular, for each single (man or woman) we define a utility level for each of the four alternatives depending on individual characteristics and the yearly disposable income associated to each alternative. In contrast, for each couple, we estimate the work decision jointly by considering eight alternatives, four for the woman and two (full time work or not to work) for the man. Then, we define a utility level for each of the eight alternatives depending on families characteristics and the yearly disposable income of the family associated to each alternative. Of course, in order to compute the disposable income for the non-observed alternatives it is necessary to generate a potential salary for the unemployed. Potential salaries are estimated using a Heckman correction model (Heckman, 1979).

With respect to the standard model proposed by Van Soest (1995), which implicitly assumes that non-working people choose not to work, we consider that unemployment may be involuntary, as in Magnac (1991), Bingley and Walker (1997), and Haan and Uhlendorff (2007).

4.2 THE CGE MODEL

The CGE model, that represents the macro component of our Micro-Macro simulation model, is a multisectoral and static model with two foreign zones: the Eurozone and the rest of the world. The model is built by using the 2006 French input-output data-set provided by INSEE. The construction of the SAM (Social Accounting Matrix), necessary to calibrate our CGE model, is completed by using national accounts concerning the government accounts and the balance of payments.

An important feature of the CGE model is its macro closure. The macroeconomic equilibrium condition states that aggregate investments must be equal to aggregate savings. The neoclassical closure, that is the most frequently used in general equilibrium models, implies that investments are then savings-driven, i.e. the macroeconomic equilibrium condition determines the aggregate investment. The use of the neoclassical closure implies that a shock which increases the value of a component of the aggregate demand produces a strong and unreasonable effect on investments, while the effect on the GDP is negligible since GDP is determined by the supply of production inputs that are supposed to be fully employed in the economy.

With respect to the neoclassical closure, the keynesian closure consists to fix the level of investments at a predetermined level (see Álvarez-Martínez and Polo, 2012) and to endogenize the unemployment rate. The unemployment rate is then determined in order to satisfy the macroeconomic equilibrium condition between investments and aggregate savings, implying that aggregate production is demand-driven. In particular, and in contrast to neoclassical models, the macroeconomic equilibrium may be an under-unemployment equilibrium, implying that unemployment appears in the case in which the level of the aggregate demand is insufficient.

However, even the keynesian closure presents a major shortcoming since the reduction in the unemployment rate produced by the currency devaluation simulated in our paper would be excessively high. This is why we chose to use in our CGE model a closure rule which is between the neoclassical and the keynesian ones. The idea is the following: with a neoclassical closure, in which investments are savings-driven, an increase in the current account, or in any other component of the aggregate demand, produces a crowding-out effect on investments; in contrast, with a keynesian closure, the same shock produces no effects on investments (if investments are fixed at a given value) or just an indirect effect via the interest rate. Our idea is to introduce in our model an investment function which takes into account for the (partial) crowding-out effect on investments produced by a change in the components of the aggregate demand. Thus, the introduction of this investment function allows us to build a CGE model with a macro closure that is between the neoclassical and the keynesian ones.

4.3 Integration of the two models

The Micro-Macro model works as follows. First, the CGE model simulates a shock (that can be a macroeconomic or a microeconomic shock) and determines the macroeconomic effect, in particular the percentage variations of (i) the equilibrium domestic wage, (ii) the equilibrium consumer prices of the goods and services, (iii) the consumer price index, and (iv) the equilibrium unemployment rate.

The percentage variations are then sent to the Microsimulation model in order to compute, for each individual, the effects on (i) the labour supply, (ii) the demand of goods and services, (iii) the employees' and employers' contributions, (iv) the taxes on incomes, and (v) the transfers from the government.

The individual effects are then aggregated and the percentage variations computed in the Microsimulation model allow us to determine the new values, used in the CGE model, of the following exogenous variables: (i) the total quantity of labour that people want to supply, (ii) the total demand of goods and services, (iii) the total contributions paid by the employees and the employers, (iv) the total taxes on incomes, and (v) the total transfers paid by the government.

The CGE model is then solved by considering the new values of the exogenous variables determined in the Microsimulation model. The solution obtained with the CGE model (i.e. the percentage variations of the equilibrium prices) is then introduced in the Microsimulation model again. And so on. We developed an algorithm in which the iterations are stopped when the fixed point is reached, i.e. when all the percentage variations remain (sufficiently) unchanged between iterations.

5 Results of the simulations

This section reports the main results of our simulations. We simulate 4 different scenarios. The baseline scenario is named “baseline” and represents the last year of life of RMI. As a very short run scenario we present an arithmetic simulation of the introduction of RSA that we call “short run”. Here no behavioural response is included and is supposed to show what would happen the day after the reform. In the long run both behavioural reactions and macroeconomic adjustments are allowed and we account for a scenario where PPE survives and one in which it is cancelled. We name these scenarios “long run (w/PPE)” and “long run (w/o PPE)” respectively. It is important to stress that in these simulations we assume that other macroeconomic

conditions are unchanged, so we do not account for the big recession occurred just after the introduction of the RSA.[13]

5.1 THE COSTS OF THE REFORM

One of the most important points of the reform is its impact on the public budget. Evaluating the cost of the introduction of RSA is decisive to assess the effectiveness of the new instrument and its efficiency in terms of resource allocation.

First of all, a distinction must be made between short and long run. In the long run, the new social minimum is intended to rationalise the whole system of households' benefits by increasing incentives to start working enough to eliminate PPE. In the medium run, however, RSA and PPE are going to coexist and costs must be estimated taking properly into account that.[14]

The expected expenditures for 2008 from the government (Livre vert sur le RSA, 2008) include RMI for 6 billions of €; API for 1 billion € and PPE for 4.5 billions €, for a total amount of 11.5 billions €.

Our simulations for the same instruments produce a total expenditure of 11.04 billions €, with a good precision in simulating beneficiaries of RMI and API together, with just 0,7% more beneficiaries.

The government cost of RSA was assumed to be around 9.75 billions €, while PPE in 2009 was expected to cost 3.9 billions € (Projet de loi). This totals to 13.65 billion € which would indicate a short run cost of 2.15 billions €. SYSIFF 2006 instead produces an estimated cost of almost 7 billions € (see Table 5), mainly because of the much larger estimated cost for the RSA "active", that is the RSA claimed by workers. We estimate a cost of about 7.7 billions € for them, while government estimates a cost of 3.25 billion € (source: Haut commissariat aux solidarités actives contre la pauvreté). Some evidence show that about half active families entitled to RSA do not claim it (Domingo and Pucci, 2012). Accounting for this difference we would obtain figures that are much closer to the governmental estimates.

[Table 5 about here]

5.2 LABOUR SUPPLY REACTIONS

As mentioned earlier, much of the debate around the reform was about its potential positive effect on labour supply. Some critics suggested that the introduction of RSA would have changed a temporary-job-trap into a part-time-trap, because working part-time entitles for a larger amount of benefit.

Table 6 and Table 7 below are the so called transition matrices. They represent the percentage of workers that change their labour supply from one category to another. On the diagonal is the percentage of workers that do not change their labour supply decisions (the observed choice is equal to the prediction after the reform). The results show that the expected labour supply reactions are rather modest, with the strongest effects being a 1-1.1% of singles that decide to start a full time work from unemployment condition, a 0.8-1% percent of bi-active couples becoming mono-active couples, and 0.5% of mono-active couple becoming bioactive couples. Overall we do not observe a massive shift towards part time jobs.

[Table 6 about here]

[Table 7 about here]

[13] At least we provide evidence that the introduction of the RSA was likely not the cause of the crisis, since it produced an increase in real GDP and a reduction in the involuntary unemployment rate.

[14] It is not clear, however, if PPE is going to be eliminated and when this should happen. At the time of writing no signals are given in that direction.

These relatively modest results seem to confirm the studies which tried to assess the overall effects in term of unemployment and found no significant impact (Bargain et Vicard, 2012).

5.3 Poverty and Inequality

Table 8 reports poverty and inequality figures for the pre- and after-reforms simulations. Poverty measures, the head count ratio and the poverty gap ratio, are computed on the equivalized disposable income[15] using 50% of the median income of the pre-reforms distribution as the poverty line for all scenarios. The indices of inequality are the Gini and the interdecile ratio, also computed on the equivalized disposable income.

[Table 8 about here]

As to the baseline scenario, we find a poverty rate of about 9.3%, a poverty gap ratio of about 2.6, a Gini coefficient of 29.4 and an interdecile ratio of 3.6. In the short run the reform brings a quite substantial reduction in poverty, almost 0.7 percentage point, which is strengthened by the behavioural reaction in the long run. Overall, this corresponds to a 9% reduction in poverty. On a similar pattern is the intensity of poverty, with the PGR falling from 2.6 to just above 2.3, a reduction of almost 11%. In both cases the presence of the PPE is almost irrelevant. This is expected, since it is a work incentive for full-time employment, therefore regarding already non-poor households.

Inequality is also reduced, even though by a smaller extent. In the long run, the Gini is reduced by 0.75 percentage points when the PPE is present, a 2.6% reduction. The interdecile ratio decreases at most by 3%.

The behavioural response caused by the introduction of the RSA seems to go in the right direction taking more people out of poverty, but the overall effect is quite limited, possibly due to a macroeconomic compensating effect of wage reduction, as detailed in the next section. The main effect, however, is the immediate one, that is the provision of an income complement to low wage workers quite likely to bring them out of the poverty line.

This intuition is confirmed by Figure 4, which represents the long run net gain on equivalized disposable income keeping the PPE available. There is a quite spread gain of 1 to 4000 or more €, clearly imputable to the RSA given to low-wage workers, and a quite concentrated very small loss that can be imputed to the wage reduction due to macroeconomic adjustments.

Figure 5 plots the probability density function of equivalized disposable income pre- and post-reform, in the long run with PPE. It clearly depicts a shift of families in the range of 5,000-10,000 € of equivalized income towards a higher income bracket (10,000-15,000 €).This confirms the basic goal of this measure, which is aimed to create incentives for people to start working. This is in line with the framework of an active welfare state (Spadaro et al., 2014).

[Figures 4 and 5 about here (possibly coupled)]

5.4 Macroeconomic adjustments

By definition, an active welfare state policy has the objective of increasing the labour supply through economic incentives. As a result, not only families have more money to spend, but also, if the objective is achieved, there is a likely effect on the labour market. Moreover, a reform such as the RSA, as shown earlier, has relevant costs in terms of public budget. Thus macroeconomic adjustments are likely to happen. Table 9 presents the more relevant macroeconomic adjustments for the long run scenario, both with and without PPE.

[Table 9 about here]

[15] We use the OECD-modified equivalence scale.

Perhaps, the most relevant effect at the macro level is the 15%[16] reduction in the involuntary unemployment rate, roughly 1.3 percentage points, which clearly reflects a success given the aims of the RSA reform. As a consequence, the total labour supply increases by 0.3%, which implies an increase by 0.2% of the real GPD. The increase in labour supply also implies a wage adjustment, with a reduction of 0.2%. Total capital in the economy results almost unchanged, with a slight increase in the remuneration of capital. Price of goods is unchanged overall, although private consumption increases by 0.8%. Total investments see a relevant reduction (1.1%) due to a decrease in the saving rate by consumers (-4.6%). Finally, government expenditure increases by 0.2%, but thanks to the positive effect on the GDP, the deficit/GDP ratio decreases by 6.6%, going from 2.4% to 2.2%. Interestingly enough, on an ex-ante perspective, the positive macroeconomic effects that RSA has on the economy surpasses its cost for the government, allowing for an improved deficit/GDP ratio.

6 CONCLUSIONS

This paper is the first systematic evaluation of the impact of RSA reform on French economic system. After the experimentation in 2008 and the generalization of the measure to the entire population, the crisis has produced a significant and unexpected impact on the number of beneficiaries, which now are close to 5 million people.

The possibility of evaluating both at the micro and macro level the effects of the reform can shed light on some issues: we use a microsimulation model (SYSIFF 2006) in order to simulate the monetary cost of the reform and the effects on poverty.

With regards to poverty eradication, using headcount ratio at 50% of the median income, we find that RSA reform produces a long run reduction of the index by less than 1 percentage point (from 9.31 to 8.54), for a total of 200 thousand people out of poverty, in line with estimates of the government.

By integrating the microsimulation model into a CGE model, we try to simulate then the short run and long run effect of RSA reform on job opportunities of beneficiaries, finding out only slight variations for couples (again, confirming Bargain et al.) but significant effects especially on singles households, with a 1% of total singles who are projected to exit unemployment in the long run to find a stable full-time job.

A quite interesting result is obtained in terms of macroeconomic implications in a scenario without economic crisis. If the RSA was working as a minimum income scheme in a pro-cycle phase, the overall effect in terms of GDP (+0.1-0.2%) would produce a positive impact on deficit/GDP, therefore counterbalancing the effect of the increased public expenditure with a multiplier effect able to boost aggregate demand.

The macroeconomic context in which RSA has been implemented was and is extremely unfavourable, especially for the governmental goal of increasing efficiency of job-search activities and to stimulate activation measures more strict for the beneficiaries. In this respect, any evaluation is necessarily questionable because the scheme is operating in a sort of 'extraordinary conditions setting' which may alter the results and reduce the precision of predictions. Nonetheless, our results come up with a positive evaluation of this measure, which is combining at the macro level a back to work strategy with social protection.

[16] For simplicity of exposition we comment only the results of the long run with PPE scenario.

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REFERENCES

Álvarez-Martínez MT, Polo C (2012) A general equilibrium assessment of external and domestic shocks in Spain. Economic Modelling 29(6): 2486-2493.

Anne D, L'Horty Y (2008) Les effets du revenue de Solidarité active (RSA) sur les gains du retour à l'emploi, CEE working paper n. 106.

Assemblée Nationale (2008) Projet de loi n°1100 généralisant le revenue de solidarité active.

Assemblée Nationale (2008) Rapport fait au nom de la commission des affaires culturelles familiales et socials sur le projet de loi (n°100) généralisant le revenue du solidarité active et réformant les politiques d'insertion.

Banks J, Blundell R, Lewbel A (1997) Quadratic Engel Curves And Consumer Demand. The Review of Economics and Statistics 79(4): 527-539.

Bargain O, Vicard A (2012) Le RMI et son successeur le RSA découragent-ils certains jeunes de travailler? INSEE Working Paper J2012/09.

Bingley P, Walker I (1997) The Labour Supply, Unemployment and Participation of Lone Mothers in In-Work Transfer Programmes. Economic Journal 107(444): 1375-1390.

Canova L, Piccoli L, Spadaro A (2009) SYSIFF 2006: A Microsimulation model for French tax system. MicroSimula – Paris School of Economics, DOI:10.13140/2.1.3076.3521.

Cazain S (2014) Les foyers bénéficiaires du RSA fin décembre 2013. *Cnaf, RSA conjoncture, n° 5.*

Comitè National de Evaluation RSA (2012) Rapport final.

Comitè National de Evaluation RSA (2011) Rapport final.

Danzin E, Simonnet V, Trancart D (2012) Les effets du RSA sur le taux de retour a l'emploi des beneficiaires. CEE Working paper n. 73.

Deaton AS, Muellbauer J (1980) An Almost Ideal Demand System. American Economic Review 70(3): 312-326.

DGTPE (2009) Note pour le HCSA.

Domingo P, Pucci M (2012) Les non recourants au RSA. CAF L'essentiel, n°124.

Gorman WM (1976) Tricks with utility functions. In M. J. Artis and A. R. Nobay (Eds.), Proceedings of the 1975 AUTE Conference, Essays in Economic Analysis. Cambridge: Cambridge University Press.

Haan P, Uhlendorff A (2007) Intertemporal Labor Supply and Involuntary Unemployment. Discussion Paper No 2888, Institute for the Study of Labor (IZA).

Haut commissaire aux solidarités actives contre la pauvretè (2008) Livre vert sur le RSA.

Magnac T (1991) Segmented or Competitive Labor Markets. Econometrica 59(1): 165-187.

Magnani R, Piccoli L, Carré M, Spadaro A (2013) Would a real depreciation of the euro improve the French economy? DEA working paper n. 60.

OECD (2011) A simplified benefits system. France country policy briefs.

Piketty T (2008) Le RSA, une imposture? Liberation 2 SEPTEMBRE 2008.

Shonkwiler JS, Yen ST (1999) Two-Step Estimation of a Censored System of Equations. American Journal of Agricultural Economics 81(4): 972-982.

Spadaro A, Piccoli L, Mangiavacchi L (2014) Optimal taxation, social contract and the four worlds of welfare capitalism in Europe. Economica: forthcoming.

Thibault F (2014) Ambition et evaluation du Revenu de Solidarité Active. Economie et Statistique 467-468.

Van Soest A (1995) Structural Models of Family Labor Supply: A Discrete Choice Approach. Journal of Human Resources 30(1): 63-88.

TABLE 1: MONTHLY AMOUNTS OF RMI, 2008

Family size	*Resources Threshold 2008*
Singles	447.91 €
Second person in the household	Add 223.96 €
Each additional person	Add 134.37 €
Each child after the 3rd	Add 179.16

TABLE 2: MECHANISM TO COMPUTE RMI

Part time worker	
Working Period	*Disposable income*
0 months	100% RMI
0-3 months	RAP + 100% RMI
4-11 months	RAP + max{plafond max RMI – 50% RAP ; 0}
12 months	RAP + max{plafond max RMI – 100% RAP ; 0}
Full time worker	
Working Period	*Disposable income*
0 months	100% RMI
0-3 months	RAP + 100% RMI
4-12 months	150 € for a single and 225 € for 2 persons or more

TABLE 3: MECHANISM TO COMPUTE PPE

Household type	RAP Thresholds	Amount	Extra
Singles, widowed, divorced, bi-active couple, families with one worker in charge earning at least 3743 €.	3743 ≤ RAP ≤ 12475	RAP × 7.7%	36 € for each person in charge
	12475< RAP ≤ 17451	(17451 - RAP) × 19.3%	
Mono-active Couples	3743 ≤ RAP ≤ 12475	(RAP × 7.7%) + 83 €	36 € for each person in charge
	12475 < RAP ≤ 17451	(17451 - RAP)× 19.3% + 83 €	
	17451<RAP≤ 24950	83 €	36 € independently of persons in charge
	24950 < RAP ≤ 26572	(26572-RAP)x 5.1%	

TABLE 4: RMI BENEFICIARIES BY CASES OF DISPOSITIF D'INTERESSEMENT

RMI 0 months	68.5%
RMI 1-3 months	8.0%
RMI 4-11 months	23.6%

TABLE 5: COSTS OF THE REFORM (IN BILLIONS OF €)

	Baseline	Short run	Long run (w/PPE)	Long run (w/o PPE)
RMI	5.95			
API	0.93			
PPE	4.16	4.16	4.13	
RSA		13.80	14.23	14.37
Total	11.04	17.96	18.36	14.37

TABLE 6: LABOUR SUPPLY REACTION OF SINGLES

Long run w/o PPE						
		Prediction				
		0	18	24	36	Total
Choice	0	14.5	0.1	0.2	**1.0**	15.7
	18	0.0	6.6	0.0	0.0	6.7
	24	0.1	0.0	8.1	0.0	8.2
	36	0.4	0.2	0.1	68.8	69.4
Total		15.0	6.9	8.4	69.8	100

Long run w/PPE						
		Prediction				
		0	18	24	36	Total
Choice	0	14.4	0.1	0.2	**1.1**	15.7
	18	0.0	6.6	0.0	0.0	6.7
	24	0.1	0.0	8.1	0.0	8.2
	36	0.4	0.2	0.1	68.8	69.4
Total		14.8	6.9	8.4	69.9	100

TABLE 7: LABOUR SUPPLY REACTION OF COUPLES

Long run w/o PPE

		Prediction								
		0-0	0-18	0-24	0-36	36-0	36-18	36-24	36-36	Total
choice	0-0	2.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	3.1
	0-18	0.0	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.9
	0-24	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7
	0-36	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.2	2.9
	36-0	0.1	0.0	0.0	0.0	17.8	0.2	0.2	**0.5**	18.7
	36-18	0.0	0.0	0.0	0.0	0.2	9.6	0.0	0.1	9.9
	36-24	0.1	0.0	0.0	0.0	0.3	0.0	13.9	0.1	14.5
	36-36	0.2	0.0	0.0	0.1	**1.0**	0.2	0.1	47.8	49.4
Total		3.4	0.8	0.7	2.7	19.5	10.1	14.2	48.6	100

Long run w/PPE

		Prediction								
		0-0	0-18	0-24	0-36	36-0	36-18	36-24	36-36	Total
choice	0-0	2.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	3.1
	0-18	0.0	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.9
	0-24	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.7
	0-36	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.3	2.9
	36-0	0.1	0.0	0.0	0.0	17.8	0.2	0.2	**0.5**	18.7
	36-18	0.0	0.0	0.0	0.0	0.2	9.7	0.0	0.0	9.9
	36-24	0.1	0.0	0.0	0.0	0.3	0.0	14.0	0.1	14.5
	36-36	0.2	0.0	0.0	0.1	**0.8**	0.2	0.1	47.9	49.4
Total		3.3	0.8	0.7	2.7	19.3	10.2	14.4	48.7	100

TABLE 8: POVERTY AND INEQUALITY

	Baseline	Short run	LR (w/o PPE)	LR (w/PPE)
Headcount ratio	9.31	8.66	8.57	8.54
Poverty gap ratio	2.55	2.33	2.31	2.30
Gini coefficient	29.38	29.01	28.98	28.63
D9/D1	3.62	3.52	3.51	3.50

TABLE 9: MACROECONOMIC ADJUSTMENTS OF THE RSA REFORM

	Variation	w/o PPE	w/PPE
Real GDP	(% var.)	0.1	0.2
Involuntary unemployment rate	(% in p.p.)	-14.0	-15.2
Labor	(% var.)	0.1	0.3
Capital	(% var.)	0.0	0.0
Real wage	(% var.)	-0.2	-0.2
Real rate of remuneration of capital	(% in p.p.)	0.1	0.2
Consumer Price Index	(% var.)	0.0	0.0
Private consumption	(% var.)	0.2	0.8
Total investments	(% var.)	-0.3	-1.1
Government expenditure	(% var.)	0.1	0.2
Private saving rate	(% in p.p.)	-1.4	-4.6
Public deficit / GDP	(% in p.p.)	-2.2	-6.6

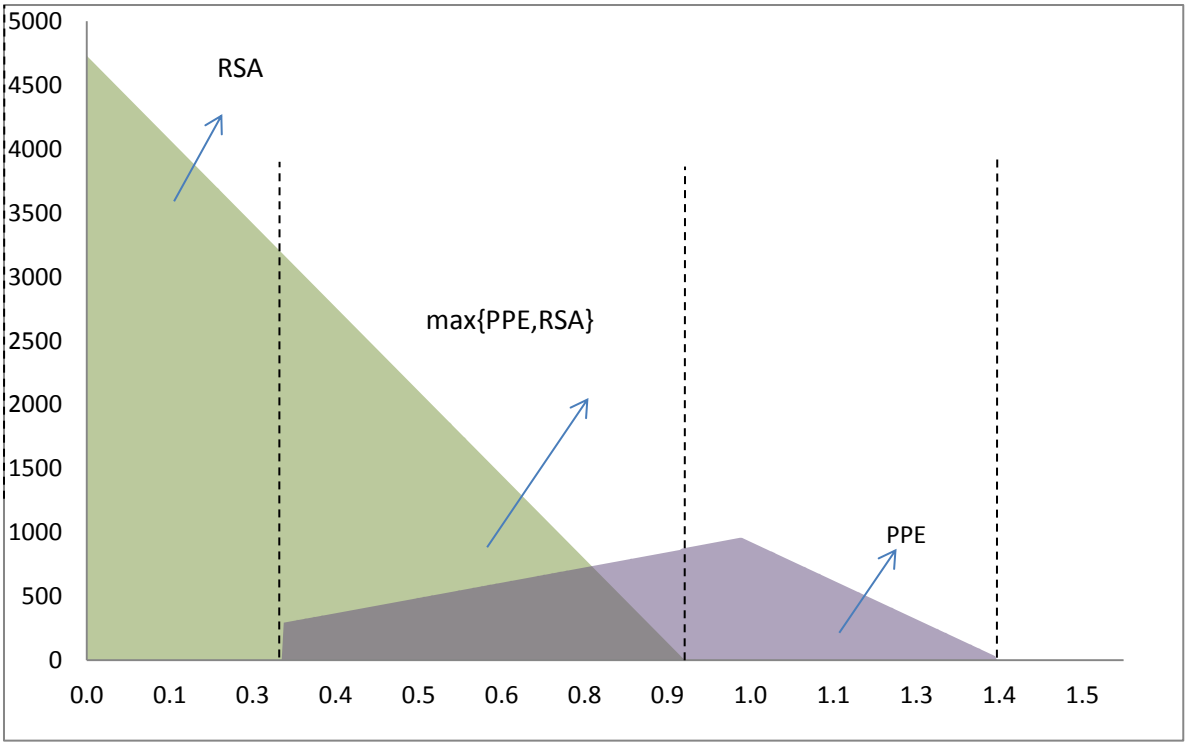

FIGURE 1: AMOUNT OF RSA AND PPE BY GROSS LABOUR INCOME AS A PROPORTION OF THE SMIC

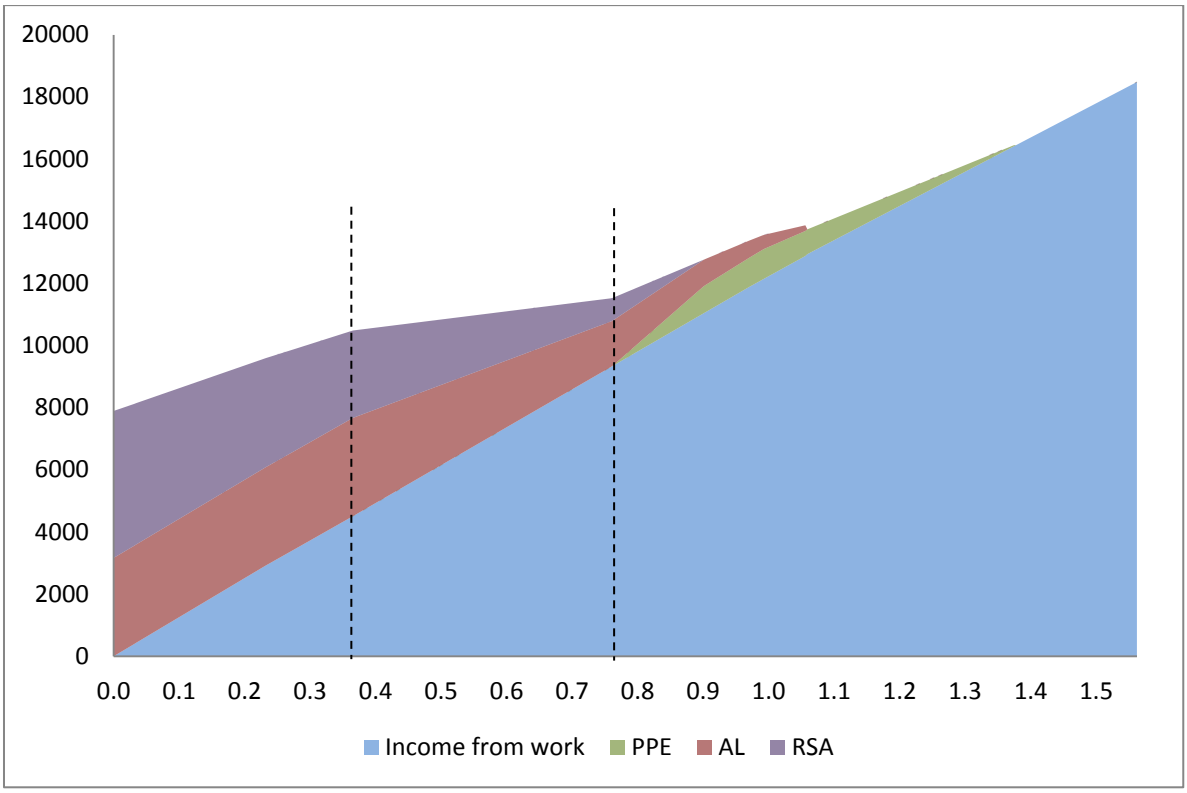

FIGURE 2: DISPOSABLE INCOME COMPOSITION BY GROSS LABOUR INCOME AS A PROPORTION OF SMIC

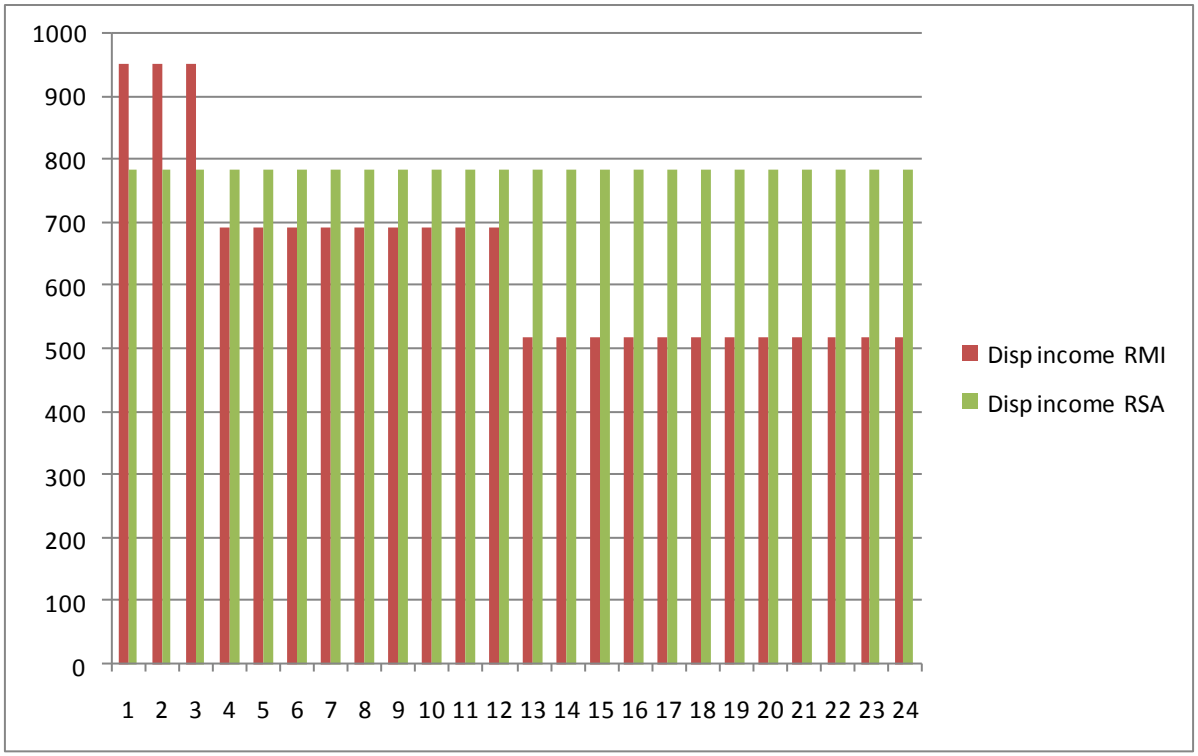

FIGURE 3: DISPOSABLE INCOME WITH RMI AND RSA IN COMPARISON, FOR MONTHS OF WORK (SINGLE PART-TIME 50% SMIC)

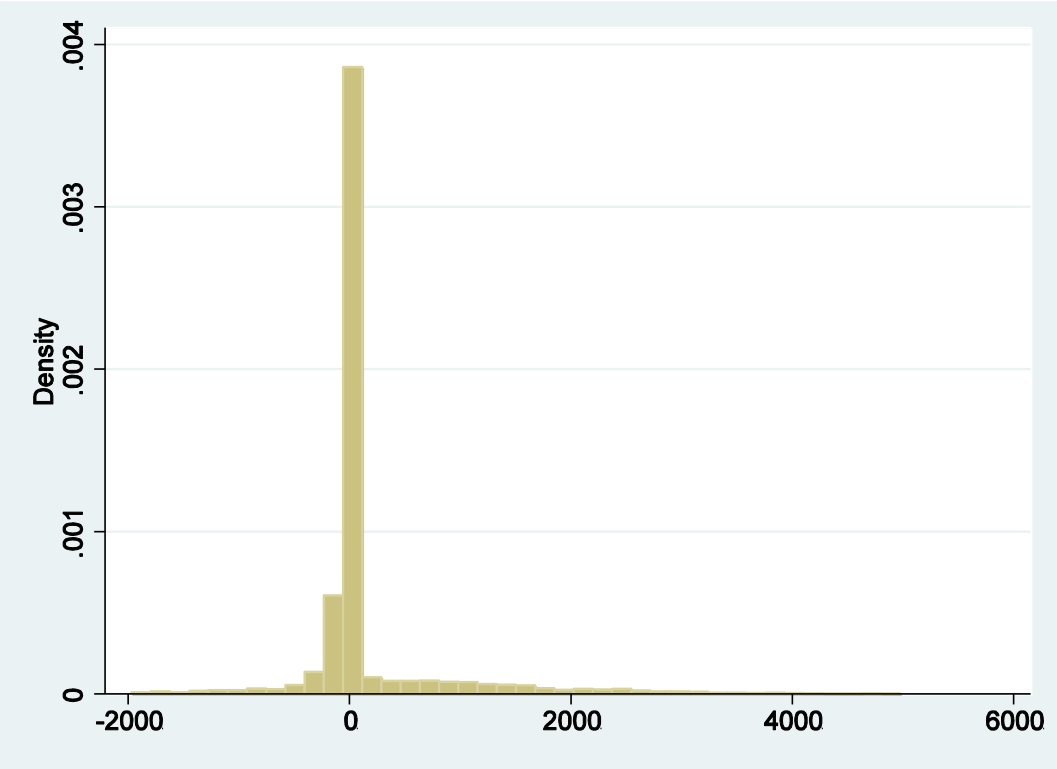

Figure 4: Net gain of the RSA reform

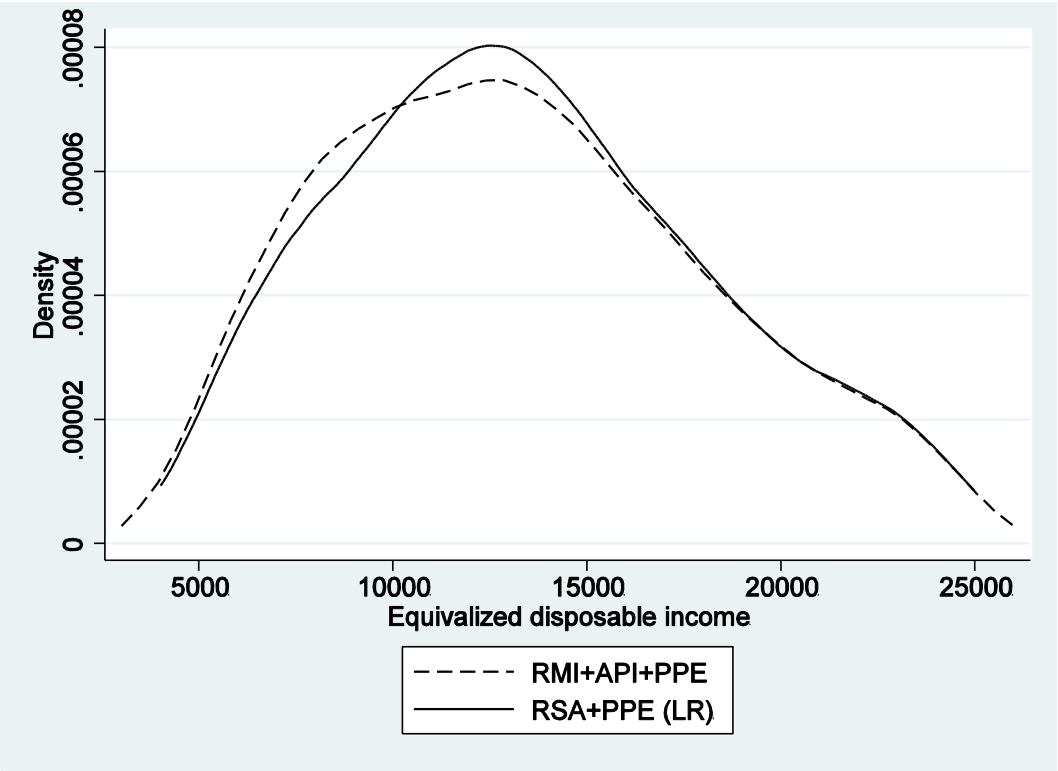

FIGURE 5: PROBABILITY DENSITY FUNCTION OF EQUIVALIZED DISPOSABLE INCOME