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A microsimulation model for the personal income tax

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Abstract

The main objective of this project is to introduce the update made to Gladhispania model. Thanks to this update the model is able to simulate Spanish Personal Income Tax for the year 2014 and the possible effects of a hypothetical reform in households' disposable income and income redistribution.

The data used for this microsimulation model is the Survey of Income and Living Conditions, provided by the Spanish National Institute of Statistics.

In order to test the utility of this microsimulator it was simulated the scenario of the year 2014 and a theoretical reform. The aim is twofold. First, testing if its results were adjusted to 2014's reality. Second, creating an alternative tax reform that improved equality and a more redistributive system without modifying tax revenue.

The results of these simulations were really productive and the objectives were achieved: the microsimulation model was able to reproduce 2014's scenario and the proposed tax reform increased redistribution among individuals.

1. Introduction

This paper introduces Gladhispania microsimulation model and its update to the economic situation for the year 2014, before introducing this specific microsimulation model a brief approach to microsimulation models is going to be made, their characteristics and how they can be used in order to analyze the effects of a policy among the individuals of a determined country. This analysis makes possible the design of an optimal policy that achieves the objectives set by policy makers trying to avoid great failures in these policies.

Microsimulation models have become a tool used by policy makers who want to test possible effects of their theoretical reform before applying it to the economy of the country; by these means it is possible to minimize negative effects or even avoiding externalities that might not be taken into account during the first analysis of the policy.

Using a microsimulation model is an opportunity to make a better approach to the study of the microeconomic variables; by using a microsimulation model individuals can understand how changes in variables affect the economy of a country. Through this method it is possible to get a better comprehension of the microeconomic variables and the relationships among them.

In order to create a model it is necessary to use a reliable source of information that reflects the reality of the population; the input data used for this model comes from the National Institute of Statistics, specifically from the SILC. It is really important to use reliable data in order to create a reliable. If the model created uses reliable data it predicts changes in country's economy in an accurate way, which will mean a model that makes possible to estimate the effects of policies properly and to achieve the objectives set by policy makers.

Through the results obtained with this model it is possible to study an important part of the Spanish taxation system: the Personal Income Tax. These results and the suggested reform will be introduced in the following sections.

In order to make a proper exposition of the job done for this paper, it is divided in five different parts:

- The first section of this paper is a brief introduction to microsimulation models: their history, the way they work and some examples of current microsimulation models.
- The following part of this paper tries to make a summary of the main characteristics of Spanish Personal Income Tax and how it works.
- In the third part of this paper it will be possible to see the characteristics of the model used for this study: Gladhispania and the adjustments made to update the model to the situation of Spain during the year 2014.
- The fourth part is devoted to the reform proposed for the model: the main objective of the policy, the reform applied and the results obtained.
- In the final part of this paper conclusions of this study are exposed and it is possible to see a comparison among 2014 situation and post-reform situation.

2. Microsimulation models

A brief introduction to microsimulation models

Microsimulation models are programs that give their users the possibility to observe the results of a change in tax policies, making possible to analyze the outputs of those reforms; microsimulation models make easier to see changes in the welfare level of individuals affected by those reforms. Due to their characteristics, microsimulation models have become a really important tool to analyze those mentioned effects *ex-ante*, allowing experts to prevent possible negative effects such as externalities or an unexpected reaction of the economy. Microsimulation models can be defined as "a way of modelling real life events through the simulation of individual's actions" (Oliver*,* 2013.).

According to Absalón and Urzúa (2011), microsimulation models have three main positive characteristics that make them a really useful tool in analyzing data:

- Microsimulation models are easy to use: since they are not complex tools, even people who are not really experienced in the use of microsimulators are able to learn how to use them properly relatively fast, making them an interesting alternative to make economic analysis.
- Microsimulation models have a detailed modeling of the field of their study: being easy to use does not mean that microsimulation models do not have detailed information, during their modeling many information is taken into account, such as tax models of the studied countries or part of individuals' economic data; making them trust worthy.
- Microsimulation models take into account the heterogeneity of individuals: this is a really important characteristic, since the model distinguishes heterogeneous individuals, it is possible to see the different effects among the population of the study, facilitating the distinction between "winners" and "losers", this fact gives experts the possibility of designing policies that provide and increase in welfare for the individuals they really want to experience it.

Although microsimulation models have these positive characteristics it is important to take into account that they need a huge sample of representative individuals in order to work properly. It is also important to mention that sometimes information is not available from the same database, which makes the creation of a microsimulation model a bit more difficult.

Now that a brief definition of microsimulators has been made, it will be possible to make an approach to their history and see some examples of microsimulation models used nowadays.

History of microsimulation models

Microsimulation models made their first appearance in the decade of 1950 thanks to Guy Orcutt, who considered that macroeconomic models were unable to provide a proper analysis for the effects of public policies in determined variables such as income distribution among economic agents. Orcutt's proposal was to design a simulation model that had as input the detailed information about a representative sample of the agents of the population, providing a better analysis about the effects of the reforms among individuals.

Despite the fact microsimulators started in the decade of 1950, their popularity rose during the decade of 1980 thanks to the technologic advances: having access to household data surveys and computers able to process more information at an affordable price. The implementation of these models started with simulators that tried to estimate the effects of tax reforms among individuals in different countries. These simulators answered questions about what would happen if there was a change in individuals' variables (income distribution, welfare levels, aggregate public budget…) and these models have evolved becoming the current microsimulation models.

Microsimulation models can be classified according to three different criteria:

- Depending on the reaction of individuals in the sample it is possible to differentiate between behavioral and non-behavioral models. Behavioral models take into account reactions of individuals to a policy while non-behavioral models do not take into account these reactions. Non-behavioral models are designed to calculate the reactions of individuals to a policy in the short term, what is called the day after effects because agents could not react to changes in the policies.
- Microeconomic simulators can also be classified as static or dynamic. Static models are those which do not take into account the effects of policies in long term among individuals, on the other hand, dynamic models take care about the long term effects of a policy among individuals.
- Finally, microsimulators can also be classified between partial equilibrium and general equilibrium models. Partial equilibrium models assume that reactions of individuals do not affect prices, general equilibrium models consider that policies affect prices and individuals' consumption.

Gladhispania is a direct taxation model. In order to show the existence of direct taxation models in other countries, some examples of them will be enumerated in the following lines.

- APPSIM : A dynamic microsimulation model that simulates the cycle of life of Australian individuals.[1]
- EUROMOD: A microsimulation model used by the European Union.[2]
- SPSD/M: A microsimulation model created by Statistics Canada to simulate Canadian tax system.[3]
- TAXBEN: A microsimulation model that studies United Kingdom's economy, developed by the institute for Fiscal Policies.[4]
- TRIM3: The microsimulation model for the economy of the U.S.A.[5]

Microsimulation in Spain

Since the emergence of the first microsimulation model in Spain, thanks to the creation of MOSIR (Castañer and Santos, 1992), several microsimulation models appeared over the years. An important reason that explains the growth of microsimulation models was the creation of databases such as the sample IEF-AEAT in 2002 (Picos Sánchez et al. 2002), a sample that included a huge number of individuals (nearly one million of observations) and more than 200 personal, family and fiscal variables. The creation of samples such as the one mentioned previously facilitated the emergence of new microsimulation models for the Spanish tax system.

Among the different microsimulation models that simulate Spanish tax system it is necessary to mention three of them: SIMESP (a simulator that uses the records of the Institute of Financial Studies as input data), EUROMOD (the microsimulation model used by the European Union has its own specific section to simulate Spanish economy) and Gladhispania (the model introduced in this paper which will be explained thoroughly in fourth section).

3. Spanish Personal Income Tax and the Social Security System

Spanish Personal Income Tax, known as IRPF in Spain (*Impuesto sobre la Renta de las Personas Físicas).* It is a direct and progressive tax that taxes each source of individuals' income.

IRPF is the main source of income for the Spanish Government with a total collection of €72.662 million over the total collection of €174.987 million, which is more than 41% of the total tax collection for the year 2014.

During the year individuals have to anticipate a part of the income they obtain in order to pay this tax. Once the year has finished, individuals have six months to prepare and present their income tax return and pay (or receive) the difference between the calculation of this tax and the withholdings. Some individuals (those with a low income) do not have to present IRPF, but they have the option to do it (which means that they will only present IRPF if it is profitable for them).

IRPF taxes each income source of individuals (labor income, capital income, property income, economic activities income and patrimonial gains and losses), these sources are treated separately due to their different nature. Those sources are taxed in two different bases: the general base and net savings base. Although most of income sources are taxed in the general base, those incomes that come from capital earnings. Both bases have a different taxation, net savings base has a lower taxation, but the general base has more deductions, which is also an advantage.

After calculating the tax for each income source, different reductions are applied (joint declaration reduction and contributions to pension plans are the most common even there are more reductions), following these deductions the information about personal and familiar minimum can be found, this minimum reduces the amount of money that has to be paid for this tax and depends on the characteristics of the household (some examples that apply to this minimum are the fact of living with descendants under 25 that do not present IRPF in that year or living with ascendants with an income under a certain level and who do not present IRPF in that year).

When these deductions have been calculated a quantity that is known in Spain as taxable income is obtained. It will be possible to find a frame that applies a level of taxation to individuals based on the value of this taxable income; as IRPF is a progressive tax, as the amount of the taxable income rises its taxation will also rise gradually. After taxable income is obtained, the frame mentioned before will help us to calculate Spanish *cuota íntegra,* which is going to be referred as full quota. Full quota has two different parts, one of them is set by the Spanish Government and is common for every Spanish individual and the other part is the one set by the Autonomous Community, this part may vary depending on the Autonomous Community and its collection will be for the corresponding Autonomous Community. Tables 2-13 show the tax brackets and the tax rates in each region. Higher incomes (which imply high full quotas) are those that have to pay more.

In order to benefit individuals, Spanish Government and Autonomous Communities set some deductions that apply when individuals accomplish

determined characteristics. Deductions set by Spanish Government are common for every Spanish individual, while Autonomous Communities deductions only apply to individuals that accomplish those conditions and live in that specific autonomous community. The final amount of deductions depends on many things, but in table 14 it is possible to see which deductions are the most common among Autonomous Communities.

Deductions apply to full quota and the result is known as *cuota líquida,* which will be known as liquid quota for simplification. Liquid quota can be equal to full quota if no deductions are applied to it. Liquid quota is the final amount that should be paid by individuals (if IRPF is presented as individual declaration) or fiscal unit (if it is presented as joint declaration).

It is really important to mention that a part of the calculation of the Personal Income Tax depends on the contributions made to the social Security System by individuals. These contributions depend on individuals' labor status and they are also computed by the model.

4. Gladhispania, a Spanish Personal Income Tax microsimulation model

A brief introduction to the model

Tax reforms affect individuals in several ways, their income is affected by these reforms. The microsimulation model that is being presented tries to study the possible effects of a reform in the Spanish income tax (known as IRPF in Spain) and Spanish social security system.

The model estimates the final amount that has to be paid by contributors in income tax and their social security contribution. Making possible to see the different parts of this tax, differentiating between the taxable event and the deductions (either state deductions or autonomic deductions) and their social security contribution which will depend on the job of individuals.

In this model there are two different parts:

- One of the parts of this microeconomic simulator simulates the Spanish Personal Income Tax, the microsimulator estimates the amount that should be paid by the household and calculates which way is the best to present the income tax return for the household (individually or jointly).
- The other part of this model simulates the Spanish Social Security System, providing information about the social security contributions of the individuals in the household. This information enables the possibility of analyzing how the contributions affect the Spanish Personal Income Tax for those individuals who have labor income.

Methodology used to update Gladhispania

In order to make a proper analysis of the possibilities offered by a public policy it was necessary to state a model that reproduced reality properly. Gladhispania was the model selected to do this job due to the fact that it is relatively easy to use and it is reliable.

Before starting to talk about the methodology used to update the model it is important to talk about the decisions taken about the input data chosen for the model.

It was necessary to choose a large sample that represented Spanish population; the sample chosen was the SILC, provided by the Spanish National Institute of Statistics. This database has also been chosen for previous versions of this model because it provides information about households and the individuals who integrate it.

Once the data was chosen and adapted to adjust certain needs of the model, the next step was modifying the simulator, updating its modules and changing them to reflect the taxation for Spain during the year 2014.

It has been carried out a validation and calibration of the model. The validation revises that all the computations are done correctly in the model. The results were being checked every time there was a change in the simulator. When a mistake was detected during this adaptation a revision of the whole simulator

was made to find if that mistake was related to any other calculations to avoid future mistakes related to similar issues.

Once the microeconomic simulator was complete, a calibration of the model was conducted, that is, if the model is able to reproduce the aggregate values of the Spanish economy. In order to do that, the real tax collection was compared to the tax collection calculated by the model, obtaining a difference of 0'72% (€ 72.662 thousand million against € 73.766 thousand million according to the calculations of the model) the same comparison was made to compare the results on the average household disposable income, obtaining a difference of 1'34% with respect to the real average disposable income (€ 24.557 against € 24.886'95).[6]

In order to adjust the model it was necessary to eliminate 37 households with negative gross income; after that the weights given to the rest of the households were adjusted to represent the sum of the Spanish households in the population.

Main differences between 2007 model and the current model

This microsimulator is an update of the same model used to process the data of income tax in 2007 (Oliver and Spadaro, 2004 and 2007), in the current model the income tax is estimated using the data of the year 2014, which was the last available by the time this update started; this data was treated with the program stata in order to adjust it to work correctly according to Gladhispania requirement, these modifications made possible the simulation of households' income like in the previous versions.

This update took into account changes in taxation, new state and autonomic deductions and also changes in Spanish Social Security system, all this information about Personal Income Tax and Social Security System can be found in *Manual Práctico Renta 2014* (Ministerio de Hacienda y Administraciones Públicas, April 29th 2015)

Thanks to this update it is possible to see the evolution of Spanish income tax, making possible to appreciate changes in taxation and deductions, making possible to estimate changes in disposable income of individuals.

In the following lines it is going to be explained how this microsimulation model works and the output that it provides.

Structure of the model and technical details

Gladhispania is a model that uses Microsoft Excel® to calculate households' Personal Income Tax. Thanks to its structure, Gladhispania is able to calculate the different parts of the Spanish Personal Income Tax, separating the different sources of income and taxing them appropriately according to 2014's taxation.

Gladhispania differentiates between labor income, property income, capital income, economic activities income and patrimony gains and losses making possible the calculation of different parts that integrate this tax. Due to this differentiation the model is able to calculate both general and net savings tax bases. The parameters that calculate these bases appear in *Manual Práctico Renta 2014* and are those that were set to 2014's IRPF.

After this calculation, the model applies the personal and family allowances, a section that is divided in different parts to simplify the calculation of the total personal and family allowances, dividing it in different parts depending on which contributors are being taken into account and their characteristics (i.e. their age, gender or if any member of the household is disabled or not).

When personal and minimum allowances are applied to both tax bases the model proceeds to calculate the result before deductions (for both, general and net savings) and calculates the part of each result that should go to the State and to the Autonomous Community. Each Autonomous Community has its own taxation for IRPF and the simulator calculates it and applies to the household depending on the Autonomous Community it belongs to. After all these calculations, the model proceeds to apply deductions (State deductions and Autonomous Communities deductions).

To simplify the calculation of Autonomous Communities deductions the model estimates the deductions for every Autonomous Community and applies them to household's IRPF, after calculating all the parameters the microeconomic simulator exposes all the deductions for Autonomous Communities and chooses those deductions that can be applied to the declaration thanks to the distinction made in the data input for the model (which gives a value to each Autonomous Community to make easier the identification of the Autonomous Community in which individuals are taxed).

The final part of these calculations is the computation of the final amount that will be paid by contributors, applying the deductions mentioned previously and calculating which option is the best for that specific household: presenting declaration individually or jointly (if it is possible to present it jointly).

But, as it was said before, this model does not only calculate IRPF, it also estimates Social Security contributions for individuals in households. The model determines the contribution that workers should pay depending on many factors that are taken into account in the simulation (such as the specific profession of individuals, maximum bases and general minimum wage). This part of the model allows the calculation of a part of IRPF that must be taken into account and it also allows the simulation of reforms of Spanish Social Security System that might be interesting for policy makers.

All these advantages make possible the analysis of the effects derived from changes in Spanish Personal Income Tax and how it affects individuals' income and Government's collection; showing the real "winners" and "losers".

Thanks to this microsimulation model it is possible to see an approximation to reality, appreciating the way IRPF affects heterogeneous individuals of the Spanish population represented in the sample of the model.

5. Simulation of a tax reform

In order to show possible applications for Gladhispania, a hypothetical tax reform was simulated. This tax reform had two main objectives: reducing poverty and increasing income redistribution avoiding to affect negatively tax collection.

The proposed reform had two main parts; the first part was the implementation of a "negative tax" of € 3.000 for those households with an income of € 3.000 or less. For higher incomes, there is a decrease of one euro in this "negative tax" for each euro above up to the limit of € 6.000; this progressive decrease (known as phase-out region) of the "negative tax" was designed in order to avoid incentive problems (if this social benefit is taken away, those households with an income between € 3.000 and € 6.000 would rather stop working because it would be better for them); the second part of the reform was an increase on the State taxation, this increase was also accompanied by the suppression of two brackets of the tax, increasing the taxation for the highest rents, this increase in taxation was made because the reform is designed to be in charge of the State; by these means it was possible to maintain tax collection in the same level and achieve the objectives set for the policy.

Once the reform was simulated, the objectives were achieved successfully: poverty decreased and income redistribution increased while tax collection suffered an inferior change compared to other options suggested by Spanish Government in tax reforms.

Using Gladhispania it was possible to calculate several indexes in order to study changes in welfare derived from this reform, those changes will be explained in the following lines.

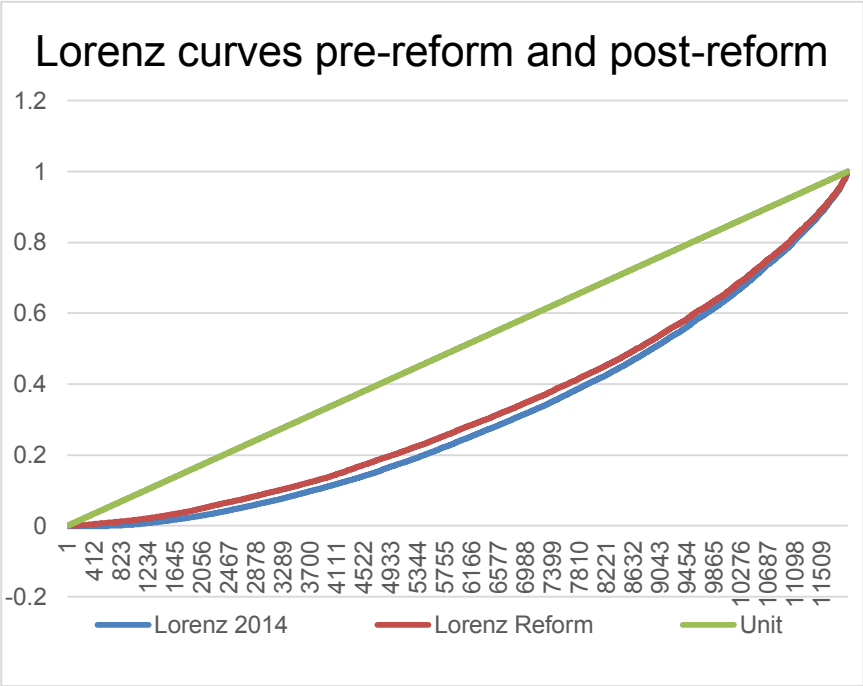
First of all it is necessary to talk about changes in tax collection: this reform will imply a tax revenue of € 73.101.834.910'54 (adding up IRPF and Social Security contributions); which means a decrease of 0'114% in final tax collection. Even this decrease in tax collection should be taken into account, the tax reform done by Spanish Government during the years 2015 and 2016 was estimated to decrease IRPF's collection at about 8% (€ 6.000 million). This information shows that the reform designed for this paper can be carried out by the Spanish Government.

Another important result of this reform is the change in households' average equivalent disposable income: thanks to the reform proposed, households' average equivalent disposable income would rise from € 14.702'97 to € 14.751'76 which means an increase of 0'332% in this variable (Average equivalent disposable income is calculated according to the OECD equivalence, which depends on individuals of the household).

This increase in households' average disposable income means an increase in equality and this increase can be seen thanks to the Gini Index (Gini Index is a value between 0 and 1 that makes possible to see how income is distributed in a country, Gini indexes close to 0 mean less inequality, while Gini indexes close to 1 mean the opposite) in this case, Gini Index decreased from 0'348 to 0'344

this means a decrease of 1'2% in Gini Index, increasing in this way equality in Spanish economy thanks to the reform proposed in this paper.

In order to show redistribution of this policy, Lorenz curves were calculated. Lorenz curves are an easy way to see graphically how income is distributed in a country; if Lorenz curves are close to the diagonal, income will be equally distributed. Thanks to the elaboration of Lorenz curves for both scenarios (pre-reform and post-reform) it is possible to see changes in income redistribution resulting from this reform. In the following graph it will be possible to see Lorenz curves elaborated for the scenarios.



Graph 1: Lorenz curves for original scenario and post-reform scenario. Own elaboration.

In order to see how redistribution increased thanks to the proposed reform, Reynolds-Smolensky index was calculated for the pre reform situation and post reform situation, moving from 0'07 to 0'08, which means a bigger increase in redistribution thanks to the reform proposed for this paper; taking into account this information, it is obvious that this reform increases income redistribution.

It is also interesting to talk about welfare measures: thanks to the proposed reform, welfare in Spain increased; in this case Sen's welfare was used in order to estimate changes in welfare to calculate changes in households' welfare. For this specific case, Sen's welfare changed from 9.580'45105 to 9.673'904643 which means an increase of 0'975% in welfare respect to the scenario.
In addition to these results, a table showing changes in deciles was elaborated in order to show how this reform affects different individuals with different incomes.

Additionally, deciles of households were calculated, so, changes in households' disposable income could be seen and measured. In this case, households in deciles from 1 to 5 obtained a positive variation in their disposable incomes thanks to this reform. The final aggregated deciles variation was clearly positive, showing a great positive change in aggregated terms. The following table shows households' deciles and percentage changes derived from the simulated policy.

	2014	Reform	% variation
1	922,679894	3011,89403	226,4289%
2	4666,52002	5903,6968	26,5118%
3	7245,88692	7996,26907	10,3560%
4	9382,56202	9836,49469	4,8380%
5	11455,2033	11525,3903	0,6127%
6	13717,5866	13575,0079	-1,0394%
7	16356,1542	15996,5154	-2,1988%
8	19697,0258	19066,3851	-3,2017%
9	24332,6983	23309,5169	-4,2050%
10	38148,6951	35535,3375	-6,8505%

Table 1: Income deciles pre-reform and post-reform and their percentage changes. Own elaboration.

Finally, in order to explain effects on poverty, poverty index and intensity of poverty were calculated (Poverty index was calculated using 60% of median income). Thanks to the reform, poverty moved from 26'65% to 21'96% (which means a decrease of 17'596% with respect to the situation of 2014). With respect to poverty intensity changes are bigger: it is reduced from 56'60% to 36'60% (a decrease of 35'325%), this decrease can be due to the fact that poor households receive the "negative tax" of € 3.000. By these means it is possible to see how this reform affects poor households, reducing the risk of social exclusion for poor households.

Once these analytical results have been shown it is possible to affirm that this suggested reform provides a better situation for Spanish population with respect to the original situation: Income is redistributed in a more equitable way, average household income has increased as it was shown in previous lines and welfare has increased according to the calculation of Sen's welfare coefficient.

6. Conclusions

The main objective of this paper was to introduce the reform of the microeconomic simulator adapting it to 2014 scenario. The adaptation of this model made possible the achievement of the objective of analyzing 2014's scenario.

Thanks to this simulator several scenarios can be represented; in this case, 2014's scenario and also a reform for this scenario were represented for this paper. Through this paper it was possible to see the different variables for both scenarios and how changes in public policies affect Spanish economy.

This paper demonstrates the capacity of Gladhispania to simulate real scenarios and the effects of theoretical reforms for those scenarios. Gladhispania is a microsimulation model able to represent Spanish reality and the effects on Spanish economy derived from public policies. Thanks to this model it is possible to see how income related variables are affected, making possible an analysis previous to the application of the reform, allowing experts to prevent negative effects for Spanish society.

Tables annex

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	66593,00	21,50%
120000,2	55000,00	22,50%
175000,2	En adelante	23,50%

Table 2: Spanish Government taxation for taxable Income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	En adelante	21,50%

Table 3: Autonomous Communities of Aragón, Baleares, Canarias, Castilla y León and Galicia and Autonomous Cities of Ceuta and Melilla taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	6592,80	21,50%
60000	60000,00	23,50%
120000	En adelante	25,50%

Table 4: Autonomous Community of Andalucía taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	16592,80	21,50%
70000	20000,00	22,50%
90000	85000,00	25,00%
175000	En adelante	25,50%

Table 5: Autonomous Community of Asturias taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	11,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	14300,00	21,50%
67707,2	12300,00	22,00%
80007,2	19400,00	22,50%
99407,2	20600,00	24,00%
120007,2	En adelante	25,00%

Table 6: Autonomous Community of Cantabria taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	11,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	En adelante	21,50%

Table 7: Autonomous Community of Castilla-La Mancha taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	66593,00	21,50%
120000,2	55000,00	23,50%
175000,2	En adelante	25,50%

Table 8: Autonomous Community of Cataluña taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	10000,20	11,25%
10000,2	4000,00	11,75%
14000,2	3707,00	12,00%
17707,2	15300,00	14,55%
33007,2	20400,00	18,50%
53407,2	7300,00	21,50%
60707,2	19300,00	22,00%
80007,2	19400,00	22,50%
99407,2	20600,00	23,50%
120007,2	En adelante	24,50%

Table 9: Autonomous Community of Extremadura taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	11,20%
17707,2	15300,00	13,30%
33007,2	20400,00	17,90%
53407,2	En adelante	21,00%

Table 10: Autonomous Community of Madrid taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	12,00%
17707,2	15300,00	14,00%
33007,2	20400,00	18,50%
53407,2	66593,00	21,50%
120000,2	55000,00	23,50%
175000,2	En adelante	25,50%

Table 11: Autonomous Community of Murcia taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	11,60%
17707,2	15300,00	13,70%
33007,2	20400,00	18,30%
53407,2	En adelante	21,40%

Table 12: Autonomous Community of La Rioja taxation for taxable income. Extracted directly from the microsimulation model.

Base para calcular el tipo de retención	Resto base para calcular el tipo de retención	Tipo general
Hasta euros	hasta euros	porcentaje
0,00	17707,20	11,90%
17707,2	15300,00	13,92%
33007,2	20400,00	18,45%
53407,2	66593,00	21,48%
120000,2	55000,00	22,48%
175000,2	En adelante	23,48%

Table 13: Autonomous Community of Valencia taxation for taxable income. Extracted directly from the microsimulation model.

Autonomous Community	Deductions applied
Andalucía	House rental deduction
	Single-parent family
	Living with ascendants
	Disability
Aragón	Born of third son or succesives
	Taking care of a dependant person
	Taxpayer elder than 75
Asturias	House rental deduction
	Single-parent family
	Large family deduction
Baleares	Taxpayer elder than 65
	Disabled taxpayers or descendants
Canarias	Birth or adoption
	Disabled taxpayers or elder than 65
	Large family deduction
	House rental deduction
	Unemployed taxpayers
Cantabria	House rental deduction
	Ascendants elder than 70 or descendants younger than 3
Castilla-La Mancha	Birth or adoption
	Disabled taxpayer
	Disabled ascendants or descendants
	Taxpayer elder than 75
	Taking care of an ascendant elder than 75
	Large family deduction
	House rental deduction for young people
Castilla y León	Large family deduction
	Birth or adoption
	House rental deduction for young people
Cataluña	Birth or adoption
	House rental deduction
Extremadura	Dependent work
	Widowhood deduction

Galicia	Birth or adoption
	Descendants younger than 3
	Large family deduction
	House rental deduction
Madrid	Birth or adoption
	House rental deduction
	2 or more descendants and low income
Murcia	Unable to estimate
La Rioja	Birth or adoption
Valencia	Birth or adoption
	2 or more descendants and low income
	Multiple birth or adoption
	Large family deduction
	Professional and personal life conciliation
	Disabled or elder than 65 taxpayers
	Ascendants elder than 75 or elder than 65 and disabled
	House rental deduction

Table 14: Autonomous Communities deductions in the model. Own elaboration

	2014 estimated value	Post-reform value	% variation
Tax collection	73185016780	73101834911	-0,114%
Average equivalent disposable income	14702,97	14751,76	0,332%
Gini index	0,348	0,344	-1,2%
Sen's welfare	9580,45105	9673,904643	0,975%
Poverty Index	26,65%	21,96%	-17,596%
Intensity of Poverty	56,60%	36,60%	-35,325%

Table 15: Changes in Tax Collection, Average Equivalent Disposable Income, Gini Index, Sen's Welfare, Poverty Index and Intensity of Poverty. Own elaboration.

	2014 real value	2014 estimated value	% variation
Tax collection	73766681676	73185016780	-0,789%
Average disposable income	26154	25704,46	-1,719%
Gini index	0,347	0,348	0,404%
Sen's welfare	17078,562	16749,01726	-1,930%

Table 16: Comparison between reality and estimations made using Gladhispania. Own elaboration.

Notes

[1]Visit NATSEM official website for further information about the model and its projects. www.natsem.canberra.edu.au/models/appsim/

[2]Visit EUROMOD official website for further information about the model. www.euromod.ac.eu

[3]Visit Statistics Canada official website for further information about the model. www.statcan.gc.ca/eng/microsimulation/spsdm/spsdm

[4]See Giles and McCrae (1995) for further information about the model and how it was created.

[5]Visit TRIM3 official website for further information about the model. www.trim3.urban.org

[6]Information from *Informe Anual de Recaudación Tributaria 2014*. Available at: http://www.agenciatributaria.es/static_files/AEAT/Estudios/Estadisticas/Informes_Estadisticos/Informes_Anuales_de_Recaudacion_Tributaria/Ejercicio_2014/IART_14.pdf

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