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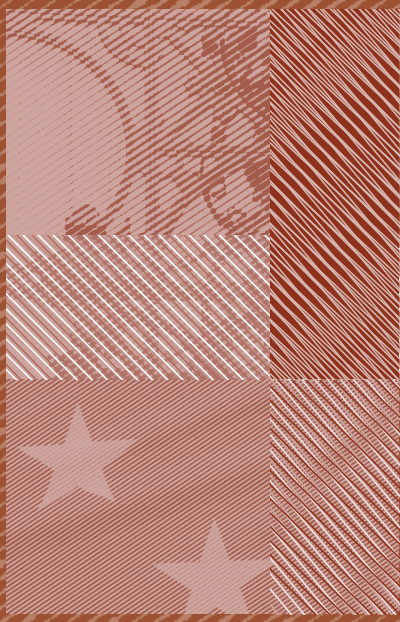

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FROM BISMARCK TO BEVERIDGE: THE OTHER PENSION REFORM IN SPAIN (*)

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Abstract

Aging is an unstoppable process and it remains a major challenge for the sustainability of the PAYG pension system in most developed countries, including in Spain. Many countries need to introduce reforms of their pension systems in order to control their expenditure, and in some cases this has already begun. However, there are other sorts of changes to certain parameters that are perceived as secondary, *e.g.* the different path of minimum and maximum pensions, and the upper and lower caps on contributions. This has significant implications for the distributive structure of the social security system that cannot be readily perceived by the population. That is why some economists in Spain refer to it as the "Silent Reform". The aim of this paper is to analyse the consequences this type of reform would have in Spain; indeed, it is the first paper to actually quantify and evaluate the potential impact it would have on the country. We have used an accounting model with heterogeneous agents and overlapping generations in order to project pension expenditures up until 2070. The results show that this kind of reform could potentially contain future expenditure and could also change the nature of the pension system from a contributory or Bismarckian-type system into an assistential or Beveridgean-type one. This change could have significant consequences as both systems have different objectives. The paper also shows that the institutional characteristics that make this kind of reform in Spain feasible are also present in most developed countries with Bismarckian pension systems. Therefore, we believe that the lessons learned in this paper on this kind of reform could well prove useful to other countries.

Keywords: aging population, pension reform, Beveridgean type, Bismarckian type, accounting projection model, overlapping generations.

JEL classification: H55, J11, J26.

Resumen

El envejecimiento de la población es un proceso imparable que continúa suponiendo un reto para la sostenibilidad del sistema de reparto de pensiones en la mayoría de los países desarrollados, incluida España. Gran parte de estos países necesitan llevar a cabo reformas en sus sistemas de pensiones para controlar su gasto y, en algunos casos, ya han empezado. Sin embargo, existen otros mecanismos que suponen cambios en parámetros del sistema, que al ser percibidos como secundarios por los ciudadanos no son apreciados como tal reforma. Este es el caso de modificaciones en los topes de las pensiones y de las bases de cotización y que en España se ha denominado, por parte de los expertos en pensiones, como la «Reforma silenciosa». El objetivo de este documento es analizar las implicaciones que este tipo de reforma tendría en el caso de España, siendo el primer trabajo que cuantifica y evalúa su potencial impacto en dicho país. Con este fin se ha empleado un modelo de proyección contable, con generaciones solapadas y agentes heterogéneos, de gastos del sistema de pensiones español hasta el año 2070. Los resultados obtenidos muestran que este tipo de reforma no solo tendría potencial para contener el gasto futuro, sino que también podría suponer un cambio en la naturaleza del sistema al ser capaz de convertir un sistema contributivo (o *Bismarckiano)* en otro de tipo asistencial (o *Beveridge)*. Esto último podría tener importantes consecuencias, pues ambos sistemas persiguen objetivos distintos. En el documento también se pone de relieve que las características institucionales que hacen posible este tipo de reforma en España existen al mismo tiempo en la mayoría de los países desarrollados con sistemas de pensiones tipo *Bismarckiano*. Y por lo tanto, creemos que las lecciones aprendidas en este documento para el caso español podrían ser de utilidad para otros países.

Palabras clave: envejecimiento, reforma de pensiones, sistema tipo Beveridge, sistema Bismarkiano, modelo de proyección contable, generaciones solapadas.

Códigos JEL: H55, J11, J26.

1 Introduction

There is no doubt that an aging population threatens the sustainability of Pay-As-You-Go pension systems, in Spain and in many other countries. In the last decades many countries have undertaken major reforms and others are now undergoing similar processes. Spain finds itself in this latter case, and several studies have shown that, in absence of reforms, the pension expenditure will increase in the next four decades, accelerating from 2035 onwards (Comisión Europea, 2009; MTIN, 2008; Jimeno et al., 2008; Díaz-Saavedra, 2005; de la Fuente and Doménech, 2009; Rojas, 2005; Sánchez-Martín and Sánchez-Marcos, 2010; Alonso and Herce, 2003; Herce and Fernández (Dir.), 2009). The reform approved in Spain in 2011 and the design of the Sustainability Factor in 2013 were the most significant reforms passed in decades. However, the changes approved in 2011 only solves about one-third of the existing problem, as highlighted in several studies (see MEH, 2011; Banco de España, 2011; de la Fuente and Doménech, 2013; Conde-Ruiz and González, 2013). The sustainability factor will transform the Spanish pension system from a defined-benefit to a define-contribution system. According with the Ministry of Economy and Competitiveness this reform could imply savings of more than 4 percentage points of GDP in 2060 (MINECO, 2014). Díaz-Gimenez and Díaz-Saavedra (2014) obtain that the system will be sustainable until 2037 but through the reduction of the real value of the average pension of the system, a 20% smaller in 2037. Sánchez-Martín (2014) coincides that this reform induces a large reduction in pension expenditure but with heavy welfare costs imposed on some cohorts (eg. young workers at the beginning of the reform).

Throughout this process of change, and due to the fact that it comes at a political cost, there is the possibility to make changes to the system that cannot be noticed easily by the population. In the case of Spain, this would be feasible by modifying parameters of the pension system - in particular the maximum and minimum pensions and the upper and lower limits of contributions bases. This would result in major changes regarding the redistribution and the overall generosity of the system which would hardly be perceived by population in the short term. For this very reason some experts in have named it the "Silent Reform" of the pension system. More specifically, the key measures of this kind of reform are: (i) increasing pensions in line with inflation instead of wage growth, and (ii) setting an upper cap for the pension an individual may receive (maximum pension) and indexing it to inflation. In a period of economic growth, these measures would imply an increase in the number of retired individuals whose pensions would be limited by the maximum pension cap. For this reason, any of the two measures could reduce the future pension expenditure because they would decrease the link between the evolution of pensions with the growth in wages. If the mechanism behind the "Silent Reform" would be applied during a period of time sufficiently long, workers would notice the reduction in their pensions, but with a smaller margin of time to adapt their working and saving decisions.

The aim of this article is to quantify the potential consequences of the called "Silent Reform", which has been so widely discussed in theoretical terms in Spain. Up until now there has been no study that quantifies its implications, and this paper is the first to analyse its hypothetical impact on the

Spanish pension system. We present the effects of the changes to the aforementioned parameters on the sustainability of the Spanish pension system before the reform approved in 2011. This assumption will allow us to study the potential of this kind of reform by comparing the results with those obtained under the reform in 2011. We shall quantify the potential implications of the reform as a mechanism for controlling future expenditure, as well as its possible distributional effects between different individuals. If this kind of reform would be implemented in its extreme form, it would change the basis of the Spanish pension system from a contributory system (or *Bismarckian*) to an assistential pension system (or *Beveridgean*) and would also have implications on the generosity of the system. In actual fact, this mechanism is already being applied to some degree; in 2013 a contribution cap growth of 5% and a maximum pension increase of 1% was introduced and for 2014 a contribution cap growth of 5% with an increase of 0.25% for all pensions including maximum pensions have been approved.

The risk of this kind of reform is that the population would not be in a position to make well-informed decisions regarding their savings for retirement because changes to the system would not be immediately noticeable. As shown in this paper, this kind of reform could have important consequences for pensioners because the objectives of a Bismarckian pension system are not the same as in a Beveridgean system. Bismarckian systems are designed to provide a sufficient pension for all workers: from the low skilled to the highly skilled. In contrast, the Beveridgean pension system aims to ensure a minimum pension but therefore also requires lower contributions, leaving room for the middle classes to add to their pension with private savings. Indeed, countries with a Beveridgean system have an average pension expenditure of 6% of GDP, while countries with a Bismarckian pension system have an average expenditure of more than 10%. In contrast, the reverse is true regarding private pensions.

It is interesting to examine the case of Spain because it is a country with a Bismarckian pension system and it is where maximum contribution base and maximum pension increase at a different pace. Moreover, the two institutional elements that are key in this sort of reform, i.e. the upper and lower pension and contribution base caps, are found in most industrialised countries with Bismarckian pension systems. This means that the implications and lessons learned regarding the "Silent Reform" in Spain could well be useful to other countries that have maximum caps.

This paper is set up as follows: section 2 presents the role of limits (the upper and lower) in contribution bases and pensions, the institutional aspects of the case of the Spanish pension system, and their existence in other countries. The methodology used in conducting our simulations is presented in section 3.1. Next, the results related to individual pensions are collected in section 3.2, regarding the percentage of new pensions that are affected by both the upper cap and the amount to which the pension is limited. The implications regarding the sustainability of the pension system are shown in section 3.3. In section 3.4 the consequences for the nature of the system are examined. Finally, we draw our conclusions, and in the appendix we present some of the results and the rules for calculating the retirement pension in Spain in more detail.

2 From *Bismarck* to *Beveridge*

2.1 The mechanism of the named "Silent Reform"

The Spanish social security system is a PAYG system, and is defined as one in which a retired worker receives a pension that is dependent on his work history (wages, years of contribution to the system and retirement age). However, the Sustainability Factor approved by law[1] in 2013 introduced two new elements: i) a sustainability factor that will take into account the increase in life expectancy at 67 years old in the calculation of the initial retirement pension (it will come into force in 2019), and ii) a new index pension revaluation which replaces updating pensions according to the CPI. Pensions, including minimum pensions, will be increased annually by this percentage (with a floor of 0.25% and a cap of CPI growth plus 0.5%) that will be set by the Budget Law each year (it entered into force in January 2014). On the other hand, maximum and minimum limits have been set historically by law for contributions and pensions, both of which play an important role in the current Spanish pension system.

The pension system in Spain seemed not to have undergone any major reforms since the late 1980s until the reform that was approved in 2011 in which, amongst other changes the retirement age was delayed to 67, and the introduction of the Sustainability Factor designed in year 2013. However, in actual fact there had been changes made to key parts of the framework of the Spanish system. Despite the outward appearance of no significant reforms up until 2011, the slight modification of some parameters of the system has led some economists to propose the idea that a pension reform was taking place in Spain but its causes were not immediately noticeable. These economists are, amongst others, Boldrin et al. (2000); Jimeno (2002); Alonso and Herce (2003); Conde-Ruiz and Alonso (2004); Conde-Ruiz and Jimeno (2004). According to these authors, the Spanish social security system is undergoing changes caused by the evolution of some of the system's key parameters, including maximum and minimum limits on pensions and contributions. The effect of these criteria has not had much attention in the media or in political arenas because they have been regarded as secondary factors to the financial sustainability of the pension system. However, changes to these parameters generate significant modifications in the distributive structure of the social security system. To change the redistribution and the generosity of the system will inevitably have an important impact on both the financial sustainability and the policy of pensions. For this reason it has been called a "Silent Reform", because it substantially affects the nature of the social security system without reforming any of the criteria that are considered to be most important ones, such as the contribution rate, retirement age, contribution bases, pension formula, etc.

The pension policy over the last fifteen years, as discussed in more detail in section 2.2, shows two clear trends: i) Minimum pensions have increased in real terms, while the maximum pensions have

[1] Law 23/2013 of 23 December, Reguladora del Factor de Sostenibilidad y del Índice de Revalorización del Sistema de Pensiones de la Seguridad Social.

been adjusted with inflation - maintaining their value in real terms but reducing their purchasing power in relation to the average wage and ii) Minimum contribution bases have been reduced in real terms, while the upper limit of contributions has remained about constant in real terms.

Despite the fact that the general population would not notice the impact of this kind of reform, the consequences would be quite evident. Let us take a scenario where there is a positive growth rate in productivity and where all the pensions (including the maximum pension) are adjusted in line with inflation. If wages (and all contribution bases) grow continuously at the rate of productivity but the maximum pension threshold is not adjusted in line with wages, it is clear that the replacement rate (ratio pension / average wage) will decrease for individuals entitled to the maximum pension - and so shall the ratio (average pension / average productivity) of the system as a whole. In other words, in an environment of wage growth, individual benefit increases (gradually if it is indexed to inflation) while the maximum statutory pension remains constant. Therefore, after a certain amount of time the pensions of a large number of individuals will reach the upper cap and will therefore stop rising at the same rate as wages. This means that the number of people receiving the maximum pension will increase over time. And as the upper limit is not adjusted in line with wages there will be a decrease in the ratio between the average pension and average productivity. If this mechanism were taken to its extreme, in an environment where wages (hence contributions) and pensions are steadily increasing for everyone, all workers would have access to the same maximum pension allowance. Nowadays the number of individuals who retire with a maximum pension is around 3%. However, if we assume that real wages (and therefore contributions) grow at the same rate that productivity increases, the distribution of wages would shift to the right so that the number of individuals entitled to receive the maximum pension would also increase, although the amount of the pension would remain constant in real terms.

This is a very interesting result because it implies that this sort of reform would transform the system from a contributory or Bismarckian system (such as the current Spanish system where pensions depend on past contributions), into an assistential system or Beveridgean system, where all individuals receive the same pension regardless of their contributions. This would mean that the very nature of the pension system would change unnoticed. This critical aspect will be discussed in detail in section 3.4. The increasing gap between limits will also affect sustainability, although more individuals would receive the maximum pension the generosity of the system would decrease in time because the maximum pension would remain constant in real terms. This means that not only would the nature of the system change, but it would also have important effects on containing pension expenditure, as we will see in the next section.

2.2 Institutional elements

In the current Spanish pension system contributions and pensions have established maximum and minimum amounts, which play an important role. These variables are set each year by the Government as part of the State Budget. The impact of changes in these variables has gone unnoticed over the years, but does generate significant shifts in the distributive structure of social security system.

Employers and employees contribute a percentage of worker's pay to the social security system[2]. Contributions are limited by both a floor $b_{\min}$ and a ceiling $b_{\max}$ that are set each year by the Government. The contribution base represents the fraction of labor earnings subject to social security contributions and it is linked to wage ω:

$$b_t = \begin{cases} b_{\min} & \text{for} \quad \omega_t < b_{\min} \\ \omega_t & \text{for} \quad b_{\min} \leq \omega_t \leq b_{\max} \\ b_{\max} & \text{for} \quad \omega > b_{\max} \end{cases} \tag{1}$$

At the same time, the Spanish social security system is characterised by a minimum (i.e. $p_{\min}$) and a maximum pension (i.e. $p_{\max}$) that limit the contributory retirement pensions. The minimum pension is intended for those individuals who are eligible to receive a contributory pension but whose contributions are below a certain threshold. The maximum pension limits the amount that individuals with higher pensions would receive. The contributory pension that an individual receives can be expressed as:

$$P = \begin{cases} p_{\min} & \text{for} \quad p < p_{\min} \\ p & \text{for} \quad p_{\min} \leq p \leq p_{\max} \\ p_{\max} & \text{for} \quad p \geq p_{\max} \end{cases} \tag{2}$$

These two elements have evolved differently over time. The amount of the minimum pension has historically increased in real terms (with significant increases in the years before the start of the crisis). The maximum pension has remained fairly constant in real terms in the past two decades due to its rising in line with inflation. Figure 1 shows the evolution of the upper and lower limits for both pensions and contributions since 1982, and the following points are relevant for the simulations carried out in this article:

(a) the minimum contribution declined slightly during the 1990's, and since 2004 it increased by more than inflation (12.8% between 2004 and 2010). This is because its increase had been in

[2]The statutory contribution rate for common contingencies is 28.3%, of which a 4.7% is paid by the worker and a 23.6% by the company.

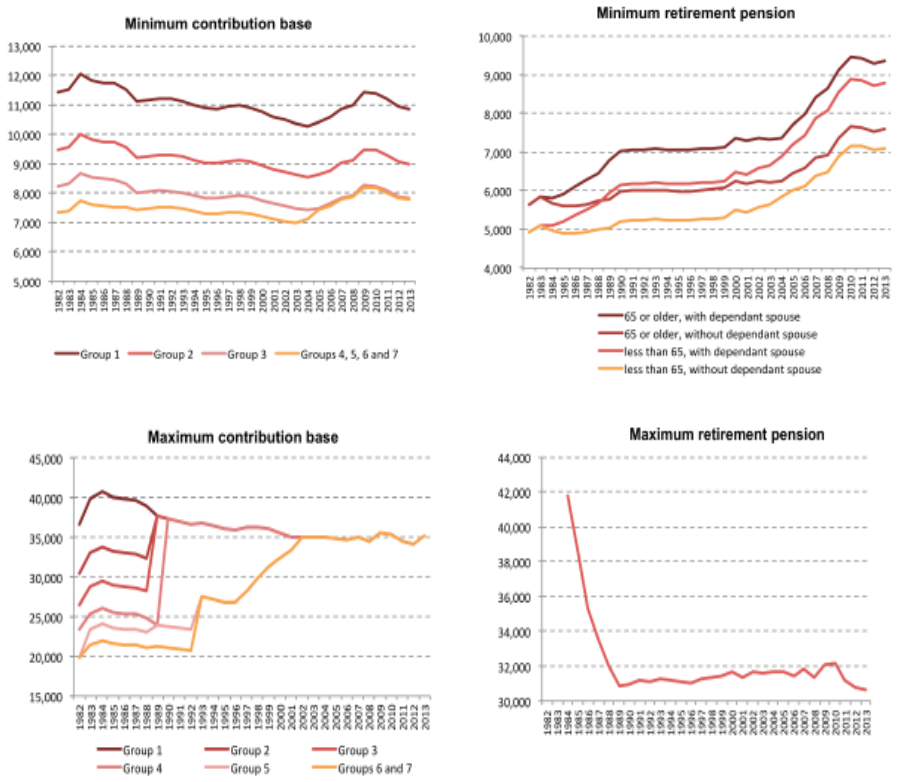
line with the growth of the minimum wage, which increased by 37.5% in nominal terms (up to 633.3 euros per month in 2010 from 460,50 in 2004) and 18.4% in real terms. However, it has dropped since 2010;

(b) the maximum contribution has historically increased with inflation. At the same time the different professional categories were grouped together. However since 2002 the maximum contribution has remained the same in real terms;

(c) the minimum pension has increased in real terms over the whole period from 1982 to 2012. Throughout the 1990s and between 2004 and 2010, all pensions increased significantly. For example, the retirement pension for individuals over 65 years with a dependent spouse grew 28.5% in real terms between 2004-2010, although in recent years it has shown a slight decline;

(d) the upper limit for the maximum pension increased in line with inflation up until 2010, but has not followed the evolution of real wages. In 2011 and 2012 it fell in real terms because of the freeze in 2011. A nominal growth of a 1% was set in 2013.

Figure 1: Maximum and minimum contributions and retirement pensions (euros/year real terms 2006, 1982-2013)

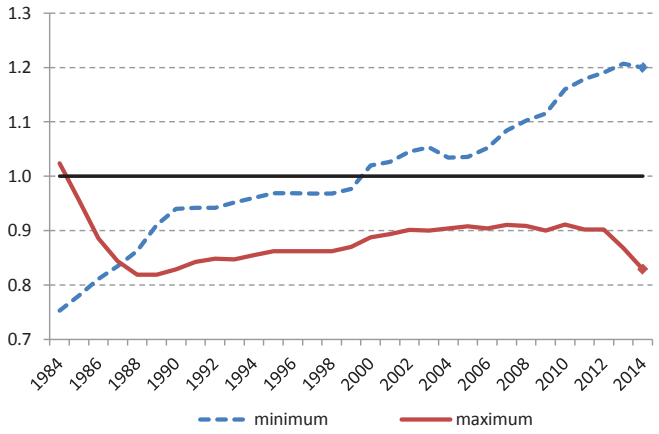


Source: Ministry of Employment and Social Security and INE

The relationship between contributions and pensions (maximum and minimum amounts) is a key element of the intragenerational redistribution of the pension system. In the case of individuals with complete working histories, if they always have the maximum (or minimum) contribution base, then the corresponding pension should be equal to the maximum (or minimum) limit. Viewed in this way, it should be noted that in a contributory system both ratios should be stable and equal to 1. If we compare the ratio between the minimum (pension / contribution base) and the same ratio between maximum amounts separately, we can see in figure 2 the evolution of these ratios since 1984. The maximum pension has always remained steadily below the maximum contribution cap (ratio less than 1) in the last ten years. Since 2000 the minimum pension has grown above the minimum contribution limit (ratio greater than 1). In 2012 the maximum pension was 9.8% less than the maximum contribution base, while the minimum pension was 19.1% higher than the minimum contribution base. In 2013, the ratio between the upper caps fell because the maximum contribution base rose 5% and the maximum pension 1%. In 2014 the maximum contribution increased by the same amount as in 2013, and all pensions including the maximum limit grew by 0.25[3].

This is a first clue that the system would be already bearing the effects a greater difference between maximum pension and maximum contribution base. For those workers that contribute continuously with maximum contribution receive a lower pension from the system than they should according with their contributions, and vice versa for those who contribute the minimum contribution base.

Figure 2: Ratio pension / contribution base - minimum and maximum (1984-2014)



Source: Ministry of Employment and Social Security

[3]The pension increase for 2014 was set and approved by the corresponding Budget Law as it is established in the General Law on Social Security (Ley General de la Seguridad Social). By Law the initial pension and the following pensions that incorporates the corresponding annual increase cannot be greater than the quantity set by the Government (General Law on Social Security, articles 47 and 49).

As we have explained above, the relationship between the lower and upper limit of both pensions and contribution bases is one of the key factors in determining the future evolution of the Spanish pension system.

2.3 Beveridge, Bismarck and caps in an International context

When worldwide PAYG pension systems are examined, we can see that different degrees of intragenerational redistribution exist. So, in addition to its characteristic intergenerational redistribution there is the redistribution from qualified to less qualified workers. No completely pure Bismarckian systems actually exist. For example, the Spanish pension system is a contributory or Bismarckian system and has a certain degree of intragenerational redistribution through its minimum pensions. However, there are a number of papers, such as Disney (2004) or Conde-Ruiz and Profeta (2007) that have classified different pension systems in the world in any of these types, Bismarckian or Beveridgean. In the previous section we saw that through the application of different growth rates to the both maximum contribution base and pension it is possible to change the nature of a system from contributory, or Bismarckian type, to an assistential, or Beveridgean type. In this section we are going to assess whether the two key elements that would enable such reform in Spain are also present in other pension systems, i.e. the existence of a maximum yearly pension and the existence of maximum yearly earnings. The analysis is purely descriptive and does not aim to show that the mechanism described above is being applied in other countries with similar characteristics. The following table 1 contains the main institutional characteristics of most developed countries.

All countries showed in table 1 that have the Bismarckian system (BI), with the exception of Finland and Norway, have a maximum cap in contributions to social security. Interestingly, most countries that have the Beveridgean system (BE) do not have a maximum limit for contributions or else are funded through general taxation. Furthermore, all countries have an upper limit for the maximum pension.

The focus of this analysis is not which system is the best for the welfare of retirees. However, we do want to highlight that both systems fulfil different goals. As shown by Disney (2004) and Conde-Ruiz and Profeta (2007), each system has specific and differing characteristics. In particular, the Beveridgean system is associated with lower pension expenditures in terms of GDP compared to the Bismarckian systems. On the other hand, countries with the Beveridgean system tend to have more developed private pension systems and more widespread the use of private pension plans. These differences, as highlighted in Conde-Ruiz and Profeta (2007), were present at the very origin of both systems.

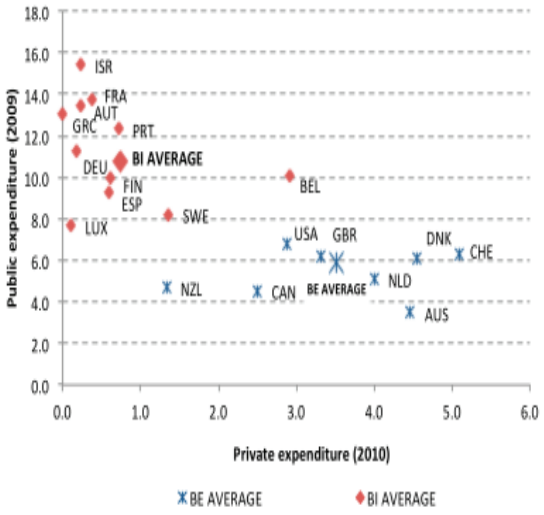
Table 1: Comparison between countries that have the Bismarckian and the Beveridgean pension systems

	COUNTRY[1]	PENSION EXPENDITURE (% GDP)[2] Public (2009)	Private (2010)	PENSION FUND ASSETS (2011, % GDP)[3]	MAXIMUM YEARLY LIMIT (YEAR 2012)[4] Earnings	Pension
BISMARCK	**AUSTRIA**	13.5	0.2	4.9	€50,760.0	1.78% of the assessment base for each year of coverage (adjusted average earnings in the best 24 years, up to €3,675.13 a year)
	BELGIUM	10.0	2.9	4.2	€ 47,960.3	60% of average lifetime earnings (75% for a married couple if the spouse has no income)
	FINLAND	9.9	0.6	75.0	NO	€77.64 to €7,303.56 depending on marital status other pension income received (limit of €16,095.4 according to marital status)
	FRANCE	13.7	0.4	0.2	€36,372.0	€36,372
	GERMANY	11.3	0.2	5.5	€67,200.0	€67,200.0
	GREECE	13.0	0.0	0.03	€66,561.6	€33,280.8
	ITALIA	15.4	0.2	4.9	€93,622.0	€96,149
	LUXEMBOURG	7.7	0.1	1.9	€108,089.4 (five times legal social minimum wage)	€84,134.76
	NORWAY	5.4	1.6	7.4	NO	7.1 times the base amount which is 82,122 kroner (May 2012)
	PORTUGAL	12.3	0.7	7.7	€36,372.0	92% of the reference earnings used for pension calculation
	SPAIN	9.3	0.6	7.8	€39,148.8	€35,320.46
	SWEDEN	8.2	1.4	9.2	440,622 kronor	60% of the insured's average income above 44,900 kronor in the 15 best years. For years with earnings below 44,900 kronor, 96% if single; 78.5% if married
	BISMARCK AVERAGE	10.8	0.7	10.7		
BEVERIDGE	**AUSTRALIA**	3.5	4.5	92.8	Total cost is financed from goverNment general revenues	Fix amount depending on personal characteristics
	CANADA	4.5	2.5	63.7	C$ 48,300.0	C$ 6,404.4
	DENMARK	6.1	4.5	49.7	Up to 2,160 kroner (for a full-time worker)	68,556 kroner with at least 40 years of residence
	IRELAND	5.1	–	46.2	NO	€230.30 a week (complements depending on marital status and personal characteristics)
	JAPAN	10.2	–	25.1	7,440,000 yen	Different maximum depending on retirement age and marital status
	NETHERLANDS	5.1	4.0	138.2	€49,297.0	Fix amount depending on marital status and personal characteristics
	NEW ZEALAND	4.7	1.3	15.8	Total cost is financed from government general revenues	Fix amount depending on personal characteristics
	SWITZERLAND	6.3	5.1	110.8	NO	27,840 francs
	UNITED KINGDOM	6.2	3.3	88.2	NO	£ 5,157.6
	USA	6.8	2.9	70.5	$ 110,100.0	$ 28,392 (year 2011)
	BEVERIDGE AVERAGE	5.9	3.5	70.1		

Source: (1) Classification following Disney (2004); (2) OECD (2013b) Year 2008 for public expenditure of Sweden and private expenditure in Norway. Year 2009 for private expenditure in The United States. OECD does not obtain data of private expenditure in Ireland and Japan; (3) OECD Global Pension Statistics; (4) U.S. SSA (2012).

The aforementioned differences can be seen in the following figure 3 where several countries are classified by the type of their pension system according to Disney (2004): Bismarckian (BI with a diamond) or Beveridge (BE with star), together with the public and private expenditure of each country. It can be seen how Beveridgean countries spend about 6% of their GDP on public pensions while Bismarckian countries spend on average more than 10% of their GDP. In contrast, the reverse occurs when analysing spending on private pensions. Countries with a Beveridgean system spend much more on private pensions than their Bismarckian counterparts, with 3.5% compared with just less than 1%.

Figure 3: Public and private pension expenditure in Bismarckian and Beveridgean countries (% of GDP)



Source: OECD (2013b) and Disney (2004)

If we look for the origins of both types of pension systems, we can see that these differences were already apparent at the time when they were first introduced.

The first social security system was created by von Bismarck in Germany in 1881. One of the main functions of this system was to provide insurance in the form of income that was paid in certain situations such as in old age or to those with disability. The system introduced by von Bismarck was of a contributory nature i.e. a system in which there was a direct relationship between pensions and the financial contributions made by workers.

The pension system proposed in the Beveridge Report was published in the United Kingdom in 1942. The report advocated the introduction of a minimum payment system to help reduce poverty. It offered a fixed assistential pension that was the same for most workers. Obviously, the redistributive component in a system of this type Beveridge is fundamental.

As Conde-Ruiz and Profeta (2007) highlighted, the adoption of one of these systems depended on several factors, including important political factors. Surprisingly the Bismarckian system was introduced due to the pressure of what we would today call the middle class, together with the influence of the industrial trade unions. The strength of the middle class contributed decisively to the movement that culminated in the unification of Germany. The introduction of this contributory pension system represented a way to combat dissent and to cement the alliance of these social groups within the Reich, and to effectively oppose to the socialist movement. In 1871 Bismarck wrote "The only means of stopping the Socialist movement in its present state of confusion is to put into effect those Socialist demands which seem justified and which can be realised within the framework of the present order of state and society" (Köhler et al., 1982). As a result, the Reich's government played a very important role in the organisation and implementation of all insurance schemes for the middle classes (retirement, health, accident and disability).

During the same period, the United Kingdom was characterised by a liberal and democratic tradition. There were no collectivist political movements nor any notions of the state's responsibility, and systems of private and voluntary insurance were developed. However, in 1942 the British economist William Henry Beveridge drawn up the "Beveridge Report" that defined what would become the British Welfare State after the Second World War. It was introduced by the Labour Government elected in 1945. This report introduced an alternative model of PAYG social security that guaranteed a minimum pension equal for all workers in Britain. The *Beveridge* plan had a clear purpose: to reduce poverty and raise the income of the poorest to ensure a certain level of subsistence. It was defined as a "weapon against the poverty of the masses". At the same time that the minimum pension was set, the report also highlighted the individualistic part of the plan: state action would be limited to the redistribution of money in favour of the poor, while wealthier individuals should privately be able to satisfy their own additional necessities. William Beveridge was convinced that the contributory or Bismarckian pension system "is damaged to personal saving, while he wanted the maximum scope for private provision above his minimum" (Hills et al., 1994).

One of the aims of this paper is to show that with the mechanism explained in section 2.1 the nature of a Bismarckian system could change to a Beveridgean system. We do not intend to show that countries where there are upper caps are necessarily going to implement the referred "Silent Reform" because for this to occur it would be necessary the adoption of political decisions in order to strategically establish the evolution of both elements. The key elements to implement this kind of reform, (such as the upper caps of pensions and contributions) already exist in most countries with a Bismarckian system. In this section we have not evaluated the advantages and disadvantages of each system. Instead we have emphasised that a possible change in system type - from a Bismarckian to a Beveridgean system, without notification to the population in question could have negative implications on the welfare of workers. This is because, as we have seen, the objectives and implications of both systems are very different and they were, at time of their creation, designed to meet different needs.

Finally, we believe Spain could be used as an example for other countries. The pension system in Spain is a typical Bismarckian one where, as can be seen in Table 2, the replacement rate (both gross and net) is not only high but also very stable for different wage levels. It is interesting to see that in the case of Spain and also some other countries, this rate drops for those with the highest wages, which is due to the existence of upper limits for the contributions and for the pensions.

Table 2: Replacement rate*

	Gross (% average wage)							Net (% average wage)						
País	50	75	100	125	150	175	200	50	75	100	125	150	175	200
Austria	76.6	76.6	76.6	76.6	74.0	63.5	55.5	91.2	90.1	90.2	89.9	86.2	73.8	64.5
Belgium	58.2	41.7	41.0	36.2	30.2	25.9	22.6	80.7	65.3	62.1	55.6	48.3	42.8	38.4
Finland	64.1	54.8	54.8	54.8	54.8	54.8	54.8	71.3	61.7	62.8	64.0	63.2	62.7	63.2
France	64.8	59.1	58.8	52.0	47.5	44.2	41.8	75.9	72.9	71.4	65.3	60.9	57.6	55.1
Germany	42.0	42.0	42.0	42.0	42.0	36.0	31.5	55.2	57.7	57.1	56.3	56.1	48.4	42.6
Greece	75.4	61.1	53.9	49.6	46.7	44.7	43.1	92.5	77.3	70.5	67.8	65.0	62.8	61.2
Italy	71.2	71.2	71.2	71.2	71.2	71.2	71.2	83.9	82.6	81.5	82.9	83.3	82.9	82.6
Luxembourg	77.7	59.8	56.4	54.4	53.0	52.0	51.3	87.1	70.8	69.4	68.3	66.8	65.1	63.6
Netherlands	94.4	91.9	90.7	89.9	89.4	89.1	88.8	104.8	106.6	101.1	98.4	97.2	95.8	94.9
Portugal	67.5	55.0	54.7	54.4	54.1	53.9	53.8	77.7	66.2	67.8	68.4	68.4	69.1	69.6
Spain	73.9	73.9	73.9	73.9	73.9	64.7	56.6	79.5	79.9	80.1	79.9	79.8	71.6	63.9
Sweden	70.2	59.1	55.6	63.5	67.9	71.1	73.4	68.8	58.5	55.3	65.3	72.9	77.1	79.1

Source: OECD (2013a)

Note: The gross/net replacement rate is defined as gross/net pension entitlement divided by gross/net pre-retirement earnings in the case of a man who enters the labour maker in the year 2012 at age 20, single, with full careers and an equivalent wage that retires at the national retirement age.

In the next section, we will quantitatively study the potential consequences in the Spanish pension system of different growth rates between maximum contribution base and maximum pension. In particular we will look at the potential effects of such a reform regarding sustainability as well its ability to change the nature of the pension system, i.e. to transform a contributory or Bismarckian pension system (the current Spanish pension system) to an assistential or Beveridge system.

3 The "Silent Reform": the case of Spain

The aim of this paper is to analyse the potential effects of a pension reform through changes in the maximum limits (contribution bases and pensions) on the Spanish pension system in the coming decades up until 2070. The model used is an accounting model with heterogeneous agents and overlapping generations in order to project revenues and expenditures of the pension system for the next six decades.

As seen in the previous section, maximum and minimum limits are fixed each year by the Government. Although it is not possible to capture exactly how these decisions will evolve in time we are going to set out different possible scenarios. Firstly, we will assume that both the upper and lower

caps for contributions and pensions will grow at the same rate as productivity. This scenario will be called "neutral", i.e. where the mechanism explained in section 2.1 does not apply. We examine three alternative scenarios where the growth rate of the maximum pension will be less than productivity rate. Specifically:

- two "middle scenarios": the maximum contribution base grows at the same pace as productivity growth, as in the neutral scenario, but the maximum pension will increase a 0.3 and 0.5 of the productivity growth respectively.
- an "extreme scenario": the maximum contribution grows at the same pace as productivity, as in the neutral scenario, but the maximum pension is not indexed with productivity and it will remain constant in real terms.

In the next section the methodology used for the projection is described and in section 3.2 we present the results of the impact on: i) the number of new pensions that are capped and ii) the quantity in which the new pensions are limited. For the analysis of the impact on individual pensions we will focus on pensions obtained by employees (or under the General Regime) who retire at legal age, because it is the most affected group by this sort of reform. We will also discuss their possible effects on the sustainability of the pension system (section 3.3) prior to the 2011 reform (in this case we consider also the workers that retire early). This will allow us to analyse the potential of the "Silent Reform" by comparing the results of 2011 obtained in Conde-Ruiz and González (2013) with the same model, the same methodology and the same demographic scenario[4]. Finally, we will highlight the implications of the system through the analysis of the generosity and the replacement rate (section 3.4).

3.1 Projection methodology

Our model is an accounting model used for the projection of revenues and expenditures of the Spanish social security system with overlapping generations and heterogeneous agents. It includes a high degree of individual distinction (by age, sex, nationality and level of education)[5]. The simulation period starts in 2006 and runs over six decades up to 2071.

The simulation strategy is developed in three main phases. Firstly, the population projection based on the Cohort Component Population Projection Method with the aforementioned heterogeneous agents are used. Secondly, the reconstruction and projection of employment history is carried

[4] It is important to point out that it is not appropriated to compare our results with the impact of the Reform approved in 2013 obtained by other authors (MINECO, 2014; Díaz-Gimenez and Díaz-Saavedra, 2014; Sánchez-Martín, 2014) because they use a methodology and demographic scenario different than ours.

[5] Model developed in González (2013) and used in Gonzalez, Conde- Ruiz and Boldrin (2009) to analyse the impact of the migration phenomena in the Spanish pension system and in Conde-Ruiz and González (2013) to evaluate the pension reform approved in 2011.

out using the data from the Continuous Sample of Working Histories of Social Security (Muestra Continua de Vidas Laborales, MCVL)[6] and micro data from the Labour Force Survey (LFS) and the corresponding data from the National Statistical Institute of Spain (Instituto Nacional de Estadística de España, INE) to obtain the transition probabilities for five different working situations (employed, self-employed, unemployed, disability and another situation of inactivity) according to the different heterogeneous agents considered. During their working lives, individuals contribute to the system. Once they retire they perceive their retirement pension to correspond with the terms of their employment history. We also take into account that they may generate a widow's pension when they die. The calculation of the pension expenditure is the third stage of the process of projection.

The model includes a great deal of detail regarding the Spanish pension system which allows us to differentiate employees contributing to the general system (Régimen General de la Seguridad Social) and self-employed workers contributing to the special scheme for the self-employed (Régimen Especial de Trabajadores Autónomos) separately. The total years of contributions, the contribution bases and the retirement age are elements that determine the calculation of the pension and are all taken into account.

The developed model is an accounting projection model, with heterogeneous agents and overlapping generations, in which individuals live for 17 periods. Every period corresponds to five calendar years. Individuals enter the economy at the age of 15 and live, at most, until the age of 100. The maximum potential working life of an individual is therefore of 10 periods (from 15 to 64 years), as 65 is the legal retirement age. The maximum period of potential life in retirement (for individuals retiring at 65) is 7 periods.

Individuals differ by age and also by gender (male and female), educational attainment (primary school, secondary school and tertiary education), and by country of origin (natives and immigrants). We have 12 different groups of individuals, each one of which is subdivided in 17 groups according to their age.

The projection model contains individual heterogeneity and institutional detail that is a noteworthy characteristic of this model in comparison with other models used in the projection of pension expenditure in Spain. Firstly, it can distinguish age, sex, educational level and nationality (versus other articles as Jimeno, 2003; Díaz-Saavedra, 2005; Sánchez-Martín and Sánchez-Marcos, 2010; Jimeno et al., 2008; Díaz-Giménez and Díaz-Saavedra, 2006; Díaz-Gimenez and Díaz-Saavedra, 2009; Sánchez-Martín, 2001, 2010). Secondly, our model is the first that we know of that considers five different working situations for any given individual (employed, self-employed, unemployed, disabled and inactive) versus papers of Jimeno, 2003; Alonso and Herce, 2003; Sánchez-Martín, 2001, 2010;

[6] The Continuous Sample of Working Histories is a database created by the Spanish Ministry of Labour and Social Affairs made available for researchers. The database contains records of the working and pension histories of more than one million individuals representing 4% random sample from the reference population which is all the people who at any time in the corresponding wave had a registered record with the social security system, either because they were making contributions or because they were receiving a pension. For more details about this database see Seguridad Social (2006) and Argimón and González (2006).

Díaz-Saavedra, 2005; Díaz-Giménez and Díaz-Saavedra, 2006; Díaz-Gimenez and Díaz-Saavedra, 2009; Rojas, 2005; Sánchez-Martín and Sánchez-Marcos, 2010. Moreover, this is one of the models that uses data from the administrative database called Continuous Sample of Working Histories, together with Gil et al. (2008); Moral-Arce et al. (2008) and Herce and Fernández (Dir.) (2009), to accurately predict contributions in accordance with the individual heterogeneity. It also includes institutional detail that allows us obtain precise data regarding pension amounts, also incorporating widows´ pensions. The model also takes into account another important element in the system such as the upper and lower cap of the contributions and pensions, key elements that are being examined in this paper. Other articles that have to some extent taken this into account include Jimeno (2003); Sánchez-Martín and Sánchez-Marcos (2010); Díaz-Saavedra (2005); Díaz-Giménez and Díaz-Saavedra (2006); Díaz-Gimenez and Díaz-Saavedra (2009); Moral-Arce et al. (2008).

STAGE 1: Demographic Projection. The first phase of the model consists in the projection of the population up to 2071. We take the demographic situation of year 2006 as our starting point[7]. We adopt the overall demographic hypotheses regarding life expectancy (and corresponding survival probability) and fertility rates released by the Spanish National Institute of Statistics (INE) in its long-term projection scenario (see INE, 2005). For the migratory hypothesis we combine its short term forecasts for the period 2010-2020 and long term forecasts for the period 2021-2051 released in the year 2010 (see INE, 2010). For the period 2051-2071 we assume a stable evolution of the three variables from 2051 onwards. The total figures projected by the INE for total number of births and net migration flows are categorised by gender, age and nationality.

The methodology used for the population projection is the Cohort Component Population Projection Method, a technique that takes each age group in the population and makes projections using estimates of mortality, fertility, and migration[8]. We have taken into account in the model the level of education of future generations as it constitutes an important factor regarding employability. We assume that all the new generations will reach the same level of education as the most educated individuals so far, (i.e. those born in 1975 and with 32 years old in year 2007). The implications of this assumption mean that the percentage of the labour force with an elementary level of education would decrease and that the percentage of university graduates would increase ten points by 2060 (see González, 2013).

STAGE 2: Projection of Work History. With the developed model we project both revenue and expenditure of the social security system. Therefore, we have incorporated the assumptions about labour force participation, employment and productivity until the year 2051 in line with the macroeconomic scenario used by Spain's Ministry of Economy and Finance in its joint exercise with the European Commission for long term pension expenditure projection (European Commission, 2011). From the year 2051 it is assumed that the forecasts will remain constant until 2071. Our

[7] We establish the year 2006 as the starting point of our exercise to be consistent with the data of the wave of the MCVL of the same year.

[8] For further detail regarding the assumptions about survival, fertility and migration in the demographic projection see González (2013).

underlying assumption is that the relevant legislation will not change; therefore the contributions will grow parallel to wages, which in turn will grow at the same rate as labour productivity.

Individuals can be in five possible situations during their working life. Specifically, between 15 and 64 years old, an individual may be working as an employee, be self-employed[9]. unemployed, receiving a disability benefit or be in another situation of inactivity[10] such as studying. Between 66 and 99 years old, it is assumed that individuals are retired, with or without the right to receive a pension, according to the rules determined by law.

We have 120 different groups of individuals (12 groups divided by gender, education and nationality, and 10 by age between 15 and 64 years old) whose contributions to the system and their pensions upon retirement we simulate. To reconstruct complete working histories first we use real work histories from when they started working up to year 2006 from MCVL data. Then we simulate a virtual work history for the following years in order to obtain the complete labour histories spanning the whole projection period. We take into account individual heterogeneity and different the rules applicable to the employed and self-employed.

From the micro data from the Labour Force Survey we obtained transition probabilities for the five possible situations between ages of 15 and 64 years in each time period of the life cycle according to age, gender, skill and nationality. Then, through a Monte Carlo simulation we estimated the probability of each of the five work situations conditional on the situation in the previous period. The estimation process follows a finite Markov chain that is, for the set of individual characteristics, homogeneous across workers and the corresponding conditional transition probability matrix[11].

The transition probabilities obtained are consistent with the situation in the base year and the expected evolution of the average employment rate over the projection period. Thus, the virtual future history is obtained by incorporating the macroeconomic assumptions and probability of being in one of the five labour situations differentiating by age, gender, nationality and educational level in order to calibrate the corresponding rates of activity, employment and unemployment for each of the different group of individuals.

Finally, retirement patterns of individuals categorised by gender, educational level and age are observed through MCVL data. Individuals can retire early (between 61 and 64 years) or at the ordinary age of 65, differentiating them by gender and level of education. It is important to point out that we do not model the endogenous behavioral reactions of individuals to the evolution of the

[9] In Spain there are several contribution schemes organised by sector but it is considered that there will be a full integration of regimes in the future in two main groups: one for employed in General Regime (Régimen General, RG) and other for self-employed in Special Scheme for Self-Employed (Régimen Especial de Trabajadores Autónomos, RETA), as recommended by the Toledo Pact Commission and it initiated yet. This distinction enables us to apply the characteristics of each scheme regarding retirement, for example in RETA early retirement is no allowed.

[10] Including the situation of inactivity is relevant because there are differences by gender, educational level and nationality as shown in González (2013). Due to the heterogeneity of the model these features can be incorporated in the projection.

[11] See González (2013) for further details.

economic and legal environment, however we gain in the microeconomic precision and data reliability of our simulations carrying out the computational exercise at the highest disaggregated level.

STAGE 3: Revenues and Expenditures Projection. The model projects the work histories of the individuals and the average growth rate of contribution bases period by period, divided by age, gender, skill and nationality. It follows the assumed growth rate of the wages (which corresponds to the growth rate of productivity from the macroeconomic scenario). Next we obtain the contributions to the system during each period in the projection. The total revenues are equal to the sum of contributions of employed, self-employed and unemployed[12] (for further details see González, 2013).

Once the work histories of each of the 12 different groups is obtained, we have the key elements for the calculation for the retirement pension: i) number of years of contribution, ii) wages (i.e. the contribution base) and iii) retirement age. With these records and by applying the legislation[13], the average pension for each group is calculated. Pension expenditure takes into account pensions at 65 years and early retirement between 61 and 64 years. The total expenditure of the system is the sum of expenditure on retirement, widow's pension and disability[14].

3.2 Results: Impact on individual pensions

The first noticeable effects of different increases in upper pension and contribution limits would be an increase in the number of individuals whose pensions would have been capped. That is, in the future it is expected that new pensions would be higher, not only because wages would be higher due to their growth in line with productivity, but also because individuals will have better work histories due to advances in levels of education. This is especially true for women whose increased participation in the labour market together with the improvement in qualifications leads to higher pensions in the future. However, the fact that the maximum pension would grow at a lower rate of productivity would mean that a greater number of pensions would be capped as time passes.

In this section we analyse the consequences of the increase of the gap between the maximum pension and the maximum contribution base for different groups of individuals. Bearing in mind that the level of heterogeneity of the model is very high, distinguished by age, sex, educational level and nationality. The analysis in this section will focus on employed people (General Regime) who retire at 65.

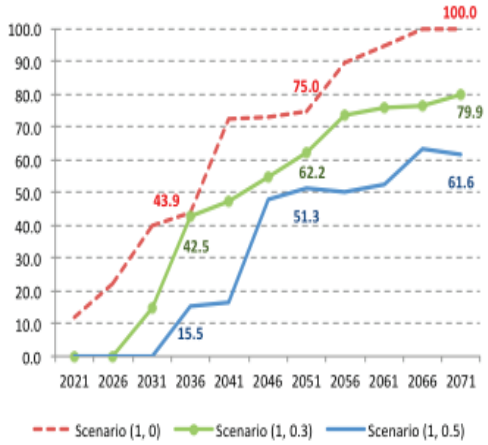
[12] Given the configuration of the Spanish system, meanwhile the unemployment benefit is received it generates rights for retirement through the contribution.

[13] See Annex B for more details about the rules of retirement in Spain

[14] See González (2013) for more detail about widow's and disability pensions.

The impact on the percentage of new pensions that are limited by the upper cap varies from scenario to scenario, as shown in figure 4. The effects start to be evident in 2036 in scenario (1, 0.5), in 2031 in scenario (1, 0.3) and in 2021 in scenario (1, 0) or extreme scenario. In Figure 4 we show the expected evolution of the percentage of pensioners affected in the coming decades. In 2051 the 51% of new pensions would be limited in scenario (1, 0.5) while this proportion would be 75% in the most extreme scenario. In this case, scenario (1, 0), the effects would begin in 2021 and the percentage of limited pensions would rise over time exceeding 70% in 2051 and reaching 100% in 2071[15].

Figure 4: Percentage of new pensions limited. Scenario comparison (2021-2071)



In a more detailed analysis, included in table 3, in each scenario men would be affected more than women by the mechanism described in section 2.1. If we take into account educational level, university graduates would have the highest percentage of limited pensions. This is to be expected, as graduates have a more complete work history and earn higher wages. There are also differences between the categories for men and women. However, women's pensions would be generally less affected, although those with higher qualifications would see their pensions capped. From 2041 the percentage of women with a university degree with a limited pension is higher than their male equivalents. This is due to the improvements in their educational and work histories compared to their older counterparts.

[15]See table A.1 in Appendix A for the detail of these results in the case of early retirement and self-employed.

Table 3: Percentage of new pensions limited by scenario, gender and skill

		Scenario (1, 0.5)			**Scenario (1, 0.3)**			**Scenario (1,0)**		
		2021	2051	2071	2021	2051	2071	2021	2051	2071
Male	Primary						24.7		25.8	34.7
	Secondary		16.6	15.9		16.6	15.9		16.6	25.9
	Tertiary		40.4	39.4		40.4	39.4	22.8	40.4	39.4
	TOTAL	0.0	57.0	55.3	0.0	57.0	80.0	22.8	82.8	100.0
Female	Primary						12.4			23.5
	Secondary			13.1		13.1	13.1		13.1	22.2
	Tertiary		45.7	54.3		54.2	54.3		54.2	54.3
	TOTAL	0.0	45.7	67.4	0.0	67.3	79.8		67.3	100.0

Once we have obtained the percentages of new pensions affected it is interesting to evaluate its impact on the average worth of pensions. Because it is expected a higher percentage of limited pensions in comparison with the neutral scenario, it is also expected that this sort of reform would reduce the average pension of the system. For example, within four decades the amount of new pensions could be between 6.7% and 30.9% lower than the pension recognized in the neutral scenario (see table 4).

Table 4: Variation of the average new pensions with respect to neutral scenario by scenario (%, 2021-2071)

	Scenario (1, 0.5)	Scenario (1, 0.3)	Scenario (1, 0)
2021	-	-	-
2031	-	-1.3	-6.3
2041	-1.9	-8.5	-19.3
2051	-6.7	-15.6	-30.9
2061	-11.1	-23.3	-40.6
2071	-15.5	-29.4	-49.0

Following the individual detail of the model, pensions for men would decrease more than for women in any of the proposed scenarios (Table A.2 in Appendix A). This is because for any given level of education, men have higher contribution bases than women. In more detail, if we take into account skill in the case of the extreme scenario the resulting pensions could register a loss of 44% in 2051. In the case of university graduates, there is a loss of nearly 60% in 2071 (see Table A.3 in Appendix A).

In Table 5 we compare the potential results of a pension reform through the aforementioned elements with the reform of the Spanish pension system approved in 2011[16] in order to assess its potential. It is clear that the effects on the average pension are very similar to those obtained under the scenario (1, 0.5).

[16] See Appendix B for further details of changes under this reform.

Table 5: Variation of the average new pensions. Comparison with Reform 2011 (year 2051)

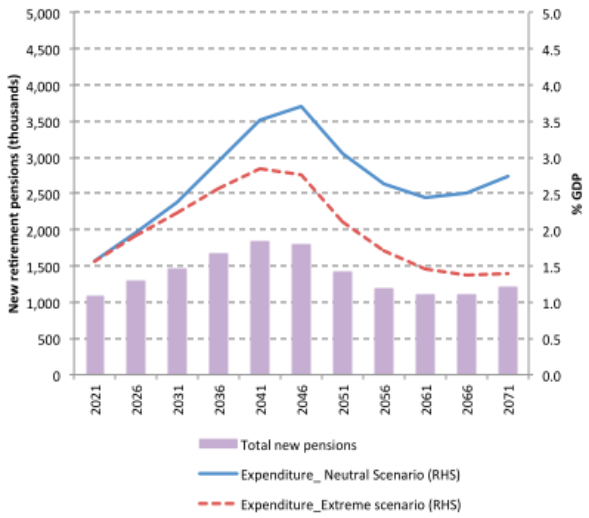
	Scenario (1, 0.5)	Scenario (1, 0.3)	Scenario (1, 0)	Reform 2011 Conde-Ruiz y González (2013)
TOTAL	-6.7	-15.6	-30.9	-9.1
Gender				
Male	-8.8	-17.8	-33.4	-8.1
Female	-4.3	-13.2	-28.0	-10.1
Skill				
Primary			-11.7	-11.5
Secondary	-3.5	-10.1	-24.3	-11.1
Tertiary	-10.3	-23.4	-40.4	-7.4

3.3 Results: Impact on sustainability

In this section we analyse the potential implications that changes in the pension system through the evolution of the limits, as it is described in this paper, would have on the evolution of total pension expenditure based on the different scenarios presented. As we have indicated we will obtain the results based on the Spanish pension system prior to the Reform of 2011 in order to have a benchmark with which we can compare the potential of the kind of reform called "Silent Reform".

As expected, the total pension expenditure will increase in the coming decades, not only due to the increase in life expectancy but also due to the fact that pensions will be higher because of the improvement of work histories. However, if the maximum contribution cap grows at the same pace as productivity and the upper cap of pensions remains constant in real terms (our extreme scenario) new pensions would be limited in quantity, as shown in previous section, and consequently would have implications in terms of total pension expenditure. The difference between the neutral and the extreme scenario would be perceptible from 2031 onwards because the number of retirees at 65 entitled to a maximum pension would begin to be significant. In fact, population dynamics plays an important role since, as seen in graph 5, the maximum number of new pensions is reached in 2040, where larger numbers of people (those from the baby boom) would retire and the evolution of pension expenditure would adopt an inverted "U" shape. At the same time, under the extreme scenario the pension expenditure from new pensions would increase until 2046. From that point in time there would be a two-fold effect: the number of new retirement pensions at 65 would be less due to population dynamics, and the called "Silent Reform" would have its greatest impact in 2046.

Figure 5: New retirement pensions at 65 and expenditure: extreme and neutral scenarios (2021-2071)



If the characteristics mentioned were to remain constant over time pension expenditure would be lower. Savings would be higher if the scenario would be closer to the extreme scenario and it could reach, in comparison with neutral scenario, 3.2 percentage points (p.p.) of the GDP in year 2051 (see Table 6). The reason for this is obvious: in our model all wages grow in line with productivity and this means that all contribution bases (including maximum) also grow at this rate. This implies that the Reference Wage (Base Reguladora) also grows for all individuals, which in turn generates the growth of benefit amount. Due to the fact that pensions have a maximum limit, a greater number of workers are entitled to receive the maximum pension. The higher the percentage of workers with a maximum pension, the greater the savings for the system. The savings will be lower in the other scenarios: with an increase of the maximum pension of 0.3 and 0.5 of productivity growth. In these cases, there is less expenditure from 2041 and in the first case the savings would be 1.4 p.p. of GDP in 2051, and in the second they would be 0.4 p.p. of GDP.

Table 6: Total pension expenditure and savings by scenario (2021-2071)

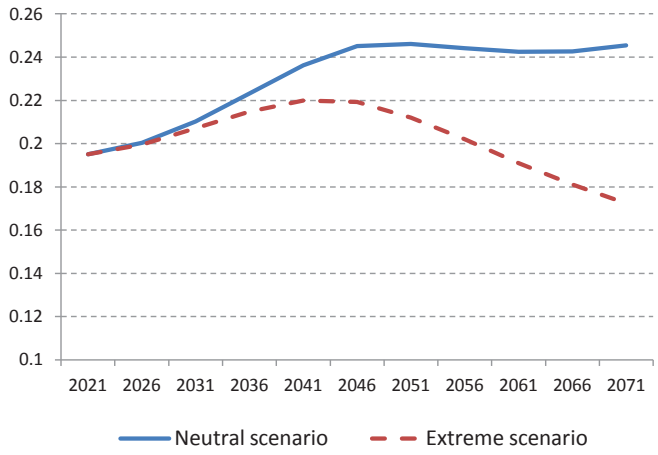
	Expenditure (% GDP)	Saving (p.p. GDP)		
	Neutral Scenario	Scenario (1, 0)	Scenario (1, 0.3)	Scenario (1, 0.5)
2021	9.2	0.0	0.0	0.0
2031	13.4	-0.2	0.0	0.0
2041	20.1	-1.3	-0.5	-0.1
2051	24.3	-3.2	-1.4	-0.4
2061	22.9	-4.7	-2.2	-0.8
2071	21.4	-6.1	-3.3	-1.5

Therefore, if the called "Silent Reform" were to take place, it would have a significant effect containing pension expenditure. As seen in this paper, it could lead to savings equivalent to 3.2 p.p. of the GDP in 2051 in an extreme scenario compared with a saving of 3.7 p.p. of the GDP under the 2011 reform, based on the same methodology and the same demographic scenario in Conde-Ruiz and González (2013). As shown in the table 6 the savings would be even greater in 2071.

3.4 Implications for the nature of the system: from *Bismarck* to *Beveridge*

If the process set out in this paper would occur, i.e. the maximum contribution cap grows at the same pace as productivity and the upper cap of pensions remains constant in real terms, it would have a significant effect on pension expenditure, but would also take place at a cost, since it would have important distributional consequences. Regarding the generosity of the system (defined as the ratio between average pension and productivity), the maximum would be reached in 2051 in all scenarios, but in the more extreme scenario there would be a lower level of the generosity across the system. In four decades, generosity would be 24.2% in scenario (1, 0.5), a 23.2% in scenario (1, 0.3) and a 21.2% in scenario (1, 0) versus to 24.6% in a neutral scenario (Table A.4 in Appendix A). Generosity would decline over time in all scenarios from 2051 when the number of pensioners affected increases, and this is still higher in the extreme scenario (see Figure 6). This sort of pension reform could be a powerful mechanism that would avoid the transfer of increases in productivity to pensions. Note that if there were no such changes, increases in productivity would transfer to the contribution bases (or wages), then to the Reference Wages and therefore to the pension.

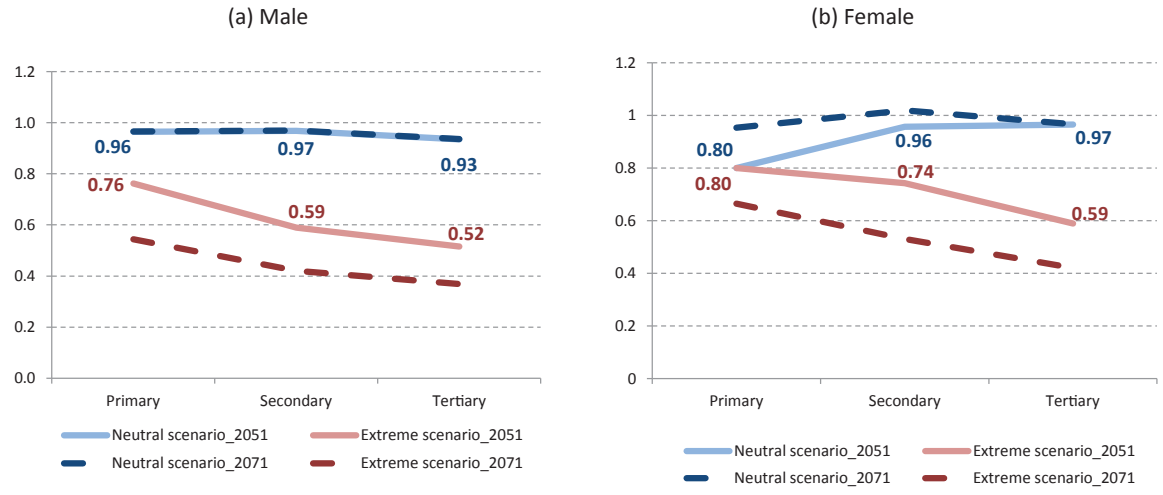
Figure 6: Generosity of the Spanish pension system. Neutral and extreme scenario (2021-2071)



Through the ratio between pension and contribution base (or wage) we can see what would happen to the nature of the system under the "Silent Reform". Let us call this the replacement ratio because it highlights the relation between the pension received and the last wage. As we know, if the pension system is purely contributory or Bismarckian, this ratio remains roughly constant in line with contributions. It implies that if someone has a higher salary (i.e. a higher contribution base), he will contribute more overall and is entitled to receive a higher pension. As observed in figure 7 the ratio maintains nearly constant in the neutral scenario. In the case of female university graduates the replacement rate increases slightly due to the fact that they have more complete work histories and so will gain access to higher pensions.

By contrast, when pensions do not depend on contributions to the system it is an assistential or Beveridgean pension system. As stated previously, in a system of that type, as all individuals receive the same pension regardless of their salary, the replacement rate decreases with respect to wages. Workers with higher wages have a lower replacement rate. And this is exactly the result of maintaining constant in real terms the maximum pension at the same time that the maximum contribution base increases at the same pace as productivity. This can be seen in figure 7(a) and 7(b) in the extreme scenario for those Spanish individuals retiring at 65. The replacement rate would decrease with the level of education and this characteristic would be all the more evident in 2071 for women.

Figure 7: Ratio first pension / last contribution base. Neutral and extreme scenario by gender



This result warns us that under the "Silent Reform" there could be a change in the nature of the system, from a contributive or Bismarckian type to a system where the pensions are moving away from the contributive model. The kind of reform analysed in this paper would increase the intragenerational redistribution element in the pension system. It means that apparent small changes in some factors could lead to a significant structural reform that would completely change the nature of the system, transforming the Spanish pension system into an assistential system with a strong element of intragenerational redistribution.

4 Conclusions and discussion

The Spanish social security system has a special feature that, according to many experts, might be decisive in containing future pension expenditure: namely the existence of an upper cap for both contribution bases and pensions which are fixed by law each year. Several authors have stressed that the policy followed by governments so far, where the maximum pension is not adjusted to growth in wages, has relevant effects regarding the generosity of the pension system by decreasing the ratio between the average pension and the average productivity: it leads to a reform that is not perceptible by population, and is therefore called the "Silent Reform". This kind of reform is based on the establishment of the evolution of maximum contribution bases and maximum pensions in favour of a system, that is increases of the maximum pension less than the maximum contribution cap. In this paper we have analysed the potential effects this sort of reform would have on the sustainability of the Spanish pension system and its distributional effects on different groups of individuals.

In this paper we have shown that this sort of reform could have significant effects on the expenditure of the system. In the most extreme case it could save up to 3.2 percentage points of the GDP by 2051 and 6.1 p.p. of the GDP in 2071. This impact is of great importance when compared to the effects of the pension reform of 2011. Conde-Ruiz and González (2013) show, using the same methodology and the same demographic scenario than this article, that the reform of the year 2011 (where the calculation period was extended, delayed the retirement age to 67 years and modified replacement rate applicable to the reference wage) can imply savings of 3.7 p.p. of GDP in 2051[17]. As a future research, it would be very interesting to compare the results obtained in this paper with the effects of the pension reform approved in 2013 and analysed by MINECO (2014); Díaz-Gimenez and Díaz-Saavedra (2014) and Sánchez-Martín (2014).

[17] These savings could reach 8.6 p.p. of GDP if it would taken into account the whole contributory history, the retirement age would be postponed until 70 and the replacement rate would be extended (Conde-Ruiz and González, 2013).

The implications of decide different growth rates between maximum pension and maximum contribution base is a potential powerful reform mechanism that also has relevant distributional effects. Indexing the maximum pension with inflation may seem harmless and may seem not to imply any institutional change to the pension system. However, it is not the case in a context of wage growth as we have shown in this paper. In particular, the application of this kind of reform could imply, in an extreme scenario, an average pension reduction of 50% in the long term in the case of workers with tertiary education levels. This means that it would reduce the average generosity of the system and would contribute to the financial sustainability of the pension system. However, given this decrease in the average generosity of the system would be achieved through the highest pensions, it would increase the degree of intragenerational redistribution. We have shown that this could completely change the nature of the system becoming a contributory or *Bismarckian* system into an assistential or *Beveridgean* system.

We show that the hypothetical "silent" pension reform analysed in these paper would have a relevant impact on the pension expenditure. It could also help the sustainability problem, although its implications would go beyond that. Due to the fact that there would be imperceptible changes in generosity and in the degree of intragenerational redistribution, it is very likely that individuals who are affected by these measures would not be able to make effective long-term decisions, adapting the new situation. The unexpected change in the nature of the system could well be detrimental to pensioners since the contributory *Bismarckian* system was originally a response to the middle class and had the aim of offering pensions that provided a sufficient level of income in old age. Assistential or *Beveridgean* systems were created with the aim of providing a minimum pension, but leaving enough space for individuals to complete the pension with private savings. The danger of this change, is not the change itself, but rather the imperceptible nature of the change, meaning that the population would not knowingly be able to adapt to it.

Finally, the institutional features that allow the called "Silent Reform" to be introduced (maximum pension and maximum contributions) are not exclusive to Spanish pension system. In fact they are present in most industrialised countries who have a Bismarckian pension system. So we believe that the lessons learned from the case of Spain could be useful for other countries.

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A Detailed Results

Table A.1: Percentage of new pensions limited by regime and age of retirement. Extreme scenario (2021-2071)

	General Regime					Self-Employed
	65 years	64 years	63 years	62 years	61 years	Regime
2021	11.9	0.0	0.0	0.0	0.0	0.0
2031	40.0	28.5	20.7	0.0	0.0	0.0
2041	72.3	53.3	56.8	34.4	18.4	0.0
2051	75.0	78.0	80.1	44.0	56.1	0.0
2061	94.9	91.7	85.3	74.2	80.4	34.3
2071	100.0	100.0	96.6	70.1	74.2	68.6

Table A.2: Variation in new pensions in the neutral scenario by gender (%, 2021-2071)

	Scenario (1, 0.5)		**Scenario (1, 0.3)**		**Scenario (1, 0)**	
	Male	Female	Male	Female	Male	Female
2021						
2031			-2.3		-9.1	-1.4
2041	-3.5		-10.4	-6.2	-21.3	-16.8
2051	-8.8	-4.3	-17.8	-13.2	-33.4	-28.0
2061	-13.6	-8.6	-25.5	-21.0	-42.9	-38.2
2071	-17.4	-13.6	-31.8	-27.0	-51.0	-47.0

Table A.3: Variation in new pensions in each scenario, by gender and level of education (%)

		Scenario (1, 0.5)			**Scenario (1, 0.3)**			**Scenario (1, 0)**		
		2021	2051	2071	2021	2051	2071	2021	2051	2071
Male	Primary						-15.4		-17.0	-38.4
	Secondary		-6.0	-16.3		-16.9	-28.3		-30.3	-47.7
	Tertiary		-15.1	-28.0		-28.1	-43.0	-0.2	-44.0	-59.9
Female	Primary						-0.5			-22.6
	Secondary			-4.4		-0.2	-17.7		-15.7	-39.9
	Tertiary		-6.4	-19.8		-19.5	-36.5		-37.4	-55.3

Table A.4: Generosity (ratio average pension / productivity) of the system in each scenario (%, 2021-2071)

	Neutral	**Scenario (1, 0.5)**	**Scenario (1, 0.3)**	**Scenario (1, 0)**
2021	19.5	19.5	19.5	19.5
2031	21.0	21.0	21.0	20.7
2041	23.6	23.5	23.0	22.0
2051	24.6	24.2	23.2	21.2
2061	24.2	23.3	21.8	19.1
2071	24.5	22.8	20.6	17.2

B Retirement in Spain

The key factors of the retirement pension calculation in Spain, up to the application of the Sustainability Factor in year 2019, are: i) eligibility, ii) the number of years of contribution, iii) the wages through contribution bases and iv) the retirement age.

Eligibility depends on the number of years that contributions were made and on the age of retirement. Pensions are granted to individuals who have contributed to the system for at least 15 years, (two of which in the last fifteen years prior to retirement), who have reached the age of 65 (prior to the 2011 reform) and have retired from the active labour force. Early retirement can be taken from 61 to 64 by those individuals with a minimum period of contribution of 30 years and with a percentage reduction from the pension. For eligible individuals, the Spanish system provides an old age pension benefit equal to: $p_t = \alpha\theta\widetilde{w}$, where $\widetilde{w}$ is the reference wage (Base Reguladora), θ is the replacement rate (percentage applied to the reference wage or Base Reguladora) and α is the penalty for early retirement. The reference wage represents the weighted average of the contributions to social security over the 15 years previous to retirement (following the system prior to the 2011 pension reform) with those contributions made in the two years priors to retirement, being indexed to inflation (equation B.1).

$$\widetilde{w_t} = \frac{\left(\sum_{i=1}^{24} b_{t-i} + \sum_{i=25}^{180} b_{t-i}\frac{CPI_{t-25}}{CPI_{t-i}}\right)}{210} \tag{B.1}$$

where b_t is the contribution base in time t and CPI_t represents the consumer price index at time t. This reference wage needs not to coincide with the actual wage, due to the existence of a upper and lower cap in contributions. Moreover, a replacement rate is applied to the reference wage depending on the number of years of contributions. The individual who has reached the minimum of 15 years of contributions correspond to 50%; for the first 25 years of contributions, each year adds 3% to the replacement rate; between years 26 and 35 of contributions each year gives an additional 2%. When

35 years of contributions has been reached, the replacement rate is equal to 100%, and further years of contribution have no marginal value for the workers.

$$\alpha = \begin{cases} 0 & \text{for} \quad N < 15 \\ 0.5 + 0.03\,(N - 15) & \text{for} \quad 15 \leq N \leq 25 \\ 0.8 + 0.02\,(N - 25) & \text{for} \quad 25 < N < 35 \\ 1 & \text{for} \quad N \geq 35 \end{cases} \tag{B.2}$$

where N represents the contribution years. Finally, the coefficient α relates pension benefits to retirement age according with the following formula:

$$\alpha = \begin{cases} 0 & \text{for} \quad R < 61 \\ 1 - \gamma\,(65 - R) & \text{for} \quad 61 \leq R < 65 \\ 1 & \text{for} \quad R = 65 \end{cases} \tag{B.3}$$

where R represents the retirement age. The discount parameter γ is equal to 8% for individuals with 30 less than years of contribution and between 7.5% and 6% for the rest depending on the number contribution years. To the resulting pension it will apply the corresponding minimum (p_{min}) and maximum (p_{max}) limits. Note that while the formulas for calculating retirement pensions are the same for employees (or General Regime, RG) and the special scheme for the self-employed (Régimen Especial de Trabajadores Autónomos, RETA) it is necessary to notice that in the case of RETA there is no possibility of early retirement.

The 2011 reform did not affect eligibility but made changes to three key parameters including the replacement rate, the period of calculation and the retirement age. It established a transitional period up to the year 2027 to reach the new values. The number of years required to reach 100% of the reference wage increased from 35 to 37 years of contribution, changing the scale to a regular and proportional one from the minimum one of 50% with 15 years. The period of contributions is extended to the last 25 years (instead of 15 years) and the statutory retirement age is raised from 65 to 67 in 2027 (although workers who have contributed for at least 38.5 years are entitled to a full pension at age 65). The reference wage after the 2011 reform is calculated as follows[18]:

$$\widetilde{w_t} = \frac{\left(\sum_{i=1}^{24} b_{t-i} + \sum_{i=25}^{300} b_{t-i} \frac{CPI_{t-25}}{CPI_{t-i}} \right)}{350} \tag{B.4}$$

[18]The Sustainability Factor in Law 5/2013 will link the initial pension to changes in life expectancy at age 67. Its application will begin in 2019 and it will be automatically reviewed every five years. In addition, the law stablished a new Pension Revaluation Index that is obtained taking into account the balance between revenues and expenditures of the system. All pensions, including minimum pensions, will be increased annually by this percentage with a floor of 0.25% and a cap of CPI growth plus 0.5%.

Retirement age. There is a well known pattern: workers retire either at the first legally permitted age[19] or at 65, evidence for which is collected in papers such as Jiménez-Martín and Sánchez-Martín (2000); Boldrin et al. (2004); Jimenez-Martín and Sanchez-Martín (2007). The model takes into account that individuals can retire early (between 61 and 64 years) or at the ordinary age of 65 if before the 2011 reform (or at the correspondent age under the reform), and be categorised by gender and levels of education[20].

Years of contributions. The complete work histories show that workers who retire within four decades have, on average, longer work histories. A general increase in both men and women in this category is observed, regardless of nationality[21].

Total pension expenditure. Pensions are calculated for each group at each point in time according to the corresponding law taking into account the number of years of contributions and the retirement age. To the resulting pension we apply the corresponding floor (p_{min}) and ceiling (p_{max}). The formulae for calculating pensions are equal to employees (RG) and self-employed (RETA), although in the latter the possibility of early retirement is not allowed. Total expenditure on retirement pensions is the sum of pensions that take place at 65 and between 61 and 64.

[19] The early retirement age was 60 years in Spain only possible for those who contributed before 1967 (these cohorts are currently reducing). In 2001 the minimum retirement age was set at 61 years old.

[20] See González (2013) for more details on retirement patterns in Spain.

[21] Native men would exceed 40 years of contributions regardless of educational level. Women with secondary education qualifications (high school and college graduate) would experience the largest increase, reflecting women's increased participation in the labour market. However, only in the case of a university degree would the gap between both genders be reduced (see González (2013)).

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