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## EVALUATING THE SUSTAINABILITY OF SPANISH SOCIAL SECURITY SYSTEM

**Francisco J. Blanco-Encomienda,**  
*University of Granada,  
Granada, Spain,  
E-mail: jble@ugr.es*

**Alejandro Ruiz-García,**  
*University of Granada,  
Granada, Spain,  
E-mail: d12ruiga@correo.ugr.es*

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**ABSTRACT.** Social security has remarkable relevance in the general context of Spanish economy. This system is viable if the volume of active population increases at a higher rate than the number of pensioners does and if, in addition, active population is employed by the productive system. The reports of the National Institute of Statistics about Spanish demography demonstrate how these conditions are not met as of today, because our society has one of the highest aging rates and also a remarkable increase in the dependency rate. Through various techniques of time series analysis, this paper reveals the current economic trends in Spain to demonstrate the need for structural reforms of the system so as to make it more sustainable in the long term. To achieve this, it is necessary to change the financing model to a mixed one where the capitalization method plays a significant role, and also to implement urgent measures in order to reduce the barriers to business and employment development.

**JEL Classification:** C01,  
C22, H55

**Keywords:** social security; sustainability; reform; pensions; Spain.

### Introduction

Social security is defined as a system promoted by the state, which carries out the necessary measures to protect the citizens of this state against those individual risks that will never cease to be present, no matter how optimal economic and social situation inside a society is (Beveridge, 1944). Most of researchers point that social security is a security condition of the State while others emphasize that it is a set of actions aimed at protecting people's interests (Zavora & Chepurny, 2014).

Many social security systems were established in the first-world countries in the late 19<sup>th</sup> century (Podger *et al.*, 2014). Thus, the precursor of the current social security system in Spain is Otto von Bismarck, who back in 1883 initiated a system of protection dedicated to finance pensions by providing capital for workers and entrepreneurs (Scholz, 2015).

Social security has acquired a growing importance in the recent years, not only because of the increase in the number of people covered by this system and the huge amount of resources it manages, but also due to its relevant role in the general context of Spanish economy. This system has attributed certain essential functions in our society since, in addition to being the payer of pensions for the many, it also has the function of being a provider of healthcare services to population, and this fact only strengthens its importance for both society and economy.

The most important source of financing for this system consists of social contributions, which represent a large share of the total taxation in the Organisation for Economic Co-operation and Development (OECD) member countries (Goudswaard & Caminada, 2015). This source comes from the base of workers who contribute a certain percentage of their salaries in the hope that future payment of their own pensions will be supported by the younger generation workers who will pay such contributions too. Thus, the amount retained by the state is neither invested in a savings fund, nor saved in its name, but instead, is quickly and directly distributed among the today's beneficiaries of the pension system. We have, therefore, the system of solidarity since it depends on some sort of intergenerational pact between the citizens of a country, in which young people finance the pensions of the elderly, with the idea that in the future their own pensions will be financed by the next generation.

This system needs the presence of certain circumstances in order to be viable in the long term. On the one hand, the base of contributors should be broad enough to sustain the model's performance in times of economic recession. On the other hand, the proportion of beneficiaries within the system should not increase faster than the proportion of contributors, since this situation would lead to the collapse of the system as such. This last requirement is not being currently satisfied due to the increase in life expectancy and the drastic fall of the birth rate at the same time. These threats to viability of the system should lead the country to rethinking the basis of the system that, at present, is not operating within the same environment in which it was once created.

The main purpose of this paper is to evaluate the sustainability of the current social security system in Spain, observing its characteristics and the problems it faces, all from the perspective of time series analysis. In addition to this, different alternatives are presented, which the government may adopt so as to avoid the collapse of the current social security system.

## **1. Threats to the viability of the Spanish Social Security system**

The Welfare State was established in our country with the reestablishment of the democratic system in 1977 with the objective of the State to regulate the economic cycle, to universalize a certain level of social welfare and to guarantee political democracy.

Social Security is the axis of the welfare state. According to Barea and Fuentes (1982), the Spanish Social Security presents the followings characteristics:

- Professional system. It delimits the protected subjects within categories of the population, since they are entitled to benefits those employees who have contributed to the system for a certain time.
- Contributory. Funding is mainly based on the contributions of workers and employers.
- Public management. Direct responsibility of the State, with the participation of private organizations.

The most important characteristic is the financial method that supports the system. This basically consists in the fact that the contributions made by the active population of a given period are transferred to the retired population, matching the contributions with the transfers (García & Pérez, 1997).

The Spanish Social Security faces two structural problems of great relevance. The first problem is due to the progressive ageing of the population (Arltová *et al.*, 2016; Blanco & Callejón, 2013; Levy, 2016; Serrano-Martínez & García-Marín) and the second one is the change that is taking place in the dependency rate, understood as the ratio between the population that can receive a retirement pension and the active population.

The forecasts published by official bodies point to the presence of a persistent imbalance due to a reduction of working-age people caused by the reduction of fertility and the increase

in the life expectancy of Spanish citizens (Ayuso *et al.*, 2013). The number of annual births has fallen from 669,000 in 1975 to 408,000 in 2016. Also since 1975 the average age of the resident population in Spain has increased from 33 to 43 years. Note that the Spanish population is one of the oldest on average in the OECD.

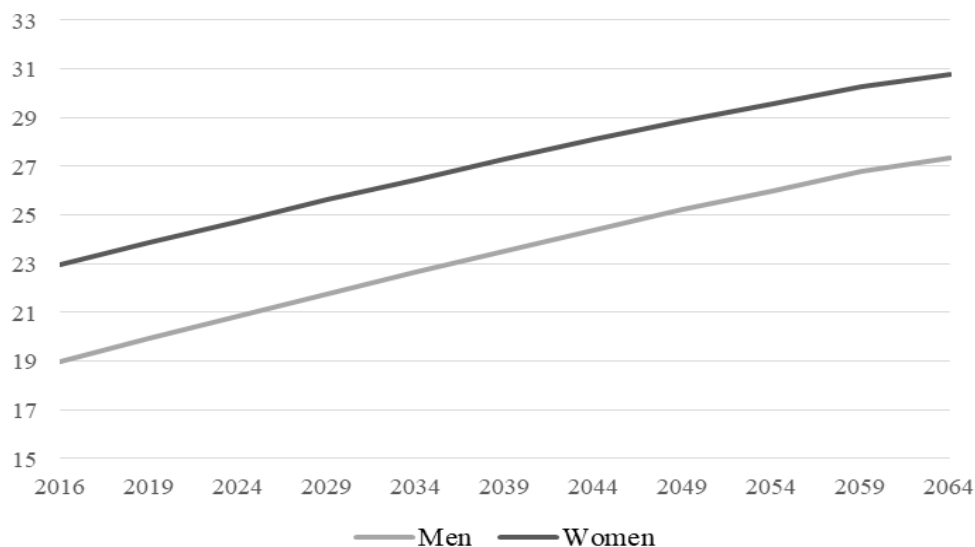
*Graph 1* shows the fall in fertility in Spain. In order to see it more clearly, we have proceeded to seasonally adjust the time series of births using the software TRAMO (Time series Regression with ARIMA noise, Missing values and Outliers).



Graph 1. Births in Spain, 2007–2016

*Source:* own elaboration using data from National Institute of Statistics

Furthermore, *Graph 2* shows the projection of the evolution of life expectancy of Spanish population after retirement.



Graph 2. Evolution of life expectancy of Spanish population after retirement

*Source:* own elaboration using data from National Institute of Statistics

In about fifty years in Spain the proportion of the population over 64 years will represent 34.6 percent of the total, compared with 18.7 percent now. In 2016 the number of people over 64 years old is 8,701,379, while in 2066 it is expected that there will be more than 14.1 million people.

The dependency rate has a clear upward trend and will go from 53.5% in 2016 to, for example, 58.2% in 2022. Thus, for every 10 people of working age in 2027 there would be in Spain almost 6 potentially inactive. In some decades this rate of dependency would rise to almost 100%, which means that for every person of working age there would be practically one that would not be in the age to do it.

All these data explain the strong growth of Social Security spending, as the number of beneficiaries of the system increases year after year while the active population will have a marked downward trend. In addition, due to the revaluation of pensions by the increase in the cost of living, the average pension does not stop growing.

## 2. Methodological approach

Due to the professional character of the Social Security, the contributions of the members are their main resource. Transfers received from the State have been the second most important source of funding, so the sum of contributions and transfers accounts for almost all the resources of the system.

In this sense, note that the increase in pensioners is indisputable. Thus, in this study a prediction of the number of contributors to the system is made using a time series analysis in order to check if the system could present financing problems in the short term.

According to Box, Jenkins, and Reinsel (2007), a time series can be defined as a set of observations sequentially generated over time. An intrinsic characteristic of a time series is the dependence between the values observed in the process.

The time series that measure the number of contributors of the system is clearly seasonal, however, it is not stationary. This fact is effectively captured by the SPSS expert modeler, proposing an ARIMA model (1,1,0) (1,1,1).

The model used, which has a regular and a seasonal difference, explains the future value of the time series by the value of the previous month, by the value of the same month of the previous year and by a linear combination of the first-order seasonal stochastic errors.

## 3. Results

In this section we present the results based on the time series analysis performed. Regarding the model obtained to forecast the number of contributors to the system, the reliability of the fit is moderate (0.66), all coefficients of the model are significant (*Table 1*) and the root mean square error indicates that the model has an approximate prediction error of 33.8 thousand people. In addition, there is no autocorrelation in the errors, as shown by the Ljung-Box statistic (p-value 0.25).

Table 1. ARIMA Model Parameters

Parameter		Estimate	Std. Error	t-Statistic	Prob.
AR	(Lag 1)	0.788	0.045	17.35	0.000***
AR, Seasonal	(Lag 1)	0.456	0.191	2.385	0.018**
MA, Seasonal	(Lag 1)	0.723	0.157	4.06	0.000***

\*\*\* $p < 0.01$ , \*\* $p < 0.05$

Source: own estimation.

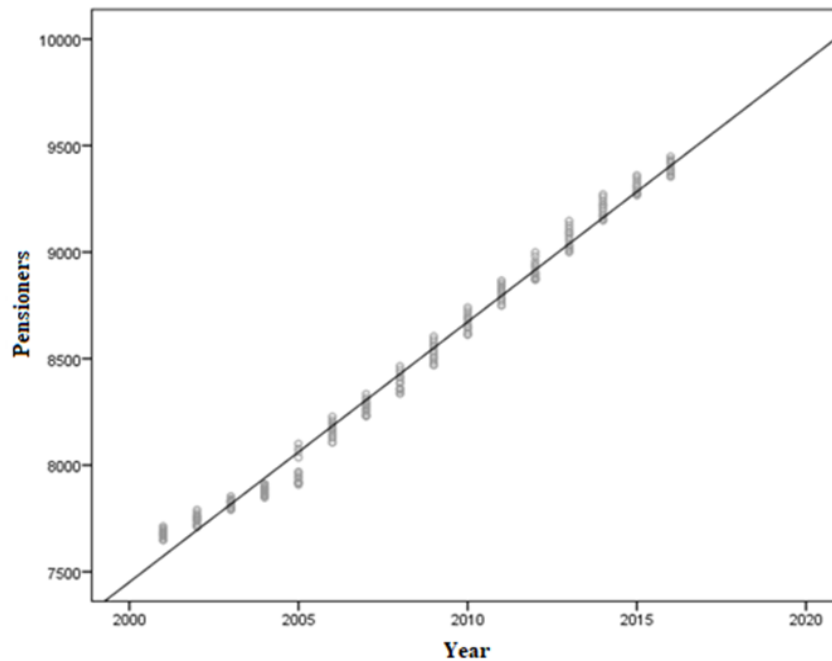
The forecast up to January 2020 is positive, as shown in *Graph 3*, since it shows an increase in Social Security contributors. This increase will lead to a rise in income from contributions and a decrease in expenses for unemployment benefits, although it should be noted that currently about 9 out of every 10 new contracts is temporary.

It does not seem that, in the short term, the system will present strong financial tensions that could lead to bankruptcy.



Graph 3. Prediction of the number of contributors (thousands of people) to Social Security  
Source: own elaboration.

However, as has been seen in demographic trends in the medium to long term, the system must be reformed as soon as possible so as to adapt it to the evolution of demography and the economic situation. This is confirmed by the predictions made with a simple linear regression model on the total number of pensioners of the system until January 2020 (*Graph 4*).



Graph 4. Prediction of the total number of pensioners (thousands of people)

*Source:* own elaboration.

*Table 2* shows the results of the regression analysis. The coefficient of determination is very close to 1 and the value of the F-statistic indicates that the regression equation correctly maps the relationship between the dependent and the independent variables. The coefficient  $\beta_1$  indicates that since 2001 there has been an approximate increase of 10,200 new pensioners each month. The model predicts that Spain will surpass 9.8 million pensioners in January 2020.

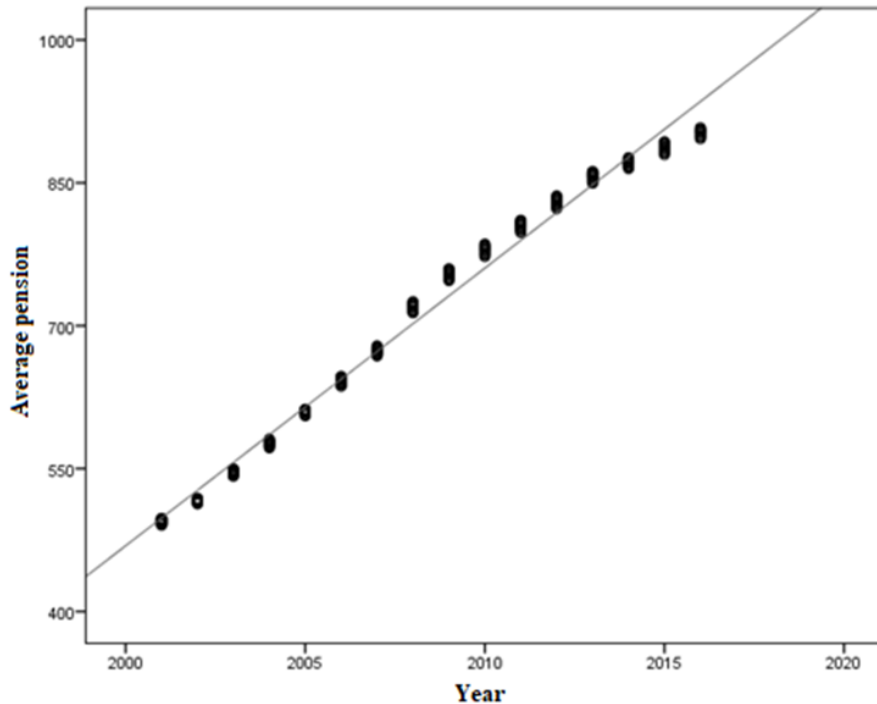
Table 2. Statistics of the first linear regression model

	Coefficient	p-value	
Intercept	7240.48	0.000	***
Year	10.2	0.000	***
Adjusted $R^2 = 0.993$			
Model F-statistic = 28240.86			
Sig. = 0.000***			

\*\*\* $p < 0.01$ .

*Source:* own estimation.

The continued increase in pensioners, whether contributory or non-contributory, is accompanied by the constant increase in the amount of the average pension (*Graph 5*). The need for a structural reform of the system is, therefore, obvious.



Graph 5. Prediction of the average pension amount

*Source:* own elaboration.

As shown in *Table 3*, this second model also presents a very good fit, with a value for the coefficient of determination close to 1. The coefficient  $\beta_1$  indicates that since 2001 there has been approximately an increase in the average pension of 2.43 euros per month.

Table 3. Statistics of the second linear regression model

	Coefficient	p-value	
Intercept	482.62	0.000	***
Year	2.43	0.000	***
Adjusted $R^2 = 0.987$			
Model F-statistic = 14711.21			
Sig. = 0.000***			

\*\*\* $p < 0.01$ .

*Source:* own estimation.

#### 4. Social Security reform: Alternatives to the current system

All problems described in the previous sections are well known to the government, whether from one political party or another. For this reason, in recent years various reforms of the pension system have been approved in Spain (Díaz-Giménez & Díaz-Saavedra, 2009). For example, a progressive increase in the statutory retirement age and the period considered for calculating the regulatory base was approved in 2011. Due to this reform, the ordinary retirement age will gradually increase to 67 years until 2027.

Another reform of the system was approved at the end of 2013, which introduces a new revaluation index and regulates the sustainability factor. According to this reform, since 2014 the revaluation of pensions is determined by the evolution of the variables that determine the

balance of the Social Security system, such as income, expenses or number of pensions, replacing the previous system, present since 1997. The sustainability factor is interesting because it is an automatic mechanism to adjust life expectancy, reducing political risk (Devesa *et al.*, 2012). In addition, since 2019 the initial pension will depend on the increase in life expectancy (Ramos, 2014). However, all these reforms are still insufficient as they are only succeeding in postponing the bankruptcy of the system (Sánchez, 2010).

If Social Security is threatened by adverse economic and demographic conditions, one possibility that cannot be ruled out is the change in the financial method of the system (Holzmann, 1997). Thus, Piñera (1996) defended the superiority of pension systems based on the capitalization of individual contributions managed by private companies, arguing that such systems bring higher income to pensioners, have beneficial effects on employment, national savings and productivity growth, and increase citizens' accountability to the country's economy. Due to the difficult sudden change of a financial system, this author designs a model of gradual transition from the current system to one of capitalization. According to this model, those over 44 years of age would remain within the Social Security system, those under 25 years of age should be included in the capitalization system, while those remaining between the two ages would have the option of remaining in the public system or leave it with a state bond to recognize the future rights already acquired during their contribution period. Under this system the role of the State would be limited to oblige the worker to pay at least a percentage of his remuneration in a private pension fund and to regulate the companies managing the plans in order to reduce the risk of bankruptcy and increase their transparency.

Conde-Ruiz and González (2016) analyse a reform that is at a very incipient stage in Spain but that could have an important impact if it were fully implemented. The reform consists in increasing maximum pensions in line with inflation instead of wage or productivity growth. This policy is reducing the replacement rate only for high earning workers and increasing the redistributive component of the system.

Once the financing system is modified, it would be necessary to solve one of the biggest demographic problems, the birth rate. Effective measures to increase the birth rate would reverse the possible loss of population and provide sufficient workers to improve the economy and sustain the system.

Regarding unemployment, each study carried out by the Center for Sociological Research shows that it is the problem that most concerns Spanish citizens, ahead of economic problems and political corruption. Between 1980 and 2016 the unemployment rate in Spain has averaged 17%, the highest percentage of the entire Eurozone. According to Lacalle (2016), the main reasons that have led Spain to suffer such unemployment rate are the inflexibility of the labour market, the bureaucracy obstructing entrepreneurship and job creation, high recruitment costs, high precariousness and the business structure, accounting the small and medium-sized enterprises more than 90 percent of the total number of companies, most of them having fewer than 10 employees. Thus, some measures should be adopted in this respect.

## Conclusions

The results from the time series analysis carried out in this paper have revealed the need for an structural reform of the Spanish Social Security system because the demographic trends of the country show a steady increase in the number of pensioners, who also receive a growing pension. At the same time, on the side of contributions, the system suffers in periods of recession and the current weak employment increase does not ensure the long-term viability of the system. Only by facilitating the creation of businesses, employment and economic activity will be possible to increase the contribution bases of a Social Security system which, as we



have seen in this paper, will have a constant increase in spending due to demographic trends and economic conditions of our country.

The current system needs a structural reform of the labour market, making contracting conditions more flexible so that creating employment in our country can be an opportunity, not a risk. The countries with the greatest economic freedom are those with the lowest unemployment rates. The unemployment rate in Spain is unacceptable, so the policymakers should have as a priority objective to reduce bureaucracy so as to increase the ease of business creation.

Even more important is the need to reform the financing system, moving it to a mixed one where the capitalization system is gradually introduced and set, since a sudden change would increase public spending dramatically. The mixed system has demonstrated greater strength, versatility, sustainability and transparency in other nations, in which citizens know in detail how much they are saving for their retirement and also with the certainty that the reforms of the past ensure the long-term viability of the system.

As other nations have done, Spain must anticipate the future and ensure the sustainability of a system so important in a society, as the welfare state.

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