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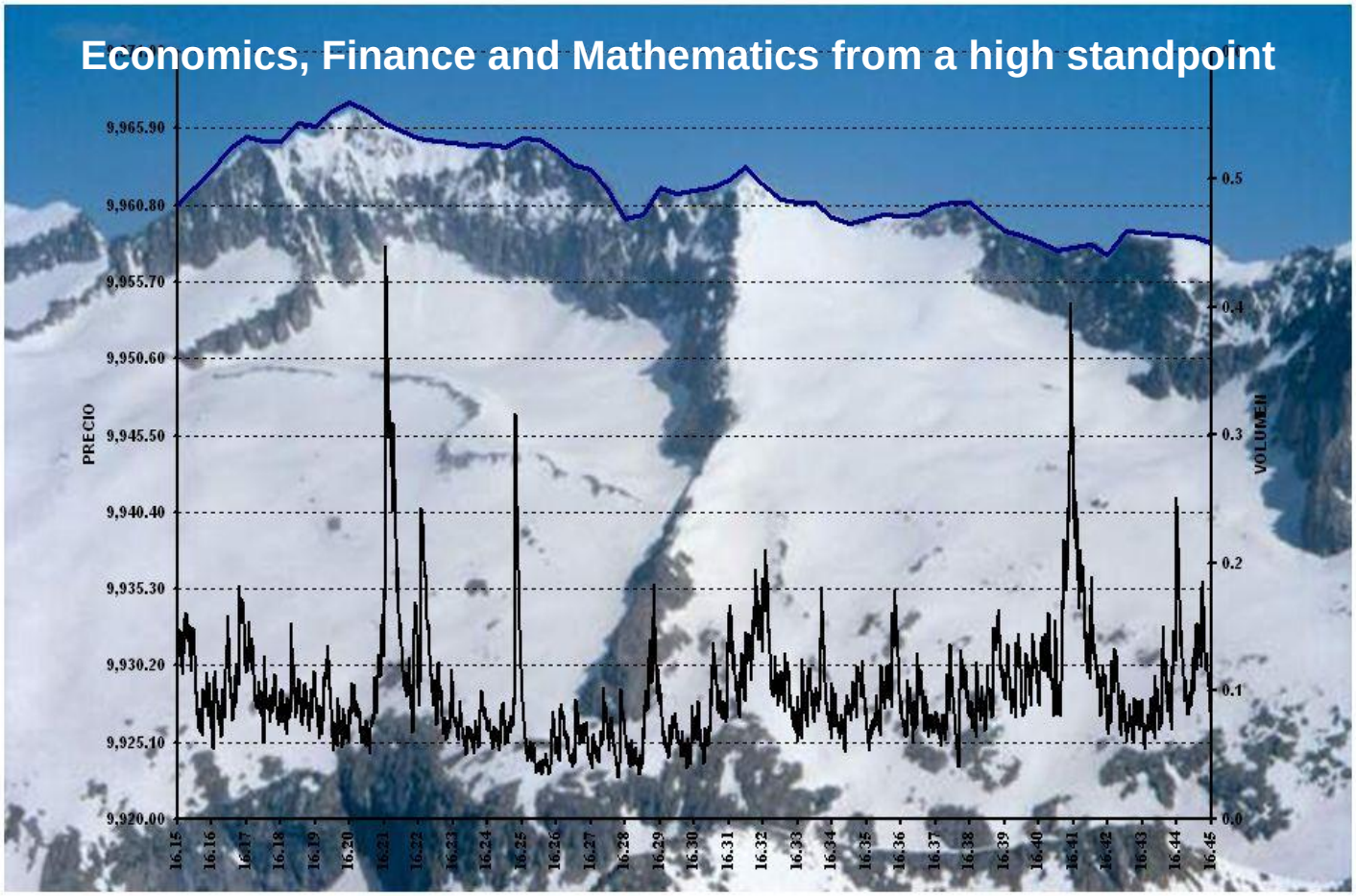

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Pensions and employment in Spain. An alternative view.

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Abstract

In this paper we measure and analyze the total amount of labour, directly and indirectly required to produce the basket of consumer goods purchased by retired people, and funded with their State Pension. Our analysis is focused on the Spanish economy, during the period 1995 – 2005, using input-output techniques. Then, we decompose the change in the vector of total labour requirements, disaggregated at 22 industries, through a shift-share analysis. Next, we build up some scenarios in order to estimate how many jobs would depend on pensions in 2030 in Spain, when the viability of the Spanish PAYG pension system is under threat, as baby boomers begin to retire.

The novelty of our research rests on the fact that we consider the payment of pensions (in a defined benefit, PAYGO scheme) not as a burden on a given full employment economic system but as a source of job creation when an economy operates below full employment. This allows us to consider the viability of a PAYGO scheme from a different perspective.

Key words: pensions, employment, input-output analysis.
JEL classification: I38; J11; C67

1. Introduction.

Longer life expectancy and lower fertility rates will lead to an ageing population in almost all countries over the world (UN, 2012). This is quite a complex phenomenon which, apparently, should be welcomed because it will stabilize the world population, providing some additional benefits at the individual and household level (e.g. lower child mortality and a better quality of life for ageing people). Nevertheless, these benefits will come at the expense of a negative shock on labour markets, a rising bill for long-term care and medical assistance for the ageing population and a growing financial imbalance of pension systems.

In the present paper, we focus on an alternative angle of the ageing process. We aim at quantifying the total amount of labour that is required, directly and indirectly, to produce the basket of goods and services purchased by old age pensioners (OAP from now on) since it is expected that there will be more beneficiaries as time passes.

We shall focus on the Spanish economy because it is, after Japan, the one with the largest life expectancy and the lowest fertility rates (together with Italy and Germany) in the whole world, and also because this economy suffers from a secular problem of massive involuntary unemployment. We proceed in two stages. Firstly, we measure the total labour requirements to attend OAP's demands in 1995, 2000 and 2005, using input-output techniques. Next, we decompose the outcome through a shift share analysis. In the second stage, we build up some scenarios in order to estimate how many jobs will depend on pensions in 2030 in Spain, when the viability of the Spanish PAYG –acronym for Pay-As-You-Go – pension system is under threat, as baby boomers begin to retire.

The novelty of our research rests on the fact that we consider the payment of pensions (in a defined benefit, PAYG scheme) as a source of job creation when an economy operates below full employment, and not as a burden on an economy operating around a full employment position. This allows us to consider the viability of a PAYG scheme from a radically different perspective, although this goes beyond the scope of this paper. Obviously, we implicitly adopt a Keynesian theoretical standpoint, where the amount of employment and economic activity is governed by aggregate demand, employment does not constrain economic growth and the endogeneity of money makes it possible to spend first, and then create the resources to pay back this debt. It is from that perspective that we consider that pension spending shall play a relevant role in the allocation of the labour endowment in the near future.

Notwithstanding, it should be clear to the reader from the very beginning that we are simply considering scenarios. This is not the same as considering a pension-led economy for example. We are aware that the financial viability of pension schemes is complex, and we only deal with a particular aspect of the issue at stake in this paper.

The structure of our paper is as follows. In the second section, we justify our theoretical viewpoint. In the third section, the model used to measure total labour requirements is described. The fourth section accounts for the shift- share analysis. The fifth section contains the projection of different scenarios. In section six we give a summary of the main empirical results. Section seven concludes.

2. Pensions in a DB-PAYG scheme: A burden for the system or larger aggregate demand?

Most societies all over the world are ageing. Table 1 shows that this is a rather generalized phenomenon. Ageing is a source of concern in countries like Japan, Korea, Spain or even Germany; a little less worrying in France or the UK, and is less relevant, though important in relative terms, for countries like China, Brazil, Mexico or the USA.

Table 1: Old age dependency rate: Population aged above 64 over population aged between 20 and 64.

	Germany	Brazil	Korea	China	Spain	France	Japan	Mexico	UK	USA
1995	22.66	7.96	8.33	9.07	22.47	23.22	20.95	7.29	24.50	19.38
2005	28.37	9.31	12.65	10.74	24.36	25.23	30.51	8.19	24.22	18.58
2015	32.29	11.59	17.64	13.21	27.90	29.32	43.98	10.05	27.99	21.96
2025	39.90	16.26	29.10	19.49	34.06	35.74	51.23	14.27	32.47	28.68
2035	52.98	22.93	46.80	29.60	46.66	41.92	59.20	21.46	38.50	32.77
2050	55.79	35.90	72.05	37.99	67.54	45.60	76.36	34.30	40.52	33.30

Source: Statistics OECD

Defined benefit, pay-as-you-go pension schemes (DB-PAYG onwards) are the most generalized pension systems across market economies. [1] These schemes have been subject to criticism for a long time. In the 1970s (e.g. Feldstein, 1974) it was argued that funded systems could contribute to a larger rate of accumulation and a larger level of output. In essence, the argument was that DB-PAYG systems lead to lower saving rates and, additionally, to a lower labour supply, because agents consume more and work less in the present if they know that they will get a pension from the government when they retire (a moral hazard problem).
From the early 1990s onwards, the main criticism shifted towards the financial unsustainability of unfunded systems, due to demographic shocks: falling fertility rates and a longer life expectancy would lead to an extremely ageing population, where young workers would be urged to make unbearable contributions in order to run a balanced social security system. Otherwise, public debt should cover the social security deficit, far beyond any bearable limit (see, for instance, Feldstein, 2006).

Table 2: Gross public pension expenditure (%GDP).

	Germany	Spain	France	Italy	UK	Norway	Austria
2010	10.8	10.1	14.6	15.3	7.7	9.3	14.1
2020	10.9	10.6	14.4	14.5	7	11.6	15.1
2040	21.7	12.3	15.2	15.6	8.2	13.7	16.5
2060	13.4	13.7	15.1	14.4	9.2	14.2	16.1

Source: European Commission, 2012. Table 2.5, p. 101.

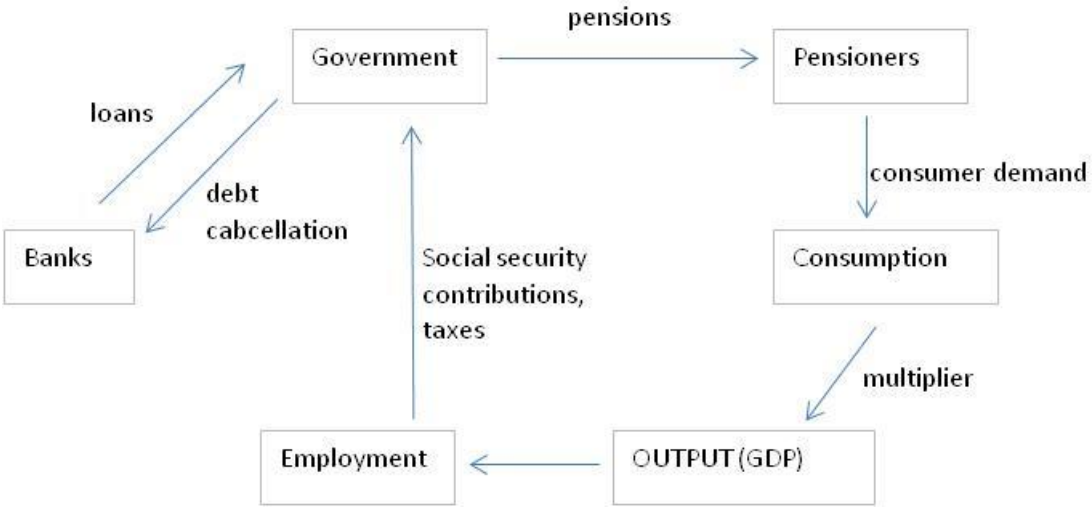
Proposals for reforming pension systems have evolved from asking for a radical shift towards funded systems (for instance, Feldstein, 1974), to parametric reforms on existing DB-PAYG (delaying the retirement age, reducing benefits, etc.), combining the already existing unfunded pension schemes with capitalized systems, funded with voluntary and mandatory contributions and privately managed (World Bank, 1994).[2]
A theoretical element underlying both the criticisms to DB-PAYG and the reform proposals mentioned above, is the assumption that economic systems naturally gravitate around a full

[1] It is common knowledge that the term PAYG means that current contributions fund the payment of current pensions. In other words, it is a non funded pension scheme. And the term defined benefit, DB, means that the stream of pensions received by an OAP, once the first pension is determined according to past earnings, is not constrained by the amount of contributions made by this agent during his or her working life.
[2] In some countries (e.g. Italy, Sweden amongst others), notional defined contribution accounts have been introduced since the 1990s. This is an unfunded pension scheme which takes into account financial-actuarial adjustment systems (see for instance Vidal-Meliá *et al*, 2002, or Gronchi and Nisticò, 2008), in order to make PAYG systems financially sustainable.

employment position and that the level of activity is ruled by the endowment of resources –and their distribution–, a given set of inter-temporal preferences and a set of production techniques (i.e. the *Say's Law* holds). Consequently, a DB-PAYG is viewed as a burden which distorts the *normal* outcome which, presumably, should be attained according to the conventional Neoclassical general equilibrium approach (a good reference for this can be found in Goodfriend, 2002).

However, from a Keynesian position which, as everyone knows, holds that advanced market economies are constrained by the demand side (Keynes, 1936), pensions in a DB-PAYG are not a burden but a source of additional demand (Cesaratto, 2002). Indeed, pensioners' spending on consumer goods can put in motion productive resources which, otherwise, would have remained idle. For this strand of thought, the limit to the sustainability of a pension system rests on the full employment clause.

Figure 1: Keynesian view of a DB-PAYG scheme.



This figure encapsulates, at a rather simplified level, the (post-)Keynesian view of the working of a DB-PAYG pension scheme (see for instance Lavoie, 1992, especially chapter 4 for further details).

According to the (post-)Keynesian strand, banks create money *ex nihilo* when they make loans (the endogenous money view: Moore, 1988) to fund the government payment of pensions; next, these pensions are spent on consumer goods. This is additional aggregate demand which, according to the Keynesian principle of effective demand, will lead, through the multiplier, to a larger level of output. This growing output requires more employment which, in turn, pays taxes and social security contributions which go back to the government as revenue so that it can cancel its initial debt to banks.

We are aware that the Neoclassical and the Keynesian strands of thought hold opposing views and cannot be reconciled. The former stresses the burden of pensions, whilst the latter gives prominence to their role within aggregate demand. Without dismissing the fact that ageing poses a serious challenge to modern societies, we believe that measuring the labour required to attend pensioners' demands in the future will contribute to a better understanding of the problem. The Keynesian approach, we believe, provides a better ground for the analysis that we carry out in this paper, because it links employment to pensions with a causality running from the latter to the former.

Table 3: Long-term projections. Employment and unemployment

	Employment rate (16-64)		Unemployment rate (16-64)	
	2010	2060	2010	2060
Germany	71.2	74.0	7.2	4.8
Spain	58.6	71.8	20.2	7.3
France	63.8	69.2	9.4	7.3
Italy	56.9	61.7	8.5	7.3
UK	69.4	72.4	8.0	5.6

Source: European Commission, 2012, Table 1.7, p. 85.

Table 3 provides an estimation of the expected rate of unemployment for some European countries in 2060. We see that, for instance, in the Spanish or French cases, employment could be higher simply by increasing the employment rate or, else, by reducing the unemployment rate expected in the very long term (NAIRU).

To sum up, there is no magic wand which we can wave to solve social security problems. The ageing of the population will lead to a burden on the whole society but it also will create new markets. In this paper, as pointed out in the introduction, and we hope this will become clearer in the next section, we estimate the total amount of labour required to produce the goods that cover the demand by pensioners in the present and also for the next 20 years, setting aside the problem of the funding of social security. The reader should not think that we are dismissing the question of the funding of the system. Here we just consider "only one side of the coin" as we believe that both questions, funding and pensioners' spending can be singled out. We think that this is an interesting exercise as it provides us with quantitative information about one of the aspects of ageing and the economy.

3. Measuring employment to cover the pensioner's demand of consumer goods.

In this section we describe how we compute the total amount of domestic labour required to produce the goods and services which can be funded with OAP's pensions. It should be clear that we are not computing the labour required to produce *all* goods and services demanded by retired people (they may fund part of their consumption demand with past savings, for instance), neither do we assume that the rate of savings on pensions is nil, nor the total amount of labour required to produce a given basket of commodities. What we intend measuring is total domestic labour embodied in the consumption basket corresponding to the mass of OAP's pensions.

This empirical exercise requires three groups of data, two of them provided by symmetric input-output tables - the total domestic output required to produce the basket of goods and services corresponding to pensions, and the labour required to produce such a basket – and the third one – the basket of consumer goods demanded by workers and OAPs– provided by the Household budget survey.

Input-output tables are based on the condition that total supply equals total demand. It is common knowledge, in formal terms that:

$$[3.1] \quad \mathbf{X} + \mathbf{M} = \mathbf{A^d} \cdot \mathbf{X} + \mathbf{Y^d} + \mathbf{A^m} \cdot \mathbf{X} + \mathbf{Y^m}$$

Where **X** is a (row) vector of total output domestically produced and **M** is also a vector, now of total imports; on the other side of the equality sign, we have intermediate inputs domestically produced, final demand covered with domestic output (final demand includes final private and public consumption, investment and exports), imported intermediate inputs and final demand covered with imports. $\mathbf{A^d}$ and $\mathbf{A^m}$ account for matrices of technical coefficients.

We are interested in the domestically produced total output, needed to match pensioners' demands, which we shall call $\mathbf{X^p}$:

[3.2] $\mathbf{X^p = A^d \cdot X^p + d^d \cdot a_n \cdot X^p + c}$

In the expression above, $\mathbf{d^d}$ is the (column) vector accounting for the consumption basket of domestically produced goods and services which can be purchased with the average monetary wage corresponding to one unit of labour; $\mathbf{a_n}$ is the (row) vector of direct labour requirements, and **c** is the (row) vector of the consumer goods which pensions can buy.
Expression [3.2] above can be arranged to yield:

[3.2.*bis*] $\mathbf{X^p = \left[I - \left(A^d + d^d \cdot a_n\right)\right]^{-1} \cdot c}$

Finally, the vector of total labour embodied in the mass of pensions is given by the expression:

[3.3] $\mathbf{l_T = a_n \cdot < X^p > = a_n \cdot [I - A^*]^{-1} \cdot < c >}$

Where the symbols < > denote a diagonal matrix and $\mathbf{A^*} = \mathbf{A^d + d^d \cdot a_n}$.
The detailed meaning of the terms in the expression above is as follows.
$\mathbf{a_n}$ is a (1 x 22) vector of labour requirements, directly required to produce one million euros of sectoral output. In formal terms, this is defined in the literature as:

[3.4] $\mathbf{a_n = a_{nf} < p >^{-1} = l < X >^{-1} < p >^{-1}}$

Here, $\mathbf{a_{nf}}$ is the vector of direct labour requirements per unit of output in physical terms, **l** is a (row) vector of direct sectoral employment (number of people employed in each industry), **X** accounts for a vector of total sectoral output, and **p** is the set of commodity prices. By and large, we do not have separate information on prices and quantities of output, but of millions of euros of sectoral output. Therefore, $\mathbf{a_n}$ measures the labour directly required to produce one million euros of output for each industrial branch.
$\mathbf{[I - A^*]^{-1}}$ is the usual Leontief inverse, where **I** is the identity matrix and $\mathbf{A^*}$ is a socio-technical matrix which has been described above.
Obviously, the wage per unit of labour *w* can be divided into consumption plus saving:

[3.5] $w = \mathbf{p}\left(\mathbf{d_f^d} + \mathbf{d_f^m}\right) + s$

Where *w* is the money wage of a unit of labour, **p** is a (row) vector of prices, $\mathbf{d_f^d}$ is a (column) vector which accounts for the physical quantities of domestically produced consumer goods in the wage basket, $\mathbf{d_f^m}$ is a (column) vector of imported physical consumer goods in the wage basket, and *s* is the part of the money wage which is saved.
Hence, we can define the second matrix, in physical terms, as:

[3.6] $\mathbf{A_f^c} = \boldsymbol{d_f^d \cdot a_n}$

And in monetary terms:

[3.7] $\mathbf{A^c} = < \mathbf{p} > \mathbf{A_f^c} < p >^{-1}$

Then, in monetary terms:

[3.8] $\boldsymbol{A^* = A^d + A^c}$

And in physical terms:

[3.9] $\boldsymbol{A_f^* = A_f^d + A_f^c}$

Again, we do not have separate information on prices, on the one hand, and quantities, on the other hand. What we really have is:

[3.10] $\mathbf{A}^* = < \mathbf{p} > \mathbf{A_f}^* < \mathbf{p} >^{-1}$

Hence, when taking into account prices and quantities separately, the Leontief inverse is:

[3.11] $\left[\mathbf{I} - < \mathbf{p} > \mathbf{A_f^*} < \mathbf{p} >^{-1}\right]^{-1} = < \mathbf{p} > [\mathbf{I} - \mathbf{A_f^*}]^{-1} < \mathbf{p} >^{-1}$

Finally, the diagonal matrix $< \mathbf{c} >$ stands for the consumption of OAPs (measured in monetary terms), which is funded exclusively with their pensions, under the assumptions that: (1) the rate of savings on pensions is nil, and (2) all consumer goods in the OAP's consumption basket are produced domestically. In formal terms:

[3.12] $< \mathbf{c} > = < \mathbf{p} > \cdot < \mathbf{c_f} > \cdot R$

[3.14] $b = \mathbf{p} \cdot \mathbf{c_f}$

With $< \mathbf{c_f} >$ being the basket of consumer goods, in physical terms, which one pension can purchase, *R* is the number of OAPs and *b* is the average (yearly) pension per pensioner (a scalar).

Expression [3.3] can be written as:

[3.3.*bis*] $\mathbf{l_T} = \mathbf{a_{nf}} < \mathbf{p} >^{-1} < \mathbf{p} > [\mathbf{I} - \mathbf{A_f^*}]^{-1} < \mathbf{p} >^{-1} < \mathbf{p} > < \mathbf{c_f} > \cdot R$

This expression makes clear for the reader that, although we do not know how many physical units are consumed by OAPs, because we do not have separate information on prices and quantities, the vector of total labour required to produce these consumer goods is independent from the set of prices. Therefore, we can make comparisons between the labour requirements in two different periods of time without deflating.

4. The shift-share analysis

Once we have calculated the total amount of labour put in motion by OAP pension spending in 1995, 2000 and 2005, we shall decompose the change in this amount into three components. The starting point is expression [3.3.*bis*], which we now date with the additional subscript *t*. After arranging it, we have:

[4.1] $\mathbf{l_{T}}_t = \mathbf{v_{f}}_t < \mathbf{c_f}_t > \cdot R_t$

Where $\mathbf{v_{f}}_t$ is the vector of total labour requirements to produce one unit of physical surplus commodities (i.e. the vector of vertically integrated labour coefficients, using Pasinetti's terminology –Pasinetti, 1973, Dejuán and Febrero, 2000):

[4.2] $\mathbf{v_{f}}_t = \mathbf{a_{nf}}_t [\mathbf{I} - \mathbf{A_{f}^*}_t]^{-1}$

We decompose the change in the total amount of labour put in motion by pensions as measured in [4.1] into three components:

- The total labour per unit of surplus output, $\mathbf{v}_{ft}$.
- The amount of consumer goods which one average pension can purchase, $\mathbf{c}_{\mathbf{f}_t}$.
- The number of pensioners, R_t.

If we now define a diagonal matrix of deflators:

[4.3] $$< \mathbf{e}_t >=< \mathbf{p}_t >< \mathbf{p}_0 >^{-1}$$

Then, [4.1] can be rewritten as:

[4.4] $$\mathbf{l}_{\mathbf{T}t} = \mathbf{v}_{\mathbf{f}t} < \mathbf{p}_t >^{-1} < \mathbf{e}_t >< \mathbf{e}_t >^{-1} \left(< \mathbf{p}_t >< \mathbf{c}_{\mathbf{f}_t} >\cdot {b_0}^{\mathbf{-1}}\right) \cdot b_0 \cdot R_t$$

Now, we have:

- $\mathbf{v_t^R} = \mathbf{v}_{\mathbf{f}t} < \mathbf{p}_t >^{-1} < \mathbf{e}_t >= \mathbf{v}_{\mathbf{f}t} < \mathbf{p}_0 >^{-1} = \mathbf{v_t} < \mathbf{e}_t >$ which is the total amount of labour required in period *t* to produce the amount of commodities included in one million euros of the base year.
- $< \mathbf{c_t^R} >=< \mathbf{e}_t >^{-1} \left(< \mathbf{p}_t >< \mathbf{c}_{\mathbf{f}_t} >\cdot {b_0}^{\mathbf{-1}}\right) \cdot b_0 = \left(< \mathbf{p}_0 >< \mathbf{c}_{\mathbf{f}_t} >\cdot {b_0}^{\mathbf{-1}}\right) \cdot b_0$ is the basket of commodities which goes to one pensioner in period *t*, measured in prices of the base year.
- R_t is, as already stated, the number of OAPs.

Next, the shift-share analysis consists, as the reader knows, in the breakup of the change of the total labour requirements into the change of their corresponding explicative variables. We define a variable in period *t* in relation to its value in the base year as:

[4.5] $$x_i(t) = x_i(0) \cdot (1 + g_{x(i)})^t$$

Therefore, if between the base year and the current period of analysis there is a difference of just one period of time, then, we have:

[4.6] $$\frac{\mathbf{l_{Ti}}t - \mathbf{l_{Ti0}}}{\mathbf{l_{Ti0}}} = \frac{\mathbf{v_{fi0}^R}(\mathbf{1}+\mathbf{g_{vi}})}{\mathbf{v_{fi0}^R}} \cdot \frac{\mathbf{c_{i0}^R}(\mathbf{1}+\mathbf{g_{ci}})}{\mathbf{c_{i0}^R}} \cdot \frac{R_0(\mathbf{1}+\mathbf{g_R})}{R_0} - 1$$

After arranging, expression [4.6] yields:

[4.7] $$\frac{\mathbf{l_{Ti}}t - \mathbf{l_{Ti0}}}{\mathbf{l_{Ti0}}} = \mathbf{g_{vi}} + \mathbf{g_{ci}} + \mathbf{g_R} + \mathbf{g_{vi}} \cdot \mathbf{g_{ci}} + \mathbf{g_{vi}} \cdot \mathbf{g_R} + \mathbf{g_{ci}} \cdot \mathbf{g_R} + \mathbf{g_{vi}} \cdot \mathbf{g_{ci}} \cdot \mathbf{g_R}$$

Where g_{ji} stands for the rate of growth of factor j in the industry i.
This expression shall be run on all i-commodities.

5. Projecting scenarios. Labour required to deal with pensioners' demands in 2030.

Our purpose in this section is to take into consideration what *could* happen in 2030, regarding the amount of employment required to cover pensioners' demands. We are aware that 20 years is a very long period of time (despite the famous tango!). Hence, we build up some scenarios in order to quantify how much employment, and in which industries, would be required to attend the demand of consumption by pensioners in 20 years time, when baby boomers begin to retire, under different circumstances. This exercise requires a lot of

assumptions, and it would be rather *naïve* to believe that we are predicting what is going to happen in the distant future with a high degree of accuracy. Therefore, it should be clear that we do not aim at estimating how much employment will actually depend on pensions in the future, nor do we take for granted that the social security system will remain the same, despite the expected demographic shocks.
We believe that this exercise is useful because it can shed some light on the impact of changes on the structure of the Spanish economy, caused by demographic changes.
Briefly, the assumptions are the following. Firstly, the vector of vertically integrated labour coefficients is assumed to change according to this pattern:

[5.1] $$v_i(t) = v_i(0) \cdot (1 + g_{v(i)})^t$$

Where $g_{v(i)}$ is the yearly average rate of the fall in the vertically integrated labour in sector i.
Secondly, we consider three scenarios, regarding the evolution of the pension benefit per pensioner.

- In the first scenario, the pension per OAP remains constant.
- In the second one, the pension per OAP increases 20%, but its composition remains the same as in 2005.
- In the third one, the pension per OAP increases 10% on average, and its composition changes according to the pattern of change shown between 1995 and 2005:

[5.2] $$c_i(t) = (1 + 0.1) \cdot \theta_i \cdot c(0) \cdot (1 + g_{c(i)})^t$$

Where θ_i stands for the relative weight of commodity i in the basket of consumer goods of a pensioner in the base year.
And thirdly, we consider two scenarios with respect to the number of pension beneficiaries.

- In the first one, the number of future beneficiaries will be given by the percentage of OAPs out of the total amount of people aged 65 or above in the base year, multiplied by the number of aged people in 2030.
- In the second scenario, we increase the percentage used above by 10%.

We justify these scenarios because of the following reasons:

- In 2030 the number of pensioners who had previously worked in the agriculture or retail trade industries will decline. In these industries, the contribution to social security has been traditionally lower than the average and, therefore, the pension due has been lower. Consequently, the average pension is expected to increase in the future.
- The viability of a pension system can be under threat for, at least, two reasons: (i) the number of OAPs increases beyond a threshold, relative to young people, and (ii) the rate of unemployment outstrips a certain level, leading to insufficient contributions to the balance the payment of pensions. In the present paper, we just focus on the first problem, so that we shall assume a system gravitating around a full employment position. This assumption entails more people contributing during a longer period of time and, therefore, higher pensions (in Spain there is a defined benefit pension scheme).

6. Main empirical results.
The following tables provide a very schematic summary of our empirical research.

Table 4. Growth rate of the components related to the employment of pensioners' consumption

	1995-2000				2000-2005			
	g_V	g_C	g_R	g_L	g_V	g_C	g_R	g_L
Agriculture and Fishing	-26.37%			-15.48%	-13.34%			**-4.81%**
Mining and Quarrying	-34.10%			-24.36%	-36.60%			**-30.36%**
Gas and other fuels for households	-49.86%	51.30%		-12.92%	-2.82%	-16.06%		**-10.40%**
Electricity	-25.70%	-8.27%		-21.77%	-48.56%	22.34%		**-30.88%**
Water supply	-17.51%	38.89%		31.50%	-12.72%	23.98%		**18.87%**
Food, Beverages and Tobacco	-17.94%	14.57%		7.91%	-11.73%	7.08%		**3.82%**
Clothing and Footwear	-11.71%	3.05%		4.43%	-26.88%	2.15%		**-17.96%**
Chemicals and Intermediate Products	7.47%			23.36%	-16.80%			**-8.61%**
Machinery and Tools	0.86%	-2.95%		12.36%	-44.12%	23.28%		**-24.33%**
Furnishings, Equipment and Services for Maintenance	4.85%	18.75%		42.92%	-8.55%	-3.09%		**-2.65%**
Housing and Real Estate activities	4.76%	31.37%	14,79%	57.97%	19.97%	-14,73%	9,84%	**12.37%**
Purchase and Maintenance of vehicles and fuels	-36.62%	29.49%		-5.79%	-14.83%	2.69%		**-3.94%**
Wholesale and retail trade	-8.90%	26.15%		31.91%	-2.75%	3.23%		**10.28%**
Restaurants and Hotels	1.72%	24.54%		45.41%	11.39%	-5.70%		**1538%**
Transport and Communication	-23.55%	17.21%		2.85%	3.25%	-7.66%		**4.73%**
Insurance and Financial Services	-53.20%	44.75%		-22.24%	-18.77%	9.28%		**-2.49%**
Business Services	-1.92%	38.89%		56.37%	-0.87%	21.58%		**32.39%**
Public administration	13.09%	45.59%		89.00%	-2.00%	-13.07%		**-6.43%**
Education	26.84%	-10.33%		30.56%	-23.29%	23.50%		**4.05%**
Health and Social Work	-13.05%	34.07%		33.80%	-24.90%	59.96%		**31.95%**
Recreation and Cultural Services	-23.19%	63.13%		43.83%	-12.79%	22.28%		**17.13%**
Private households with employed persons	-19.57%	11.82%		3.23%	-2.26%	27.98%		**37.40%**
TOTAL / Average	**-15.81%**	**26.30%**	**14.79%**	**22.05%**	**-2.49%**	**3.31%**	**9.84%**	**10.66%**

Source: Authors' calculations.

This table informs about the main results from the shift share analysis, as described in expressions [4.6] and [4.7].

Between 1995 and 2000, $\mathbf{g_c}$ offsets the significant productivity increases in most of the sectors considered, so that in the last instance the total amount of labour required to attend pensioners' demand increases by 22.05%.

However, from 2000 to 2005 $\mathbf{g_R}$, the number of OAPs, is the relevant factor explaining the changes in $\mathbf{g_L}$, the total amount of labour required to produce pensioners' consumption baskets. And what we find especially relevant, is the increase of labour in the "private households with employed persons" industry.

Table 5: Labour requirements.

	L_{1995}	L_{2000}	L_{2005}	L_{2030} Scen 1	L_{2030} Scen 2	L_{2030} Scen 3
Agriculture and Fishing	68.041	57.508	54.742	24.161	26.578	26.578
Mining and Quarrying	2.463	1.863	1.297	130	143	143
Gas and other fuels for households	1.099	957	858	147	194	178
Electricity	3.857	3.017	2.086	153	202	175
Water supply	2.551	3.355	3.988	2.685	3.545	4.161
Food, Beverages and Tobacco	40.363	43.555	45.218	31.099	41.050	36.948
Clothing and Footwear	22.666	23.671	19.420	8.928	11.784	10.020
Chemicals and Intermediate Products	31.103	38.369	35.067	50.422	55.464	55.464
Machinery and Tools	8.032	9.025	6.829	1.952	2.577	2.293
Furnishings, Equipment and Services for Maintenance	9.400	13.435	13.080	24.012	31.696	27.766
Housing and Real Estate activities	64.774	102.324	114.981	544.290	718.463	623.141
Purchase and Maintenance of vehicles and fuels	29.736	28.015	26.912	6.615	8.732	8.201
Wholesale and retail trade	156.776	206.799	228.053	317.372	418.930	388.783
Restaurants and Hotels	80.721	117.378	135.427	445.949	588.652	519.813
Transport and Communication	55.211	56.784	59.468	55.254	72.935	62.536
Insurance and Financial Services	42.343	32.927	32.107	2.314	3.054	3.275
Business Services	33.864	52.953	70.107	135.124	178.364	204.714
Public administration	4.576	8.649	8.093	24.662	32.554	29.753
Education	14.389	18.786	19.548	37.759	49.842	43.059
Health and Social Work	27.243	36.451	48.098	23.009	30.372	49.467
Recreation and Cultural Services	43.788	62.983	73.769	38.591	50.940	73.286
Private households with employed persons	63.640	65.698	90.268	82.684	109.143	107.610
Total	**806.636**	**984.502**	**1.089.417**	**1.857.313**	**2.435.217**	**2.277.364**
Pensions paid to N>65 / GDP	**3,95%**	**4,65%**	**4,24%**			
L required to produce OAP's consumer basket / total L	**6,19%**	**6,28%**	**6,06%**			

Source: Authors' calculations.

In the three left hand side columns of the table above, we give information about the total labour required to produce the pensioners' consumption basket in the corresponding years. This is the outcome of expression [3.3] above.

The three columns on the far right hand side account for three hypothetical scenarios, which are briefly described as follows.

Scenario 1 assumes no changes in the consumer basket nor in the ratio between pension beneficiaries and people aged 65 or older in 2005. Only the number of pensioners changes *pari passu* with the number of people aged beyond 64.

Scenario 2 gives information about the number of workers required to produce a pensioners' consumption basket with the same composition as in 2005, though 20% more expensive, and a ratio between pension beneficiaries over the population older than 64 which increases by 10% with respect to 2005.

Scenario 3 accounts for changes in the composition of the pensioner's consumption basket according to the trend estimated between 1995 and 2005, as well as a 20% increase in the *size* of the pensioners' consumer basket and the ratio between pension beneficiaries and older than 64 increases by 10% with respect to 2005.

Under the assumptions of Scenario 3, labour increases a little less than in Scenario 2. Labour falls in Restaurants and hotels, but it increases in Health and Social Work and Recreation and Cultural Services.

7. Conclusions.

OAP spending accounts for a relevant percentage of total aggregate demand. Although total pension spending over GDP stands above 8% between 1995 and 2005, the ratio between OAP benefits and GDP is roughly one half of the above figure, the rest being pensions paid to people aged below 65, orphans, widows or disabled people. The total labour required to produce the OAP consumer basket is nearly 6% of total employment in that period of time. In 2030, the total amount of labour linked to OAP spending may increase to 2.4 million people, depending on different assumptions on the generosity and eligibility of the pension system. We find particularly relevant increases in wholesale and retail trade, restaurants and hotels, recreation and cultural services and private households with employed persons.

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