Opinion on the application of the formula to calculate the contribution rate of the cessation of self-employment benefit for self-employed workers

1. Introduction

Under Article 23 of Organic Law 6/201 of 14th November on the establishment of an Independent Authority for Fiscal Responsibility AIReF can issue an opinion[1] concerning the application by the Ministry of Employment and Social Security (MEYSS) in Spain of the formula to estimate the contribution rate of the benefit paid for cessation of work by a self-employed person as well as the financial sustainability of the protection system for cessation of self-employment.

The benefit was created in 2010 to protect self-employed workers from the risk of any total or involuntary cessation of their self-employed work. This benefit is funded solely and exclusively through the contributions paid into the protection system specifically for this contingency and the contribution rate is calculated annually in order to guarantee the financial sustainability of the protection system.

In 2016, with the application of the formula the contribution rate would be kept at the minimum rate of 2.2% set in the budgets.

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[1] This possibility is also envisaged in article 344 section 4 of Royal Legislative Decree 8/2015 of 30th October approving the recast text of the General Social Security Law in Spain.

Background and key features of the benefit

The benefit for cessation of self-employment that protects self-employed workers from the risk of involuntary cessation of their self-employment activity was created in 2010. The creation of the benefit implemented the provisions contained in the Self-employed Workers Statute in Spain. A study conducted by a group of experts led to a proposal for a specific protection scheme for cessation of self-employment for self-employed persons.

The benefit is regulated in Law 32/2010 of 5th August and is implemented through Royal Decree 1541/2011 of 31st October. This law was amended in 2014 in the new Mutual Insurance Funds (*Mutuas*) Law[2] but the legislation containing the implementing provisions is still pending.

Social protection for cessation of self-employment is voluntary, i.e. the self-employed worker is free to choose whether or not to pay for the cover. The aim of the benefit is to provide financial cover in the event of total and involuntary cessation of self-employment that may be either temporary or permanent for registered self-employed workers signed on with the Special Self-Employed Workers Scheme (RETA, *Régimen Especial de Trabajadores Autónomos*) or the Special Scheme for Workers at Sea who have paid their contributions for it.

The financial benefit is managed by the '*mutuas*', mutual insurance funds that collaborate with the Social Security System in Spain, the State Public Employment Service and by the Marine Social Institute (ISM, *Instituto Social de la Marina*). The mutual insurance funds are responsible for the protection for all those workers that are members of their funds (89% of the workers protected against the risk of cessation of self-employment). For those workers who are not members of a mutual insurance fund, the management body for the benefit is the State Public Employment Service (9.5% of the workers covered by the protection) or the Marine Social Institute if the workers fall under the Special Workers at Sea Scheme (1.5% of protected workers).

This shared management of the benefit between the Social Security System and the State Public Employment Service (PES) is an exception to all the other benefits.

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[2] Law 35/2014 of 26th December amending the recast text of the General Social Security Law with regard to the legal arrangements for mutual insurance funds for work-related accidents and professional illnesses in the Social Security System.

BOX 1. A brief guide to the mutual insurance funds ('*mutuas*') sector and how it works together with the Social Security System in Spain

The Social Security System is made up of the management entities, the common services (National Social Security Institute, Marine Social Institute, National Health Management Institute, Institute for the Elderly and Social Services and the Social Security General Treasury), and the *mutuas,* the mutual insurance funds that collaborate with the Social Security System. These are private, not-for-profit associations of business people whose sole and exclusive purpose is to collaborate with the Social Security system in the management of the following benefits for the workers who are associates/members:

1. Financial and health benefits stemming from professional contingencies (work-related accidents and professional illness)
2. Financial benefit for temporary disability due to a common contingency
3. Benefit for risks during pregnancy and breastfeeding
4. Benefit for the care of a minor suffering from cancer or other serious illness
5. Benefit for cessation of employment by self-employment workers

In the course of this collaboration the *mutuas* manage contributions in the system that are transferred on a regular basis by the General Treasury of the Social Security System (TGSS). In addition they are assigned over Social Security buildings. There are currently 20 mutual insurance funds of this kind in Spain.

Revenue and expenditure

The population protected by the mutual insurance funds totalled 13,200,000 workers in December 2014. The mutual insurance funds managed 7.1% of the expenditure of the system (more than €9.5bn) and 9.5% of the contributions (€9.47 bn).

€ millions

	Management entities & TGSS	Mutuas	Mutuas as % of total
Contributions	89,729	9,469	9.5
Non-financial revenue	106,306	9,917	8.5
Non-financial expenditure	123,746	9,513	7.1
Non-financial balance	-17,440	404	

Source: IGSS 2014 settlement data

The financial result is earmarked for the provisioning of reserves that are set up in the *mutuas* up to a certain statutory limit and in the TGSS from the surplus to endow the professional contingencies fund, the supplementary professional stabilisation reserve fund or cessation of self-employment and the reserve fund as regards the common contingencies surplus. The aggregate balance sheet for 2014 shows a figure of €6.5 bn in reserves in the net worth of the mutual insurances funds.

- **Contributions and income for cessation of self-employment**

This benefit is funded solely and exclusively through the revenue collected from the contributions paid for that contingency. Initially the protection cover for cessation of self-employment was linked to protection for professional contingencies of self-employed workers, i.e. those workers who were paying a contribution for professional contingences also had to pay for the cover for cessation of self-employment.

When the protection for professional contingencies and for cessation of self-employment were initially linked together it meant that the population protected could be larger and the risks associated with the cessation contingency could be diversified. That changed with the amending of the Mutual Insurance Funds Law passed in 2014[3] when protection was made voluntary. This might entail a reduction in the number of people paying the contribution and an increase in the benefits paid out.

The latest available data published by the Social Security in Spain show a slight reduction in the percentage of workers signed up as members of the RETA scheme who are paying a contribution for cessation of self-employment. The number of contributors to RETA is rising and yet the number of contributors specifically for cessation has fallen. In September 2015, out of a total of 3,163,612 members of RETA only 606,110 (19.2%) were paying the contribution for self-employment cessation. That means the figure has dropped by 19,015 compared to the same month of the previous year, despite there being 48,718 more members affiliated to RETA. In addition there are almost 14,500 workers paying the contribution for the benefit in the Special Workers at Sea Scheme. This figure has remained relatively unchanged over time.

The graphs below show the development of the percentage of RETA workers who are paying a contribution for cessation of self-employment. A sharp growth in numbers can be observed until January 2012 when there was a slight drop that became more notable during 2014 and 2015.

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[3] Law 35/2014 of 26th December amending the recast text of the General Social Security Law with regard to the legal arrangements for mutual insurance funds for work-related accidents and professional illnesses in the Social Security System.

Note: In January 2012 the members of the Special Agrarian Scheme join
Source: Social Security website
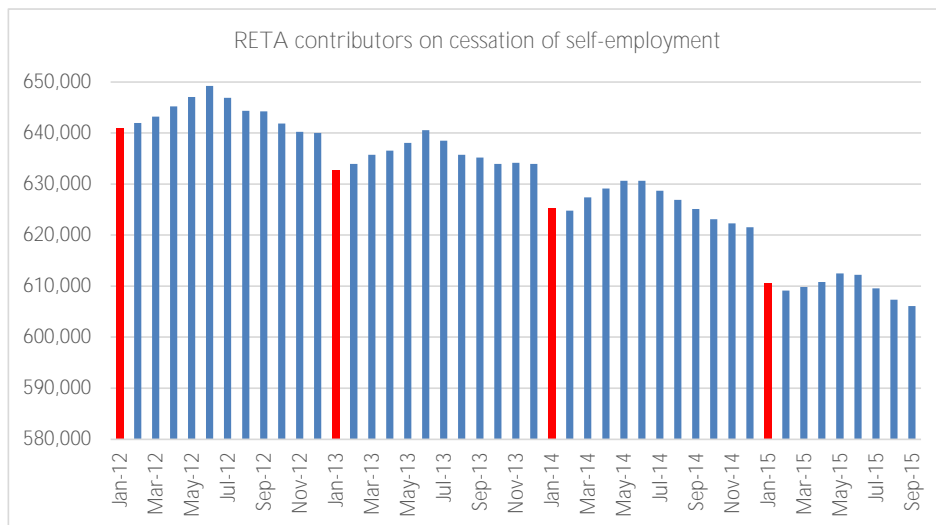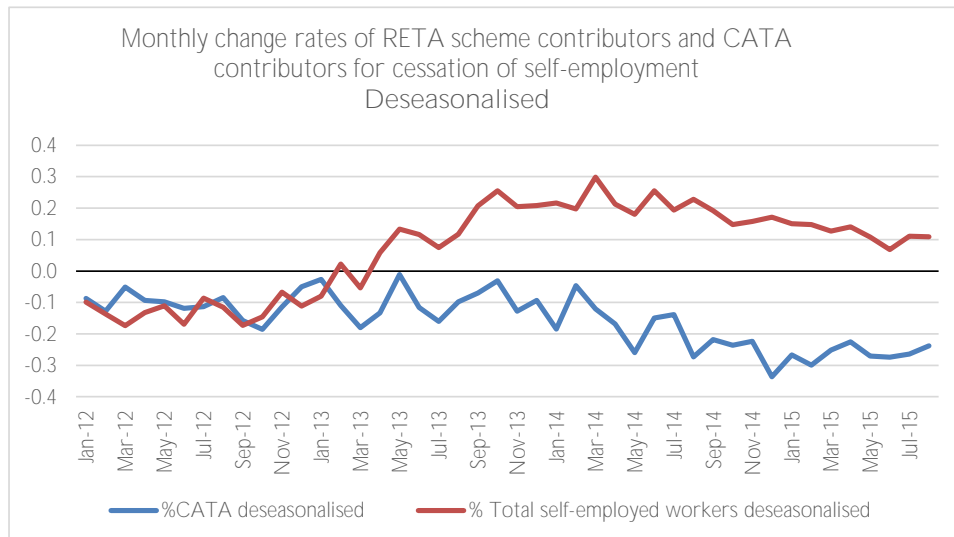
Source: Social Security website

The annual rate of change in the cumulative revenue collection from contributions turned negative in April 2015 although the impact on the total revenue collection is still not significant. The reduction observed in the number of workers paying the contribution for cessation of self-employment has still not had a significant impact on total revenue collection as the total amount collected is similar to 2014 levels. The average monthly figure for contribution revenue paid into the system remains constant at around €12.43M, in line with 2014 and 2013 (€12.47M and €11.87M). However, cumulative revenue from contributions started to record negative rates of change from April 2015 onwards and the year-to-date recognised entitlements to September 2015 are 2.6% down on the figure for the same month in 2014.

Monthly recognised entitlements € millions

Cumulative recognised entitlements year-on-year rate of change
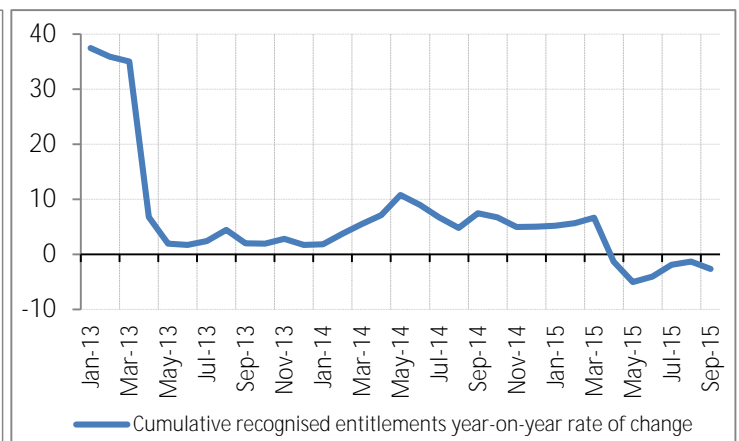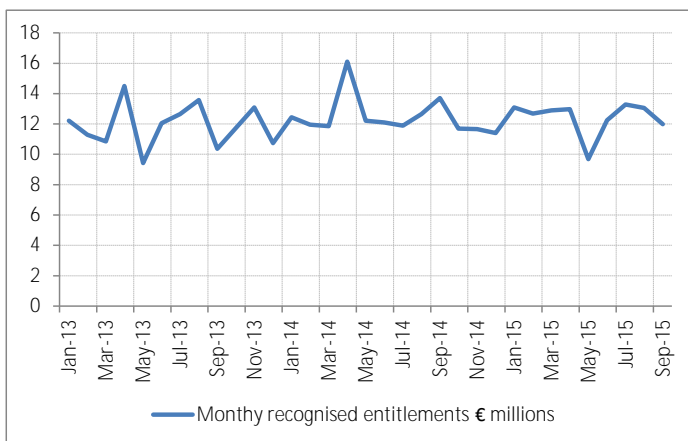
- **Benefit characteristics**

A short description of the requirements for entitlement to the benefit and the definition of the legal status of cessation of self-employment can be found in Annex I.

How much is paid out as the benefit and how long for?

The protection includes a financial amount paid out as a benefit and the payment of the Social Security contribution for common contingencies and temporary incapacity to work.

The amount paid out as the benefit is 70% of the average of the contribution base for the 12 months prior to the cessation of the self-employment with a cap that is applied to the Public Indicator of Multiple Effects Income in line with the dependents in each case.

Maximum benefits paid out for self-employment cessation

	% IPREM		€/month	
	Max	Min	Max	Min
General	175	80	1,087	497
With 1 dependent child	200	107	1,243	665
With 2 dependent children	225		1,398	

* IPREM 2016 increased 1/6 amounts to 621.26 €

The duration of the benefit depends on the length of time during which the worker has paid contributions and on their age. The protection period is determined by taking into account the contributions paid during the 48 months prior to the cessation of self-employment of which 12 must be continuous and immediately prior to the cessation.

Contribution period - Months	Protection period < age 60	Protection period > age 60
From 12 to 17	2 months	2 months
From 18 to 23	3 months	4 months
From 24 to 29	4 months	6 months
From 30 to 35	5 months	8 months
From 36 to 42	6 months	10 months
From 43 to 47	8 months	12 months
From 48 +	12 months	12 months

- **Development of expenditure and of the benefits recognised.**

  Expenditure on the benefit for cessation of self-employment is increasing but is still much lower than the revenue collected. Reserves can be built up in a newly created benefit as a result. In 2014 the expenditure paid out (€8.64M) was €141M lower than the revenue collected (€149.65M). In 2015 the data provided by the Ministry of Employment & Social Security (MEYSS) show 38% growth in the year to date expenditure to September, a similar figure to the growth recorded in 2014[4]. This high rate is both due to the greater number of benefits granted and to the gradual extension of the time the benefit lasts as the number of months for which the beneficiaries have been paying contributions increases. Any assessment of this growth should take into account that the benefit was only created in 2010,

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[4] This increased expenditure on benefits refers to the expenditure managed by the *mutuas* that provide protection for 89% of workers who pay a contribution to cover cessation of self-employment.
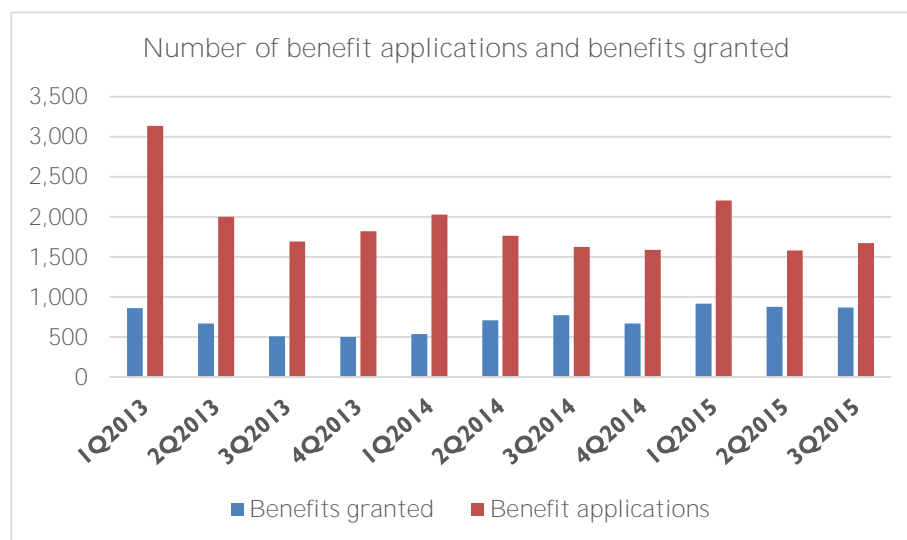
and so the first contributors date from 2011 and were unable to accumulate 48 months of paid contributions until 2015.
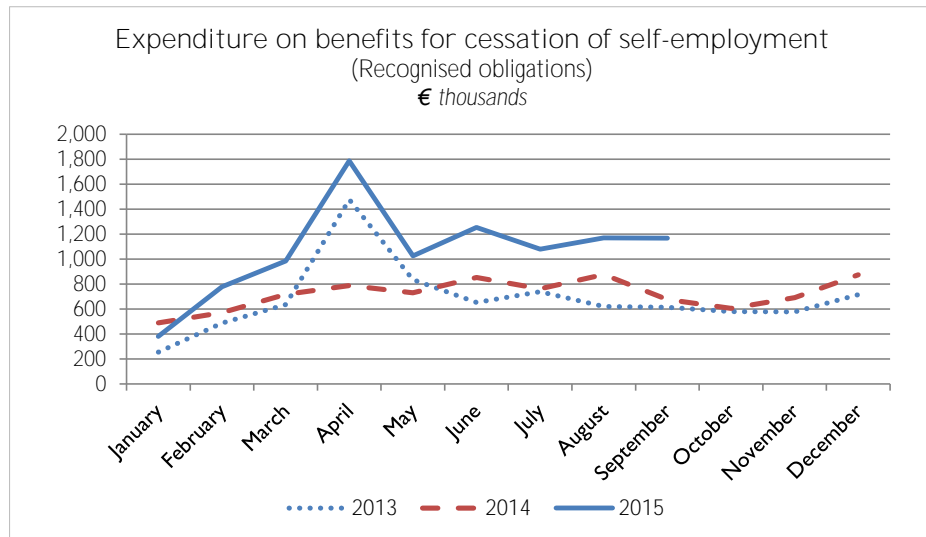
From January to September 2015 2,664 out of the 5,457 applications for benefit were granted. This proportion represents a 48.8% recognition or granting rate, considerably higher than in 2013 (29.4%) and 2014 (38.4%). In any event, it is still a relatively low rate compared to the approval rate for all the other benefits paid out from the protection system in Spain. This low granting rate might be related to the difficulty of proving the status of cessation of self-employment.

The number of recognised benefits, nevertheless, has risen by 32% compared to the same period of 2014 and yet the benefits applied for in this same period rose by only 0.75%. The table below shows the trend in the number of contributors and of the benefits applied for and granted:

	Contributors	Benefit applications		Benefits granted		as a % of benefit applications
		Number	As a % of contributors	Number	As a % of contributors	
	(1)	(2)	(2)/(1)	(3)	(3)/(1)	(3)/(2)
sep-15	606,110	5,457	0.9	2,664	0.4	48.8
2014	636,755	7,005	1.1	2,687	0.4	38.4
2013	649,706	8,648	1.3	2,538	0.4	29.3
2012	656,056	8,470	1.3	1,542	0.2	18.2
2011	517,973	570	0.1	110	0.0	19.3

Source: MEYSS Total benefits RETA & Special Workers at Sea Scheme

Expenditure on benefits for cessation of self-employment
(Recognised obligations)
€ thousands

There was an exceptional spike in spending on benefits in April 2013 and 2015 that was concentrated specifically in the Special Workers at Sea Scheme as a consequence of the declaration of force majeure.

- **Accumulated reserves**

The difference between income and expenditure has generated reserves totalling more than €605M which have been earmarked for the protection of cessation of self-employment. In December 2014 the reserves generated in the mutual insurance funds totalled €525.23M and in the SEPE the surplus was €80M.

€ millions

	Revenue from contributions	Expenditure on benefits
sep-15	76.2	9.6
2014	149.7	8.6
2013	142.5	8.2
2012	140.1	2.5
2011	112.1	
2010	14.3	

Source: MEYSS

BOX 2. Some facts and figures on the Special Self-employed Workers Scheme (RETA, *Régimen Especial de Trabajadores Autónomos*)

The Special Self-Employed Workers Scheme (RETA, *Régimen Especial de Autónomos*) provides cover for workers who regularly personally and directly carry out an economic activity for profit without being linked to an employment contract to do so.

- In October 2015 the RETA had 2,973,066 members, 17.2% of the total number of employed workers signed on to the system. This weight in the number of employed members of the system has increased slightly over recent years because it is a group of workers whose membership level has remained relatively stable during the crisis.

- In 2014 €10.82M were collected in this scheme and a total of €15.95M were paid out in contributory pensions.

- The average contribution base of the RETA in 2014 was 40% lower than the General Scheme (€1,038.61 compared to €1,725.68). The lower contribution base together with a shorter contribution period also generates smaller pensions in financial terms.

- Out of the new pensions with minimum supplements recorded in September 2015, 27.5% correspond to the RETA.

Application of the formula

The contribution rate for cessation of self-employment is set in the budgets law on an annual basis. The current regulations on the benefit provide for the application of a formula to calculate the applicable contribution rate that guarantees the financial sustainability of the protection system. The contribution rate is the rate that balances the contribution revenue collection with the corresponding expenditure 12 months before the calculation. Given that the usual procedure would be to estimate the contribution rate in September when the budget is drawn up each year, the period set by law is July to July.

The formula is as follows:

$$\text{Contribution rate}_t = (\text{Expenditure/Contribution base}) \times 100$$

where:

t = year of the State General Budget (SGB) in which the new rate will come into force

Expenditure = sum total of the expenditure on benefit in the months between 1st August of $t-2$ and 31st July of $t-1$

Contribution rate = sum of the contribution bases for cessation of unemployment in the months between 1st August of $t-2$ and 31st July of $t-1$

The formula will not be applied when the resulting change in the rate is less than 0.5% nor when the modification is a decrease and the accumulated reserves are less than the forecast expenditure.

On the other hand, the law establishes a 4% ceiling or cap on the maximum rate and a minimum rate that is currently set at 2.2%. If when applying the formula to guarantee the sustainability of the system the resulting rate were higher than 4%, the contribution periods required for entitlement to the benefit would have to be revised upwards. This revision would toughen the requirements for access to the benefit and reduce the number of beneficiaries as a consequence.

Currently, the result of applying the formula is a contribution rate that is much lower than the statutory minimum. To do the calculation the contribution bases have been estimated using the monthly collection data published by the Social Security General Comptroller's Office in its budget implementation summary.

The monthly expenditure on benefits for cessation of self-employment has been provided by the MEYSS[5] and includes the *mutuas*, State Public Employment Service (SEPE) and the Marine Social Institute (ISM).

Calculation of the rate when applying the formula

	DR	BC	G
ago-14	12,650,000	575,000,000	875,943
sep-14	13,700,000	622,727,273	676,364
oct-14	11,690,000	531,363,636	605,278
nov-14	11,660,000	530,000,000	691,273
dic-14	11,400,000	518,181,818	874,518
jan-15	13,090,000	595,000,000	379,283
feb-15	12,680,000	576,363,636	777,081
mar-15	12,890,000	585,909,091	983,720
apr-15	12,980,000	590,000,000	1,787,029
may-15	9,680,000	440,000,000	1,026,135
jun-15	12,250,000	556,818,182	1,252,518
jul-15	13,280,000	603,636,364	1,078,591
Sum total 12 months	147,950,000	6,725,000,000	11,007,732

Rate=G/BC*100	0.2%

DR=BCx2.2/100 Published entitlements published IGSS
BC Contribution base
G Expenditure on benefits
Minimum rate 2.2%

The consideration of no more than 12 months might have a pro-cyclical effect. In times of strong growth the revenue collected from contributions tends to increase and expenditure on benefits falls. The opposite occurs in low economic growth periods. As more experience is gained with this benefit and all of its effects are seen, it would make sense to consider extending the length of the period taken into account to calculate the balancing contribution rate.

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[5] Recognised entitlements after deducting cancelled entitlements and including the entitlements that are pending final application and obligations recognised in the mutual insurance funds (*mutuas*), State Public Employment Service and Marine Social Institute.

A simulation exercise using the Continuous Sample of Working Lives

The idea is to use the information contained in the 2014 Continuous Sample of Working Lives (MCVL, *Muestra Continua de Vidas Laborales*) to estimate a potential number of candidates who could be beenficiareis of the benefit for cessation of self-employment. Only the workers signed up to the RETA scheme are analysed, not including the self-employed workers who pay into the Special Sea Regime contribution scheme. The exercise is carried out as follows:

- The workers who have signed off from the RETA scheme during a period of time (one month) and had not joined again, do not generate a pension and have contributed at least during a period of 12 months immediately before they signed off from the scheme are selected. The reason for the 12-month period is because it is the mínimum continuous contribution period required for a worker to become entitled to the benefit. A total number of 130,725 workers leaving the scheme and complying with these requirements are obtained.

- The MCVL does not identify those workers who are paying a contribtion for the self-emplyment cessation benefit so we multiply that total figure of workers leaving the scheme by the percentage of contributors to RETA that pay the contribution for cesssation of self-employment (20.37%). A total number of 26,630 posible beneficiaries are obtained.

- The MCVL also tells us the contribution track record of these workers who have left the scheme and so it is posible to calculate the duration of the benefit. Likewise, the longer duration of the beneficiaries aged over 60 is taken into account.

Now that we know the potential beneficiaries and the duration of the benefit, we estimate the expenditure that would arise from automatically granting the benefit to those self-employed workers who have left the scheme and who have been contributing for the cessation of self-employment benefit during at least 12 consecutive months[6]. The contribution rate to cover this expenditure would be 2.9%.

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[6] The average benefit in 2014 (including the financial benefit and social security contribution) is calculated using MCVL data.

2014 AGED UNDER 60

By contribution duration time brackets:	% total	N° de workers leaving scheme	Benefit duration (months)	Annual expenditure (average benefit **896.05 €/month**)
12-17 m	10.44	2,531	2	4,535,957.25
18-23 m	9.77	2,368	3	6,365,855.50
24-29 m	8.51	2,063	4	7,392,606.38
30-35 m	7.06	1,711	5	7,666,406.62
36-42 m	11.64	2,821	6	15,168,533.10
43-47 m	5.73	1,390	8	9,966,328.61
+48 m	46.86	11,362	12	122,169,665.50
	100.00	24,246		173,265,352.96

Pro-annual report: Average expenditure (benefit +contributionn) €/month MCVL   *896.05*

2014 AGED OVER 60

By contribution duration time brackets:	% total	N° de workers leaving scheme	Benefit duration (months)	Annual expenditure (average benefit **896.05 €/month**)
12-17 m	3.21	76	2	136,900.12
18-23 m	3.42	81	4	292,053.59
24-29 m	5.13	122	6	657,120.57
30-35 m	4.49	107	8	766,640.66
36-42 m	3.85	92	10	821,400.71
+43 m	79.91	1,905	12	20,479,096.77
	100.00	2,383		23,153,212.42

Balancing rate if "automatic" granting

One single criterion 12 months contribution	
Potencial beneficiaries	26,630
Total expenditure (€ thousands)	196,419
Contribution collection base	6,802,273
Rate	2.9

In no event is this automatic recognition or granting of the benefit being proposed or considered reasonable here. The idea is simply to carry out a simulation exercise that shows that there seems to be no sustainability risk in this benefit with the current contribution revenue collection.

If we take into account the additional factor that in 2014 only 22.6%[7] of those potential beneficiaries applied for the benefit, the balancing or equilibrium rate is substantially reduced (down to 0.6%).

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[7] In 2014 7,005 benefits were applied for, 6,008 of which were in the RET and 997 in the Special Sea Regime.

BOX 3. Effect of the self-employment cessation benefit on workers returning to self-employment and the Social Security system contribution of self-employed workers.

From the sustainability standpoint it is relevant to analyse the behaviour of self-employed workers once they cease to be self-employed depending on whether or not they receive the cessation of self-employment beenfit. To do so, the time they take to return to being self-employed is analysed with an approach similar to the approach used for benefit duration data, by observing their status as active members in the Social Security system, depending on the number of months that have elapsed since they signed off the self-employed workers scheme.

The method used to do this is to look for periods of registration as members of the RETA that came to an end in the years 2011-2014 in the Continuous Sample of Working Lives. The month in which the deregistration in the RETA scheme took place is the reference value 0 and the contribution status of each individual in the RETA during the twelve months before the deregistration is calculated (a dichotomous variable whose value is 1 if the worker is paying the contribution during that month and 0 if the contrary is true) and their contriution situation in the Social Security system (either in the RETA or in the employee workers scheme) throughout the following 24 months subsequent to the deregistration

Two differentiated groups are used to carry out the study: the treatment group, made up of self-employed workers who are being paid the cessation of self-employment benefit, and the control group that includes the self-employed workers who have voluntarily signed off from the system without receiving the benefit.

Figure 1: Contribution percentage 12 months before leaving the RETA scheme and 24 months subsequently.
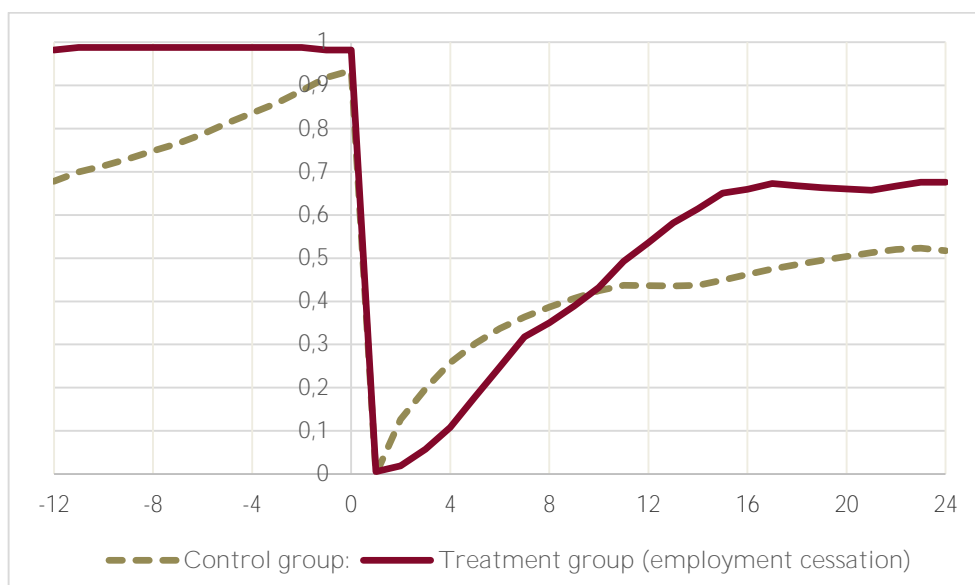
Given that to be able to receive the cessation of self-employment benefit a worker needs to be contributing to the RETA during 12 consecutive months before the deregistration occurs this is exactly what can be observed in the graph (values between -12 and -1), whereas lower contribution rates than the unit are shown for the control group. Once the worker has signed off from the RETA, the self-employed workers who are paid the benefit record rates of return to self-employment that are much lower than the ones for the self-employed workers who stop paying into the system but do not receive any subsidy. However, as of the ninth month after deregistering from the RETA, the self-employed workers who receive the self-employment cessation benefit show self-employment rates that are considerably higher than those of the control group.

Together with this analysis, an impact evaluation study is made to check whether there are any differences in the number of days of contribution made in the first year after the deregistration in the RETA. Using the same treatment and control groups defined previously an evaluation is carried out of the impact of payment of the cessation of self-employment benefit on the number of days of registration in the Social Security system throughout the following year after the self-employed worker has signed off from the RETA scheme. The evaluation diagram is as follows:

Recevie the cessation of self-employment benefit → days contributed in the year following deregistration from the scheme

The following set of hypotheses is checked out through the Propensity Score Matching (PSM) method developed in Annex I:

$$H_0 : dias.\cot izados.a\tilde{n}o.despues_{tratamient} = dias.\cot izados.a\tilde{n}o.despues_{control}$$

$$H_A : dias.\cot izados.a\tilde{n}o.despues_{tratamient} \neq dias.\cot izados.a\tilde{n}o.despues_{control}$$

In the event that this null hypothesis is not rejected, the assumption is that there are no signficiant differences between the two groups and therefore the fact that a self-employed worker is paid a cessation of self-employment benefit does not imply that the worker records periods of self-employemnt after the derigstration that are any different from the self-employed workers who do not receive this subsidy. The results obtained are shown in the table below:

Table: Estimation of the impact of cessation of self-employemnt on the number of days the contribution was paid. PSM

PSM method	Impact: $\bar{X}_{treatment} - \bar{X}_{control}$	"t" test
nearest neighbor	-35.71	-2.624
Kernel	-32.45	-3.56
Radius	-32.11	-3.51

Therefore, the self-employed workers who are paid a self-employment cessation benefit show shorter subsequent self-employment periods that are 33 days less than the other self-employed workers during the first year subsequent to the deregistration.

Conclusions

Under the current legislation the minimum 2.2% contribution rate as set in the SGB for 2016 should be used. The contribution rate that results from applying the formula is much lower than the rate set as the mínimum cap (2.2%). A lot of leeway is still detected in the level of expenditure before it would be equal to the revenue collection and it would be necessary to increase the contribution rate.

No risks for the financial sustainability of the benefit in the medium term are detected. In the long term, however, the development of the number of contributors and of the expenditure will have to be observed after the entry into force of the changes introduced in 2015 once the duration of the benefit reaches its maximum value and it is fully operational.

The recognition or granting of the benefit is still limited. It is difficult to determine whether or not the cessation of the self-emplyment is involuntary and so the access requirements for the benefit must necessarily be stringent. In practice this is a barrier for workers to have access to it.

The difficult of having access to the benefit and the optional nature of the system might be the reason for the decrease in the number of contributors. This decrease does not entail any risk for the sustainability of the cessation of self-employment protection system at the moment because the revenue collection from contributions is much higher than the expenditure on benefits.

When the benefit has been functioning for longer and has a longer track record, the possibility of extending the period taken into consideration to calculate the contribution rate could be examined. That might reduce the posible pro-cyclical effect entailed by the current formula.

Proposals

The establishing of a formula to set the balancing or equilibrium contribution rate allows a picture of the financial position of the self-employment cessation benefit to be obtained. AIReF has made its calculations using the information sent by the MEYSS. AIReF is of the view that it is important to make the calculation transparent by publishing the data series required to estimate the contribution rate as well as the result obtained.

1. **AIReF recommends publication by the Ministry of Employment & Social Security (MEYSS) in the State General Budgets of the information allowing the calculations to be made of the formula to estimate the balancing rate of the self-employment cessation benefit.**

In the medium term, given that the current formula may give rise to a pro-cyclical behaviour of the estimation of the rate consideration could be given to extending the period taken into account for revenue and expenditure that is used in the formula.

2. **In the medium term AIReF recommends extending the period taken into consideration for revenue and expenditure that is used in the formula**

ANNEX I. Evaluation of the impact of the self-employment cessation benefit on the return to self-employment and the contribution to the Social Security System of self-employed workers.

It is extremely interesting to analyse the effect that the use of the self-employment cessation benefit can have on an increase in the period of no employment for the self-employed worker. This situation of no self-employment has a two-fold effect in terms of policy sustainability. On the one hand, the increase in the expenditure due to the possibility of being paid a benefit that may last as long as a full year depending on the period during which the worker has been paying contributions and on the other hand the posible reduction in revenue in the system. Both effects work against the solvency of the system.

In figure 1 in box 3 in this document it can be observed that the self-employed workers who are paid the self-employment cessation benefit record periods of "no self-employment" that are longer than for other self-employed workers. This finding is in line with what has been observed in other labour market studies that show the existence of a high correlation between the length of time the unemployment lasts with the benefit offered by a PES to someone in that position. As reported in the studies published by Nickell and Layard (1999), Lavile (2007) or European Commission and OECD reports, amongst others, the extension of the period of payment of unemployment benefits is a disincentive for seeking a job and therefore leads to prolonged periods of unemployment.

However, when analysing figure 1 in box 3 above, apart from the statement that the self-employed workers who are paid for cessation of their self-emplyment show rates of return to the labour market that are lower than any other type of self-employed worker, it is unlikely that any other affirmation can be extracted except that the characteristics of that type of self-employed worker who can benefit from that subsidy for cessation of self-employment might be very different from another type of self-employed worker. That means that the longer period of no self-employment is not due to the fact of receiving a benefit but rather to those other special characteristics (expectation of a return to the contribution, age, level of education, etc.) of those self-employed workers who receive the benefit. That is the reason why an evaluation exercise is carried out in this annex to calculate the impact that the use of the "self-employment cessation" benefit has on the "number of days of work in the year".

To be able to make the calculation the MCVL2014 is used to find episodes or periods of membership in the RETA ending in the years 2011-2014. The study is restricted to

the workers who signed off from scheme 0521 and two groups are generated for the evaluation:

- The treatment group, made up of self-employed workers that shows after being in the RETA an episode of membership of the scheme corresponding to receiving benefits for cessation of self-employment.

- The control group, consisting of the self-employed workers who voluntarily sign off as workers (code 51) without receiving the benefit. The primary characteristic of this control group is that it must be made up of a series of workers presenting similar features to the workers that have ceased their self-employment (entitled to a benefit, age, gender, type of activities, etc. all similar) but that do not get paid a benefit for "cessation".

The aim of this evaluation is to observe whether there are any significant differences between both groups in the variable "*número de días activo*" which is "number of days signed on as a worker" "(paying contributions to the SS)" in the year following deregistration from scheme 0521. Therefore, the following set of hypotheses is compared:

$$H_0 : dias.\cot izados.año.despues_{tratamiento} = dias.\cot izados.año.despues_{control}$$

$$H_A : dias.\cot izados.año.despues_{tratamiento} \neq dias.\cot izados.año.despues_{control}$$

In the event that this null hypothesis is not rejected the assumption is that there are no signficiant differences between the two groups, and therefore the fact that a self-employed worker receives a benefit for self-employment cessation does not imply that the worker records periods of self-employment after the deregistration that are any different from the self-employed workers who do not receive this subsidy.

Initially, when making an impact evaluation, the best approach is to randomly select the individuals for the two groups (D=1 is the treatment group and D=0 is the control group). In this situation and on the assumption that the potential results Y_1 - days of contribution if paid the cessation benefit – and Y_0 - days of contribution if not paid the cessation benefit – are independent from the treatment, i.e. $Y_1, Y_0 \perp D$, then the average effect of the self-employment cessation beenfit can indeed be estimated as:

$$\alpha = E(Y_1|D=1) - E(Y_0|D=0) \qquad (1)$$

given that the randomisation ensures that the selection bias will be zero. However, what happens if randomisation is not feasible and the selection for the treatment group is made in line with a set of observed variables? That is when matching methods are used. These methods are used to be able to build comparison groups when the

allocation of the treatment is not random but is done on the basis of observed variables.[8]

The idea underlying the matching method is to select a group of non-beneficiaries (in this case self-employed workers who do not receive the benefit for self-employment cessation) with the aim of making them more similar to the beneficiaries who are the self-employed workers who receive the cessation benefit, in all the aspects observed, except in the fact of having received a public subsidy. If this group is successfully made as similar as possible then the variable of interest observed (number of contribution days in the year subsequent to the deregistration from the scheme) in the matched group is approximated to the contra factual and the effect of the intervention is estimated as the difference between the averages of the outcome value of the two groups. Given that the intention is to evaluate the impact the payment of the benefit for self-employment cessation has on the days during which a contribution has been paid in the year subsequent to the deregistration, the evaluation study diagram is:

D (receive a benefit for cessation of self-employment) → Y (days of contribution in the year after the deregistration)

To estimate the effect of being paid the benefit on the number of contribution days self-employed workers who receive the cessation benefit are matched with all of the self-employed workers who do not get paid the subsidy but are similar in all the important explanatory variables when determining whether that self-employed worker might have been eligible for the benefit. The effect of the cessation benefit on the days of contribution is estimated by means of the difference between the average number of days of contribution in the year subsequent to the deregistration of the self-employed workers who are being paid the benefit minus the number of days of contribution of those who do not receive the benefit and who have been matched. All of this is on the condition that the matching generates two equivalent groups.

The intuition behind this idea is that the comparison group should be as similar as possible to the treatment group in terms of observable characteristics before the treatment is carried out and assuming that there are no differences in the non-observable characteristics. The key assumption for the matching method to work is that the allocation to the treatment is independent of the potential results given the variables prior to the treatment X. In other words:

$$Y_1, Y_0 \perp D \mid X$$

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[8] The matching methods do not let comparison groups be built when the allocation to the treatment group is done in line with non-observable variables.

The estimator of the impact of the treatment can be specified as the average of the difference of Y between the control units as weighted using the Propensity Score obtained by the participants. The calculation must be made in three steps:

1. Estimate the Propensity Score, or the probability of exposure to the treatment,

2. Compare the quality of the matching done and

3. Estimate the impact and its significance in statistical terms.

Phase 1: Estimate the Propensity Score

In this phase the participation of an individual in the programme is estimated. In this case the participation variable D is "self-employed worker who is paid a benefit for self-employment cessation", and it depends on a set of variables such as the age of the self-employed worker, whether they are entitled to a benefit, the amount to be paid out as a benefit, for how many months, level of education, etc. To do this a limited dependent variable model is estimated that is specified by the following system of two equations:

$$D_i^* = \gamma_0 + \gamma_1 X_i + U_i \qquad (2)$$

$$D_i = \begin{cases} 1 \text{ si } D_i^* \geq 0 \\ 0 \text{ si } D_i^* < 0 \end{cases} \qquad (3)$$

In which D is observed, never D*, but D is determined by the value that this non-observed value takes. The main characteristic is that the observed variable, D, only presents two types of values (0.1), and so it is a limited dependent variable model widely studied in basic econometrics reference books (Greene, 1998). The U variable is the error term of the non-observed variable equation. To estimate this system any discrete choice procedure can be used (such as the Logit or Probit models) that allow probability estimates to be generated in the interval [0, 1]. Using a specification of a Logit model, the expression that estimates the participation in the programme is:

$$p(D_i | X_i) = \frac{\exp(\gamma_0 + \gamma_1 X_i)}{1 + \exp(\gamma_0 + \gamma_1 X_i)}$$

Where D is the dependent variable that takes two values (1,0), the observable explanatory variables vector is X where γ_0 is the parameter of the constant term and γ_1 the parameters vector that needs to be estimated. With the available data from the MCVL2014 the explanatory variables that have been considered are:

- *Age*: age of deregistration in the RETA

- *More60*: Fictitious variable that takes the value 1 if the age of deregistration in the RETA is more than 60, and 0 if not.

- *Condition*: Fictitious variable that takes the value 1 if the self-employed worker has been contributing during the last 12 months before the cessation of self-employment in the RETA.

- Contrmonths: number of months of contributions paid in the RETA in the last 4 months.

- *Secondary*: fictitious variable that takes value 1 if the individual has secondary studies and zero if not.

- *Male*: factious variable that takes value 1 if the self-employed worker is a man, and 0 if not.

- Benefitmon~^{5} : number of months that the person can receive the self-employment cessation benefit.

- Spanish: Fictitious variable that takes value 1 if the self-employed person was born in Spain and 0 if not.

- 9 fictitious variables for the line of employment in which the self-employed person works, that takes value 1 if the worker is in that type of employment and 0 if not. The lines of employment are "*prima*" (primary employment),"*Indus*" (industrial line of employment), "Sales"(commerce), "*Transp*" (transportation and storage employment), "*Hostel*" (bars and restaurants), "*Info*" (IT), "*bank*" (banking and insurance), "*consul*" (consultancy line of employment), that takes

- 16 fictitious variables for the Autonomous Regions, taking value 1 if the self-employed worker lives in that Autonomous Region and 0 if not.

Table A.1 gives the results of the estimation of the Logit model, equations (2) and (3). Variables such as retirement age, meeting the requirement of 12 continuous months of contribution payments before cessation of self-employment, the number of months of contributions as a self-employed worker in the last 4 years, the level of education, and certain lines of self-employment are seen as affecting whether or not a self-employed worker receives the benefit for cessation of self-employment.

Table A.1: Estimation of the participation in the benefit for cessation of self-employment.

| treatment	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	.0100464	.0036244	2.77	0.006	.0029427	.0171501
more60	.1054897	.1329663	0.79	0.428	-.1551195	.3660989
condition	1.28834	.1877885	6.86	0.000	.920281	1.656398
contrmonths	.0159138	.0078824	2.02	0.043	.0004647	.0313629
prima	-.3383671	.2683162	-1.26	0.207	-.8642572	.187523
indus	.0048905	.1194891	0.04	0.967	-.229304	.2390849
sales	-.1861516	.0855656	-2.18	0.030	-.3538572	-.0184461
transp	.0382392	.1401066	0.27	0.785	-.2363647	.3128432
hostel	-.3043908	.1091266	-2.79	0.005	-.518275	-.0905067
info	-.0736088	.2319051	-0.32	0.751	-.5281344	.3809169
bank	-.0260642	.1732693	-0.15	0.880	-.3656657	.3135373
consul	.0952493	.0980823	0.97	0.331	-.0969885	.2874871
male	-.1023611	.0642175	-1.59	0.111	-.2282252	.0235029
benefitmon~s	-.0267677	.0232793	-1.15	0.250	-.0723943	.0188589
spanish	.1864428	.0892809	2.09	0.037	.0114554	.3614303
secondary	-.1839517	.062541	-2.94	0.003	-.3065298	-.0613737
arag	-.141917	.2014734	-0.70	0.481	-.5367976	.2529636
astu	-.0320418	.1929193	-0.17	0.868	-.4101566	.346073
bale	-.2207166	.1970615	-1.12	0.263	-.60695	.1655169
cana	-.2692135	.1820114	-1.48	0.139	-.6259493	.0875223
cant	-.5478584	.3765989	-1.45	0.146	-1.285979	.190262
cleo	-.0768185	.1468771	-0.52	0.601	-.3646923	.2110552
cman	-.2438894	.160022	-1.52	0.127	-.5575267	.069748
cata	-.2577226	.1020894	-2.52	0.012	-.4578141	-.057631
vale	-.1744978	.1060254	-1.65	0.100	-.3823038	.0333081
extr	-.4475771	.2610551	-1.71	0.086	-.9592356	.0640815
gali	-.0913571	.13526	-0.68	0.499	-.3564618	.1737476
madr	-.0647575	.1020799	-0.63	0.526	-.2648305	.1353154
murc	-.5426164	.2504513	-2.17	0.030	-1.033492	-.051741
nava	-.1810851	.2902224	-0.62	0.533	-.7499105	.3877404
pvas	-.2489842	.173887	-1.43	0.152	-.5897964	.0918281
_cons	-4.150237	.2814163	-14.75	0.000	-4.701803	-3.598672

Phase 2. Evaluate the quality of the matching

Good properties are shown when estimating the impact of a policy using the PSM method if a number of assumptions are satisfied. In this phase therefore, essentially the idea is to evaluate if the "common support" assumptions hold up and if the "samples are balanced"".

The first step is to check the common support between the treatment and control groups. The most direct way to do this is a visual analysis of the density distribution

of the PS in both groups. Lechner (2000) argues that given that the problem of support can be resolved through an inspection of the distribution of probability distribution of receiving the benefit, or the Propensity Score, there is no need for making formal comparison checks.

Figure A.1: Density function of the probability of receiving the benefit for cessation of self-employment in line with the explanatory variables
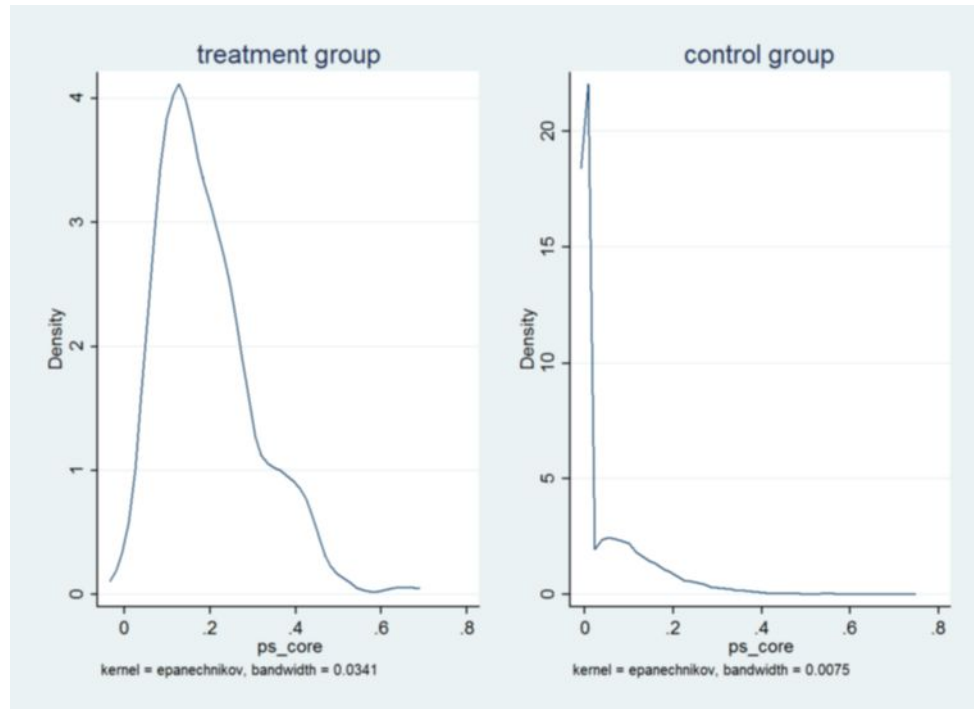
In addition, it can be observed that the common support between both groups is found in the interval [0.0, 0.656], and so there is a relatively high degree of overlap between the treatment group and the control group.

The second condition is "sample balancing" in order to check whether the matching procedure is capable of balancing the distribution of the relevant variables, both in the control group and in the treatment group. The simplest method is to check out whether there is any difference in the mean average values between the treatment group and the control group in the explanatory variables observed, so that a check is made of the difference in the averages for two populations –treatment and control individuals– and for each one of the explanatory variables of the Logit model estimated previously: months for which the contribution has been paid, age, if the requirement to be able to receive the benefit is met, percentage of men, etc.

If the null hypothesis of "absence of significant differences in the average of both groups" is not rejected it can be considered that the findings regarding the differences observed in the variable of interest – days of contributions in the year following the

deregistration in the RETA –between self-employed workers who are paid the benefit and those who are not – is due only to the impact of receiving the benefit because similar workers are being considered (as far as all the other characteristics observed are concerned)..

Phase 3: Estimate the average effect between individuals treated and controlled using the Propensity Score

Once the Propensity Score has been estimated the value of the probability of exposure to the treatment is obtained for each individual. The next step is to carry out the matching once the matching algorithm for matching between the control and treatment group units has been decided. Information on 3 variables is used to do this:

- The outcome value of the variable of interest, number of days for which contribution is paid in one year.

- Whether the individual belongs to the treatment and control group.

- The probability of receiving the self-employment cessation benefit (PS), estimated previously.

The figure below gives the dispersion graph of the two groups showing the information on these three variables.

Figure A.2: Cloud of dots of days of contributions in line with the probability of receiving the self-employment cessation benefit.
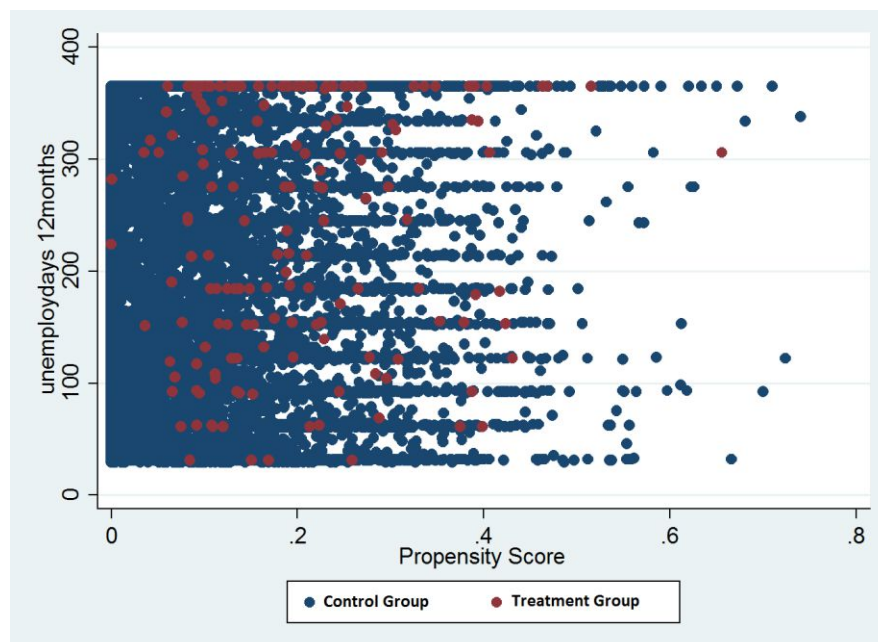
The matching algorithms not only differ in the way the "proximity zone" is defined for each individual treated but also in line with the weights assigned to these neighbours. The different types of algorithms that are used in this exercise are:

a.   Nearest neighbour matching.

b.   Radius matching.

c.   Kernal matching.

After the matching has been done, and when it is deemed to be of good quality, the estimator of the impact of the units treated can be specified as the weighted average of the difference of Y between the control units using the outcome of the PSM obtained from the participants. The classic estimation if cross-section data are available can be written as:

$$\alpha_D = E_{P(X)|D=1}\left[\left(Y^T|D=1,P(X)\right) - E\left(Y^C|D=0,P(X)\right)\right] \tag{4}$$

Where Y^T is the outcome value of the variable of interest, days for which contribution has been paid to the SS, if the person is a beneficiary of the self-employment cessation benefit, whereas Y^C is the value of the variable of the outcome for the individuals who do not receive the subsidy. More explicitly the treatment effect can be written as follows (Heckman, Ichimura y Todd, 1997):

$$\hat{\alpha}_D = \frac{1}{N_D}\sum_{i \in D}\left[Y_i^D - \sum_{j \in C}w(i,j)Y_j^C\right] \tag{5}$$

Where $w(i,j)$ is the weighting function whose value depends on the degree of proximity that exists between the treatment individual and the control individual. With this generic expression, we are going to see the estimator of the impact depending on the matching method used. In the following table, the results are shown of the estimation of the impact that the cessation benefit has on the number of days of contribution in the following year depending on the three approaches proposed previously.

Table A.2: Estimation of the impact of self-employment cessation on the days of contribution. PSM

PSM method	Number of individuals treated	Number of individuals controlled	Impact: $\overline{X}_{tratamiento} - \overline{X}_{control}$	Statistical t
Nearest neighbour	170	172	-35.71	-2.624
Kernel	170	27314	-32.45	-3.56
Radius	170		-32.11	-3.51

Therefore, self-employed workers who receive the cessation benefit show shorter subsequent self-employment periods, 33 days less than the other self-employed workers during the first year subsequent to the deregistration as self-employed workers.

Annex bibliographical references:

- Nickell, S, y R. Layard. (1999). "Labor Market Institutions and Economic Performance."In Handbook of Labor Economics.Vol. 3C, ed. OrleyAshenfelter and David Card, 3029-84. Amsterdam: Elsevier Science, North-Holland, 3029–84.

- Lalive, R. (2008). "How Do Extended Benefits Affect Unemployment Duration? A Regression Discontinuity Approach." Journal of Econometrics, 142, 2, 785-806.

ANNEX II. Benefit details.

Requirements for entitlement to the benefit:

a.   Be registered with the Social Security System and an active contributor.

b.   Have covered the minimum 12 months contribution period.

c.   Be in a legal position of cessation of self-employment.

d.   Not have reached the statutory age to become entitled to the contributory retirement pension unless the self-employed worker has not been able to prove the contribution period required for rit.

e.   Be up to date with payment of contributions to the Social Security system.

When is a person in the legal position of cessation of self-employment? As a general rule:

a) **When economic, technical, productive or organisational reasons exist concurrently**. If there is an establishment open to the public it will be required to close during the period of payment of the benefit or to be transferred to a third party. These reasons are deemed to exist if:

1/ Losses in a full year, higher than 10% of the revenue obtained in the same period, excluding the first year of start-up of the self-employment.

2/ Claims of debts owing by enforceable means that entail at least 30% of the revenue in the financial year immediately preceding the year in question.

3/ Legal filing for bankruptcy.

b) **Due to force majeure** as the determining factor for temporary of permanent cessation of the self-employment.

c) **Due to the loss of the administrative licence,** provided the licence is a requirement to carry out the activity and has not been lost because a criminal offence has been committed.

d) **Gender violence** as the determining factor of the temporary or final cessation of the self-employment.

e) **Due to a divorce or legal separation,** through a court ruling, whenever the self-employed person was performing the duties of family assistance in the business.

Due to involuntary cessation from the post of board member or director of a company or in the provision of services to it, whenever the company has made

losses amounting to more than 10% of its earnings or its net worth has fallen below two thirds of the share capital figure.

Economically dependent self-employed workers who cease to be self-employed because the contract they had with the client on whom they are economically dependent comes to an end will be in a legal position of cessation of self-employment.

In no event will those persons who voluntarily cease to be self-employed or interrupt their self-employment and the dependent self-employed workers who after their relationship with the client ends and after receiving the benefit enter into a contract again with the same client within one year from the time the benefit ran out be deemed to be in a legal position of cessation of self-employment or else they will have to pay back the benefit they have been paid.