Cessation of activity benefit of Spanish self-employed workers: a heterogeneous impact evaluation

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Abstract

The goal of this paper is to evaluate the effects of a public policy implemented through the Spanish Social Security system: the Cessation of Activity Benefit (CAB) for self-employed workers. Making use of the Continuous Sample of Working Lives (MCVL) and by means of a Propensity Score Matching (PSM) methodology, our results show that, when we do not take into account heterogeneity in the treatment, self-employed workers receiving CAB experience non-employment spells between 22 and 33 logarithmic points longer than their not entitled counterparts. We also detect that this difference is not constant but depends on the likelihood of being treated. We believe that the two traditional problems that affect the insurance markets, consequence of the asymmetric information, adverse selection and moral hazard, are behind these results.

JEL codes: J08, J64, J65, K31, D04

Keywords: Self-employment, Impact Evaluation, Propensity Score Matching, Opportunistic Behavior.

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1. Introduction

The main goal of this paper is to evaluate the effects of a public policy implemented through the Spanish Social Security system: the specific system of protection due to cessation of activity of self-employed workers or Cessation of Activity Benefit (CAB). More precisely, in this research we focus on the effects of duration concerning spells of non-employment of Spanish self-employed workers who receive CAB. The evaluation of public policies is a question increasingly important within the European Union agenda, and Spain is not the exception. Furthermore, the results obtained in this piece of research are particularly relevant since the Social Security budget is nowadays a hot political issue in Spain and other European countries. Public administration finances are currently under public scrutiny due to the question of their sustainability. The conclusions achieved in this article could help remove inefficiencies in the assessed policy, which in turn would contribute to improved management of the Social Security budget.

In any case, we strongly believe that the evaluation has to be rigorous, and with this aim in mind, we make use of impact evaluation techniques in order to obtain the results and the economic policy recommendations. To be more specific, the methodology used is Propensity Score Matching (PSM). This technique allows us to establish a "correct comparison" between treated individuals by the policy and their non-treated counterparts. By "correct comparison" we mean that we eliminate the selection bias conditioned to the observable variables included within our database. Thus, by means of this quasi-experimental econometric technique we would be getting closer to the idea of a random experiment, which is considered the best option to evaluate a policy, but in few occasions can be carried out. It is also worth mentioning that we not only estimate the average impact of public intervention, but also the heterogeneous effects as a consequence of the different likelihood of being treated. This methodology, originally proposed by Lechner (2002), provides us with some relevant insights.

We use the Continuous Sample of Working Lives ("Muestra Continua de Vidas Laborales", MCVL), a microeconomic dataset based on administrative records. This database allows us to analyze the labor trajectories of self-employed workers after a cessation of activity event. The period from the cessation of activity to a new appearance in the MCVL records as a self-employed worker, as a salary worker or as an individual receiving a retirement pension is considered non-employment time. It is worth mentioning that the concepts "unemployment" and "non-employment" will be used as synonyms throughout the paper, despite the fact that the former has an active job-search connotation whereas the latter does not. The MCVL records do not allow us to know if such active job-search is going on, but it is possible to identify jobless spells for the analyzed individuals. This

is why we employ both concepts as synonyms to label those individuals without a job (regardless their job-search activity).

The CAB program, which will be explained in detail later, is essentially a public insurance system. Its main objective is to provide self-employed workers with an income in the event that the cessation of activity occurs. At first glance, this program may be conflated with unemployment benefits (UB) that wage earners receive when they experience an unemployment episode in their labor history. And it is true that this public insurance shares some common features with unemployment benefits. Nonetheless, the CAB has its own distinct characteristics. To better understand this we briefly review the two well-established problems affecting insurance markets, consequence of the information asymmetry between the insured and the insurer: adverse selection and moral hazard.

In this context, the first one, adverse selection, would entail that "low-quality" self-employed workers would have greater economic incentives to take out an insurance policy than "high-quality" self-employed workers. Evidently, by "low-quality" we mean those self-employed workers with a higher likelihood of failure in their business ventures. As mentioned, the CAB is a public insurance, however it should also be pointed out that self-employed workers could choose to enter the insurance scheme by paying the corresponding insurance fees, or opt out of it. This feature implies an important difference when it is compared to the UB for wage earners, due to the fact that the Social Security compels both the firm and worker to pay a premium for it in the form of payroll taxes. Therefore, there is neither willfulness nor discretional ability in this second case. The result of this institutional characteristic of the CAB is that the problems linked to adverse selection might be potentially serious, whereas they should be theoretically negligible within a compulsory insurance scheme like the unemployment benefit.

Moral hazard is the second issue. Here, we refer to this concept as the change in self-employed worker's behavior due to the fact of being insured. Indeed, the self-employed worker might carry out opportunistic behavior attempting to take advantage of the public insurance scheme. We deem that three different types of moral hazard could be operating associated with the CAB: (1) "ex ante incidence moral hazard", this entails some self-employed workers covered by the insurance making risky decisions, bankruptcy being a greater likelihood (triggering the cessation of activity); (2) "ex post incidence moral hazard", which would imply that those insured self-employed workers could cease their activity more easily (within their leeway) than those without insurance coverage; (3) "ex post duration moral hazard", which would lead to an "unjustified" lengthening of the non-employment period in the case of those self-employed workers under the CAB coverage. Due to the main aim of this paper, the last type of moral hazard is the one that concerns us. However, the other two categories of moral hazard could affect our results as well.

According to the theoretical effects mentioned above, we might expect the existence of opportunistic behavior among some self-employed workers covered by the CAB. To put it in other words, we could anticipate a higher incidence of cessation of activity events and longer non-employment spells when comparing individuals covered by the insurance to those without coverage. Our main interest is precisely this second dimension. We may state that our empirical evidence points in that direction: on average, self-employed workers under the CAB coverage remain non-employed between 22% and 34% more time than those without this insurance scheme.

As far as we know, this is the first impact evaluation of the CAB program for Spain. What is more, to the best of our knowledge, this is the first impact evaluation of a similar program in Europe. Although there is some literature analyzing different aspects of self-employment and its consequences for the Spanish labor market, both from a microeconomic perspective (e.g. Cueto and Mato, 2006; Muñoz-Bullón and Cueto, 2011; Cueto et al., 2017) and from a macroeconomic standpoint (e.g. Congregado et al., 2010; Carmona et al., 2012; Congregado et al., 2012; Cueto et al. 2015), none of these papers has addressed the topic studied here. From a wider geographical viewpoint, there have been some authors who recently have examined, by means of quasi-experimental designs, public policies promoting self-employment as a way out of unemployment (e.g. Baumgartner and Caliendo, 2008; Caliendo, 2009; Rodriguez-Planas and Benus, 2010; Caliendo and Künn, 2011, 2014; Behrenz et al., 2016; Caliendo et al., 2016). However, this strand of research, although sharing the same group analyzed here (self-employed workers), has a very different goal. Our interest here coincides much more with that of the literature examining the effects of the UB on the duration of unemployment spells in the case of salaried workers (Carling et al., 2001; Røed and Zhang, 2003; Van Ours and Vodopivec, 2006; Lalive et al., 2006; Card et al., 2007; Lalive, 2008; Uusitalo and Verho, 2010; Schmieder et al., 2012; Rebollo-Sanz and García-Pérez, 2015; Rebollo-Sanz and Rodríguez-Planas, 2016). Nonetheless, and as mentioned above, our goal here is rather different from the previous studies. The particular institutional characteristics of the CAB program make this impact evaluation particularly appealing for policy makers due to the implications for the Social Security budget.

The rest of the work is organized as follows. Section 2 depicts the institutional framework in which this public policy is implemented. Section 3 reviews the related literature. The database we use is discussed in section 4. In section 5, the methodology employed is explained. Section 6 is devoted to a preliminary descriptive analysis. The main results obtained are shown in section 7. Section 8 summarizes and concludes.

2. Institutional Framework

The policy to be evaluated is the CAB. *Law 32/2010, of August 5* (developed by *Royal Decree 1541/2011, of October 31*), which establishes a specific system of protection for Spanish self-employed workers, finishes the recent transformation of the legal standards for the promotion and support of self-employment in Spain. Previously, *Law 20/2007, of July 11, of the Statute of the self-employed worker*, had taken the first steps in this direction. It should also be noted that *Law 32/2010* was amended with the new Law on Benefit Societies (*Law 35/2014, of December 26, amending the consolidated text of the General Law of the Spanish Social Security system in relation to the legal regime of the Benefit Societies of Workplace Accidents and Occupational Diseases of the Spanish Social Security system*). Its regulatory development is still pending[1].

This legal standard is intended to provide some benefits in the case of total involuntary cessation of activities, either temporary or permanent, to Spanish self-employed workers affiliated with and enrolled in the Special Regime for Self-Employed Workers (RETA, in Spanish) or in the Special Regime for Workers of the Sea. In both cases, however, there is a requirement: to have paid for the above-mentioned benefit[2]. In this sense, it could be said that the benefit examined shares the same objectives as the ones for the unemployment benefits of people employed by someone else (more simply, the so-called salaried workers).

Nevertheless, there are also some remarkable differences between these two social protection systems. One of them is the voluntary nature of the CAB scheme, that is, regarding the question of the subscription, the self-employed workers have to make a decision: to pay contributions or not. In this regard, it should be noted that the CAB program is exclusively financed by the tax collection from the contributions of this group.

Initially, the coverage of the protection by cessation was linked to the protection of the professional contingencies of the self-employed workers, that is, those workers who paid contributions for professional contingencies had to do it by cessation of activity as well. Nonetheless, the amendment of the Law on Benefit Societies, approved in 2014 (*Law 35/2014, of December 26*) changes this aspect and makes the protection voluntary. There is no doubt that this legislative modification may result in important economic effects. The starting link between the protection for professional contingencies with the one related to cessation of activity made it possible to increase the number of people covered and to diversify the risk associated to the contingency of the cessation. After the reform, is likely to observe a

1 See Moral-Arce (2016).

2 The RETA offers coverage to workers who perform a regular, personal and direct economic activity for profit, without being subject to a work contract.

reduction in the number of contributors and an increase in the incidence of the benefit.

The compensation of interest is managed by mutual insurance companies, partners of the Spanish Social Security, the Spanish Public State Employment Service (SEPE, in Spanish) and the Spanish Social Institute of the Navy. These mutual insurance companies are responsible for protecting workers who are affiliated with them (approximately 89% of the people covered by the CAB system). The entity charged with overseeing those workers not affiliated with a mutual insurance company is SEPE (about 9.5% of the workers covered) or the Social Institute of the Navy in the case of workers from the Special Regime of the Sea (the remaining 1.5% of the workers covered). A remarkable fact is that this shared management, between the Spanish Social Security System and the SEPE, is an exception with respect to other benefits.

Bearing in mind the importance of the mutual insurance companies working together with the Spanish Social Security in the management of the CAB scheme, it would be necessary to clarify that they are associations of entrepreneurs of a private nature, non-profit, whose exclusive purpose is to collaborate in the administration of the following benefits for workers: (1) Economic and health benefits derived from occupational contingencies (workplace accidents and occupational diseases); (2) Economic benefits of temporary disabilities for common contingencies; (3) Risk-benefits during pregnancy and breastfeeding; (4) Child-care benefits in case of cancer or serious illness; and (5) Benefits for the cessation of activities of self-employed workers.

In the development of this collaboration they manage contributions of the system that are regularly transferred from the Spanish General Treasury of Social Security. On the other hand, they are also assigned some real estate of the Spanish Social Security. At present, there are twenty mutual insurance companies of this type.

Regarding the requirements to receive the benefits analyzed, we should point out that the following five criteria must be met simultaneously: (1) to be enrolled in the Spanish Social Security system; (2) to cover the minimum period of contribution (12 months); (3) to be in legal status of cessation of activity; (4) not having reached the stipulated age to qualify for the retirement pension, unless the self-employed worker had not proved the required period of contribution; and (5) to be up-to-date with Spanish Social Security contributions.

Therefore, a key legal concept to receive the CAB is *"to be in legal status of cessation of activity"*. In general, this situation occurs in the following scenarios: (1) By the concurrence of economic, technical, productive or organizational reasons. In case of an establishment open to the public, it will be required to close it during the receipt of the service or

its transmission to third parties. It is understood that these motives are fulfilled if they exist (or it exists): (1a) Losses in a full year, exceeding 10% of the incomes obtained in the same period, excluding the first year of beginning of the activity; (1b) Claiming of debts by taking administrative steps if it involves, at least, 30% of the incomes from the previous year; or (1c) judicial declaration in case of bidding process. (2) By *force majeure*, determinant of the temporary or definitive cessation of the activity. (3) Loss of administrative license, provided that it is a requirement for the exercise of the activity and is not motivated by the Spanish commission of criminal infractions. (4) Assumptions of gender violence when they involve the cessation of activity (either temporary or definitive). (5) By divorce or marital separation, by means of judicial decision, in the cases in which the self-employed worker can take advantage of family allowances for assistance in the business. (6) By involuntary cessation in the position of adviser or administrator of a company or in the rendering of services to it, when the company has incurred losses above 10% of its incomes or has decreased its net worth below two thirds of the social capital. (7) The economically dependent self-employed workers who cease their activity by terminating the contract signed with the client on which they depend.

It is necessary to clarify that in no circumstances will it be considered a legal situation of cessation of activity for those workers who cease, or voluntarily interrupt, their activity. Nor will it be considered legal if the dependent self-employed workers who, after finishing their relationship with the client and receive the benefit, re-contract with the same client within one year from the moment the benefit is exhausted. In such a case they are required to refund the benefit received.

Finally, it is worth highlighting two characteristics of the CAB scheme: the amount and the duration of the service. In connection with the amount, it should be pointed out that the right that makes a self-employed worker eligible for the CAB includes an economic compensation and the payment of social security contributions for common contingencies and temporary disability. In general, the amount of the benefit is 70% of the average of the contribution bases of the previous 12 months of the activity with a limit that varies according to the family burdens.

However, there are maximum and minimum limits that are based on the Public Indicator of Multiple Effects Income (IPREM, in Spanish) and the number of children supported by the self-employed worker. Table 1 summarizes this casuistry.

[Insert Table 1 here]

As regards the second of the points previously mentioned, it should be noted that the duration of the benefit depends on the period of contribution and the age of the self-employed worker. In order to determine the period of coverage, the contribution of the 48 months prior to the cessation of activity

is taken into consideration. Of this total, 12 months must be continuous and immediately previous to the cessation. Moreover, two different situations can be identified: the general case and the one of self-employed workers over 60 years old.

Table 2 shows the relationship between the period of contribution and the period of protection in the two situations already described.

[Insert Table 2 here]

3. State of the art

This paper is related to several strands of literature. On the one hand, this piece of research contributes to the pool of knowledge concerning the effects of self-employment on the overall labor market. On the other hand, we could also affirm that, due to the empirical methodology employed here, our paper is linked to that relatively recent literature making use of quasi-experimental designs to obtain the results. In this sense, it might be stressed that there are a number of new papers that analyze the self-employment start-up programs as a way out of unemployment by means of this type of methodology. Furthermore, it could be stated that this work is even more connected with the bibliography analyzing the disincentive effects of public insurance schemes in the labor market. The bibliography examining opportunistic behavior of salaried workers when receiving UB is substantial. In contrast, this paper is a contribution to the scant research on the opportunistic behavior carried out by self-employed workers when receiving a public benefit while not working.

According to the conventional view, one person decides to become self-employed by comparing costs and benefits of doing so (see, for instance, Rees and Shah, 1986; De Wit and Van Winden, 1989; Johansson, 2000; Hammarstedt, 2006; Hammarstedt and Shukur, 2009; Congregado et al., 2012). Within this theoretical framework, it is common to distinguish between "opportunity entrepreneurs" and "necessity entrepreneurs". The former are individuals who become self-employed as a consequence of "pull" factors, i.e. where the aim for doing so is to explore business opportunities (see, for example, Dennis, 1996; Blanchflower and Oswald, 1998; Dawson et al., 2009; Millán et al., 2014). The latter are workers that go into self-employment because of the lack of alternative employment opportunities, that is, due to what the literature has labelled "push" factors (e.g. Storey and Johnson, 1987; Persson, 2004; Congregado et al., 2010; Dawson and Henley, 2012).

Self-employment is at the same time an important part of total employment in the labor markets of most countries. Based on figures from the OECD, we may state that 16.1% of total employment is made up of self-employed workers in the EU28 in 2015, being that percentage 15.6% in the

Eurozone and 17.3% in Spain. Perhaps because of this quantitative importance, the analysis of the effects of entrepreneurship in the labor market has attracted much attention in recent research. A variety of aspects regarding self-employment have been investigated, both from a macroeconomic and a microeconomic perspective.

From a microeconomic standpoint, and with a European perspective, we found some papers studying the relationship between self-employment and the labor market. Román et al. (2011) analyses whether the strict regulation of employment protection encourages employers to contract out work to their own paid employees by the formula of dependent self-employment, of which evidence was found. Millán et al. (2012) investigates the determinants of self-employment survival in Europe. One of their findings is that entering self-employment from unemployment has a strong negative effect on survival within self-employment. Román et al. (2013) questions whether start-up incentives are really an entrepreneur policy or rather an active labor market program. In conducting that research, they investigate the underlying determinants of an individual's decision to switch from unemployment to self-employment in Europe and highlight three essential dimensions: (1) the existing heterogeneity within self-employment (employers vs. own-account workers); (2) the effects of different measures of social capital and network contacts; (3) the explanatory power of cross-country differences in the state of the economy. Finally, Millán et al. (2014) make a clear distinction between entrepreneurs (employers) who hire employees and entrepreneurs without personnel (own-account workers). Their work discovered different determinants for entrepreneurship survival in Europe in both groups with important policy implications.

Regarding the literature that particularly addresses the Spanish case, also from a microeconomic standpoint, the pioneering work by Cueto and Mato (2006) examines the determinants of continuity of subsidized self-employment activities by means of duration models in a region of Spain (Asturias). Their results establish that the most significant variables explaining survival are age, industry, and the unemployment rate. Muñoz-Bullón and Cueto (2011) study the survival of start-up firms among former wage workers in Spain. With regard to their conclusions, it might be highlighted that a higher survival rate in self-employment is associated with men, prime-age workers, and individuals with higher previous labor turnover. Finally, Cueto et al. (2017) evaluate the impact of a Spanish program fostering self-employment for unemployed youth workers. The main result obtained is that the program has no effect in terms of survival rates.

Now, examining the macroeconomic perspective, the work by Parker et al. (2012) is an example of how entrepreneurship rates might affect aggregate outcomes in the labor market. The authors investigate the hysteresis hypothesis in the rates of non-agricultural self-employment (entrepreneurship) for 23 OECD countries covering the period from 1972 to

2006. They concluded that shocks have highly persistent but not permanent effects on entrepreneurship. As regards the Spanish case, Congregado et al. (2010) analyze whether the labor market policy of encouraging unemployed individuals to start their own businesses is a good strategy. Their results suggest that very few own-account workers succeed in finding safe wage jobs during boom conditions so that the stock of (marginal) own-account workers may become too large during less prosperous phases of the business cycle due to a strong recession push effect. In a similar vein, Carmona et al. (2012) study the relationship between self-employment and output growth. They find that the relation between self-employment and the business cycle differs across two components of self-employment, that is, employers and own-account workers. Notwithstanding, the authors also found that entrepreneurship promotion policies oriented to encourage the emergence of new job creators may be a cornerstone of a new strategy to combat unemployment. In a comparative work between the US and Spain, Congregado et al. (2012) discovered evidence of hysteresis in the Spanish rate of entrepreneurship whereas there is no signal of that pattern in the US. Finally, Cueto et al. (2015) take into account the spatial dimension in the relationship between self-employment and unemployment. They argue that entrepreneurship activity in each region depends not only on its own endowment but that the entrepreneurship environment may exert some influence. Nonetheless, their empirical outcomes reveal that both the direct and indirect effects are relatively small. Anyhow, the authors also conclude that if unemployment grows in neighboring regions, incentives for entering self-employment increase, implying that there is a 'refugee' effect.

As mentioned above, there is also emerging literature analyzing self-employment start-up programs as a way out of unemployment by means of quasi-experimental designs. From an international perspective, and organizing the review by country, we can summarize the evaluation of these kinds of programs as follows. Meager et al. (2003), for the UK, carries out a longitudinal study of young people getting business start-up support. They analyze the impact of the program for the participants on the successive labor market outcomes. In order to do this, they applied a matching methodology. However, they found no evidence that entry into self-employment (through any sort of subsidy or assistance) had a significant impact on the subsequent job search for participants.

In the case of Germany, three papers should be highlighted. Baumgartner and Caliendo (2008) conduct a study on West Germany and evaluate the success of two German programs aimed at encouraging unemployed individuals to become entrepreneurs. Their results show that the two start-up proposals had a positive effect. Among other facts, they observe that the unemployment rate of those who participated in the program, at the end of its implementation, was lower than that of the people who remained in the control group. Caliendo (2009) examines again the impact of these two programs, but now for the case of East Germany (a region that accumulated a large amount of investment in active labor

market policies though with few results). The author concluded that the implemented program was once more successful, displaying an improvement in the likelihood of finding a job and in the level of earnings of participants. Finally, the third work of interest as regards Germany is Caliendo and Künn (2011). The authors touch on one of the most important aspects of the recent active labor market policies developed in some OECD countries: the transition from unemployment to self-employment. Through the PSM technique, and by using administrative and survey data, they observed that around 80% of the participants in the program received a comparatively higher income five years after its implementation.

For the data on Argentina, Almeida and Galasso (2010) evaluate a self-employment program that provides financial and technical assistance. Their findings, in the short run, and studying non-experimental methodologies, do not offer conclusive results in favour of the program. On the other hand, for the case of Romania, Rodriguez-Planas and Benus (2010) study the effects of four different programs. By using the PSM method again, these authors find some relevant results for three of the four programs analysed, basically, they find an enhancement in the economic outcomes examined for participants. Another paper of interest is Michaelides and Benus (2012), concerning the case of the United States. They perform an experimental design to study the effectiveness of giving self-employment training to unemployed and other individuals interested in self-employment. The evidence found leads us to conclude that the program, supported by Project GATE data, was effective, among other considerations, in helping the unemployed to start their own business. Lastly, it is worth mentioning the work of Behrenz et al. (2016) for Swedish data. Resorting to matching techniques (as do several of the targeted studies) and by using administrative data, they assess the Swedish self-employment start-up program. Their results reveal that the start-up subsidy program for unemployed individuals is a successful program as it improves the integration level of the unemployed in the labour market. The authors also noticed that this improvement was greater in the case of the unemployed with a low level of education.

From a more general perspective, the following papers could also be considered. Caliendo and Künn (2014), where the authors delve into an issue not examined to date: the potentially heterogeneous effects of start-up programs across regional labor markets. They present evidence demonstrating that not only the process of founding and development of firms, but also the effectiveness of the program, are affected by the prevailing economic conditions at the time of the start-up. Caliendo et al. (2015) make special emphasis on the start-up subsidies from a business perspective, a question scarcely studied. For this purpose, they compare subsidized start-ups of people coming out of unemployment with regular business founders with respect to personal characteristics and business outcomes. Among their main results, they observed that projected deadweight losses linked to start-up subsidies happen on a lower proportion

than typically supposed. Finally, Caliendo et al. (2016) examine, by using thorough administrative-survey data, the importance of taking into account the (commonly) unobserved personality characteristics or measures in the evaluation process. They not only find significant positive effects in the return to the labor market, they observed income gains in the new program as well. Additionally, they note that their results, including and excluding these characteristics, hardly differ. Consequently, one of the key points of the study is the one relative to the potential or possible overestimations of the program's effect when we omit these measures in these sorts of analyses.

The third strand of literature influencing this piece of research is the analysis of the disincentive effects of public insurance schemes in the labor market. The effect of UB on the duration of unemployment spells in the case of salaried workers is a topic widely studied within the labor economics field. At the aggregate level, some papers making use of macroeconomic data establish a clear relationship between the generosity of UB and the unemployment level. Thus, for instance, Layard et al. (1991), employing cross-sectional data from 20 OECD countries, estimate that a 10 percent increase in the UB replacement rate leads to a 1.7 percent rise in the unemployment rate. Other studies, referring to the same group of industrialized countries, offer a comparable outlook. Thus, Scarpetta (1996) estimates an elasticity of unemployment with respect to UB of 0.13, Nickell (1997) finds that elasticity to be 0.11 and Bassanini (2006) equal to 0.12.

The microeconomic literature is more extensive. Two articles reviewing the bibliography on this subject are Atkinson and Micklewright (1991) and Pedersen and Westergård-Nielsen (2000). This early microeconomic literature uses cross-sectional variability in UB to draw the main conclusions. The empirical evidence obtained detects important effects of UB in the United States and UK, and weaker, or no significant effects in Continental Europe. Thus, in most studies for the U.S., the elasticity of unemployment with respect to UB is estimated to be within the range of 0.3 to 0.9 (Holmlund, 1998). On the other hand, the disincentive effects of UB on the unemployment outflow rate are found to be dependent on the duration of the unemployment spell itself (Nickell, 1979; Fallick, 1991). Some classical works examining the relationship between the unemployment outflow rate and UB are Ham and Rea (1987), Meyer (1990) or Katz and Meyer (1990), for the Canadian and U.S. cases. The seminal works on this question for the European case are Hunt (1995), Carling et al. (1996) and Winter-Ebmer (1998). A common denominator in the results of this literature is that when the entitlement for receiving the UB compensation is close to expiring, the likelihood of finding a job increases disproportionately.

After this early microeconomic literature, new developments in econometric techniques have tried to isolate the true causal effect by means of quasi-experimental econometric methodologies, such as the "differences-

in-differences estimator" or the "discontinuity regression design". A first example of this sort of work, for the U.S. case, is Card and Levine (2000). There are also some very relevant papers for the Nordic countries in Europe, like Carling et al. (2001) for Sweden, Røed and Zhang (2003) for Norway, or Uusitalo and Verho (2010) for Finland. Central European countries have also been a good "laboratory" for these types of quasi-experiments. The works by Van Ours and Vodopivec (2006) for Slovenia, Lalive et al. (2006), Card et al. (2007) and Lalive (2008) for Austria, and Schmieder et al. (2012) for Germany are some examples of this kind of research. The main conclusion that may be drawn from these works is that there are significant effects on the unemployment duration if the replacement rate or the potential benefit duration (PBD) changes. As a result, and "on average", we could affirm that an extension of the PBD lengthens unemployment duration by about 20% of such PBD time extension. On the other hand, the elasticity of unemployment duration with respect to UI is estimated to be in the range of 0.4 to 1.0.

Regarding the papers for the Spanish case, an early reference within this experimental or quasi-experimental literature is Bover et al. (2002). In this work, the authors exploit a labor reform implemented in Spain in 1984 which legalized the use of fixed-term contracts, thereby creating a type of worker with much less UB benefits than those workers enjoying open-ended labor contracts. According to their view, this legal change produced a situation close to a random assignment. Their main finding, in the authors' own words, is that "*at an unemployment duration of three months – when the largest effects occur – the hazard rate for workers without benefits doubles the rate for those with benefits"*. Secondly, Rebollo-Sanz and García-Pérez (2015) examine the difference in the job-finding probability between workers who receive benefits and those who do not, for a database ranging from 2002 to 2007 and using the timing-of-events approach. Their results are that the likelihood of finding a job for a worker receiving UB is between 10 and 20 percentage points lower than that of non-receivers for the first months of the unemployment spell. In an even more recent paper, Rebollo-Sanz and Rodríguez-Planas (2016), using a diff-in-diff approach, find that reducing the replacement rate by 10 percentage points (or 17%) increases workers' likelihood of finding a job by at least 41% with respect to identical workers not affected by the policy reform implemented on July 15, 2012. Such a reform reduced the replacement rate from 60% to 50% after the first 180 days of the unemployment spell.

In a nutshell: incentives clearly matter. The job-seeking behavior of individuals is influenced both by the level and the entitlement duration of UB. Our work is related to this sort of literature which makes use of econometric techniques that intend to get close to what would be a pure random experiment. However, our methodological proposal in this paper is slightly different. We make use of the PSM methodology to obtain the main results, which is a novelty in this sort of research. Furthermore, this is the first quasi-experimental study of a program like CAB in Europe. To the best

of our knowledge there is no other impact evaluation assessing the disincentive effects of job search behavior for self-employed workers.

4. Database

The data used in this study comes from the MCVL, as mentioned in the introductory section. This statistical source was created in 2004 by the initiative of the Secretary of State of the Social Security belonging to, what then was denominated, Ministry of Work and Immigration. The MCVL offers information regarding the population distribution for a given year according to different socioeconomic characteristics registered in the administrative records of the Social Security. By processing this information, it is possible to build the labor history of individuals in the sample, which is a key feature for the purposes of this research.

The MCVL design took into account the labor population in a broad sense when elaborating the microdata. Individuals registered as employed or receiving a contributory pension from the Social Security at any time in a given year were included. That means that two different situations are taken into consideration: employed persons and pension beneficiaries. Moreover, and due to the methodology of the database, both situations may occur successively or simultaneously. Another point that has to be raised is that those individuals that have had a relationship with the Social Security administration at any time within a year (not at a given date) are borne in mind. Thus, it is probable that those persons with regular labor activity but that frequently enter or exit the Social Security records can be found in the database.

It is also worth clarifying that the criterion to include an individual within the MCVL is to be actively earning income, and not so much to be part of the labor force in the sense of accomplishing the requirements established by the International Labor Organization (ILO) as, for example, the active population in the EU-LFS conducted by Eurostat. Four distinct groups might be identified (López-Roldán, 2011): (1) employed workers registered in the Social Security system (both wage earners and self-employed workers); (2) Social Security payers not working (the so-called "special agreement", temporary disability and recipients of non-contributory UB); (3) contributory pension beneficiaries (retirement, permanent disability), including those generated by the Obligatory Old-Age and Disability Insurance (Seguro Obligatorio de Vejez e Invalidez, SOVI) and the survival pensions (widowhood and orphan hood); and (4) those persons receiving UB. In a nutshell, in the MCVL it is possible to find both economic active persons (according to LFS criteria) and inactive individuals (provided they maintain an administrative relationship with Social Security).

In this research, we have made use of the MCVL 2015. We have checked the affiliation episodes to the RETA finished in the period 2011-

2015. It is also noteworthy that we have focused on the "deregistrations" from the RETA recorded in the Model TA.0521[3]. Our outcome variable has been named *days until contribution* (DUC) and is defined as the logarithm of the number of days between the "deregistration" from the RETA and a new registration period as a self-employed worker. The explanatory variables used in the study are defined below in Table 3.

[Insert Table 3 here]

As regards the design of our quasi-experiment, we have included, on the one hand, those self-employed workers presenting one Social Security registration record corresponding to the CAB compensation. These individuals constitute our treatment group. On the other hand, our control group is made up of those self-employed workers who voluntarily withdraw from the RETA (code 51) with no compensation associated.

This second group has been selected with individuals sharing similar characteristics to those self-employed workers within the treatment group (i.e. individuals with similar features captured by means of the variables included in the MCVL like age, sex, industry, compensation entitlement, etc.), but with one difference: they do not pay contributions to the CAB program.

5. Methodology

The main goal of this work is to carry out an impact evaluation of a cessation benefit concerning self-employed Spanish workers, in order to determine its effects on the return to activity, measured by the variable DUC. The relationship between the product variable and the outcome variable is given by the following diagram:

$$D(cessation\ benefit) \rightarrow Y(days\ until\ contribution)$$

In our case, and taking into account that the allocation of individuals to the treatment group and the control group is not random, it is necessary to make use of quasi experimental designs that fix the selection bias. In this exercise, we apply the PSM technique. The objective of this method is to select a group of non-beneficiaries (self-employed workers that after cessation of activity do not receive benefits) that are as similar as possible to the beneficiaries (self-employed workers who do receive the benefit after the cessation of activity) except for the fact of participating in the program.

[3] Model TA.0521 is the one that allows process registration, "deregistration" and application changes in the RETA from the Social Security records. It is available from the web page of the Spanish Ministry of Employment and Social Security.

To assess the impact of the policy, we compare the periods of unemployment of both groups of self-employed persons and we estimate the causal effect of receiving the cessation benefit. The hypothesis testing that is carried out is as follows:

$$H_0: days\ non-employed_{treated} = days\ non-employed_{control} \quad (1)$$
$$H_1: days\ non-employed_{treated} \neq days\ non-employed_{control}$$

If the null hypothesis is not rejected, we would assume that a self-employed worker with a cessation benefit would not have discrepancies in periods of inactivity compared to those who did not receive such support. The estimation of the impact of the treatment, by means of PSM, can be described in three stages: (1) Propensity Score estimation, i.e. the probability of receiving treatment; (2) assessing the common support and balancing test and; (3) the impact estimation (average treatment on treated units) and its statistical significance (Pérez and Moral-Arce, 2015).

5.1. Estimation of the Propensity Score

In the first step, we estimate the probability of participation in the program, i.e. being beneficiary, of each individual in the sample. The variable of participation, *D*, refers to the self-employed worker who receives the benefit after the cessation of activity and only takes two possible values. Furthermore, this variable depends on a set of explanatory variables considered relevant (see Table 5). Because of the limited nature of the dependent variable (participation), the model specification is the following:

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

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

where *D** is the unobserved latent variable, *D* is the observed variable, that only takes two values: 1 if the individual is a beneficiary or 0 if the individual is not a beneficiary, *X* is the vector of observable explanatory variables and γ_0 and γ_1 are the parameters to be estimated. Assuming that the error term, *U*, follows an extreme value distribution, we estimate a logit model given by:

$$p(D_i|X_i) = \frac{exp(\gamma_0 + \gamma_1 X_i)}{1 + exp(\gamma_0 + \gamma_1 X_i)} \quad (4)$$

With the estimation of the parameters $\hat{\gamma}_0$ and $\hat{\gamma}_1$ we obtain the estimated probability of each individual in the sample to receive the cessation benefit according to the observed characteristics *X*. This probability is the so-called Propensity Score.

5.2. Evaluating the quality of the matching

In this second stage, two assumptions must be tested: the "common support", which implies that the greater the degree of overlap between the treated group and the control group, the greater the quality of the impact estimation, and the "balancing test", assessing whether the two groups have similar average values in their observed characteristics. If both requirements are fulfilled, we would be able to guarantee that the estimates made through the PSM technique will have good statistical properties.

5.3. Estimation of the average impact of public intervention using the PSM

After estimating the Propensity Score, the impact estimator on treated units can be specified as the weighted mean of the difference in the outcome variable Y between the control and the treatment units. According to Heckman et al. (1997), the Average Treatment on Treated (ATT) is given by:

$$\hat{\alpha}_D = \frac{1}{N_T} \sum_{i \epsilon D} \left[DUC_i^T - \sum_{j \epsilon C} w(i,j) DUC_j^C \right] \tag{5}$$

where DUC^T refers to the value of the outcome variable for the beneficiaries of the benefit, DUC^C denotes the value of the outcome variable for those individuals who do not receive the program, N_T is the number of individuals in the treatment group and $w(i,j)$ represents the weighting function, whose value depends on the degree of proximity between the treatment individual and the control individual in the estimated Propensity Score obtained before. For the sake of comparability, in this work three weighting options are used: nearest neighbor matching, radio matching and kernel matching.

5.4. Estimation of heterogeneous effects

After estimating the average impact, we also analyze the heterogeneous impact of the CAB by applying the approach developed by Lechner (2002). More specifically, we estimate the conditional mean of DUC depending on the probability of receiving the benefit. The regression in the group of treatment would be:

$$\mathrm{E}\left(\mathrm{DUC_i} \middle| \mathrm{treated} = 1, \mathrm{ps}^4\right) \tag{6}$$

As for the control group, we would have:

$$\mathrm{E}(\mathrm{DUC_i} | \mathrm{treated} = 0, \mathrm{ps}) \tag{7}$$

[4] The abbreviation "ps" in equations (6), (7) and (8) stands for "propensity score".

The impact, depending on the probability of receiving the benefit, is calculated by the difference between the expressions (6) and (7), respectively:

$$\hat{\alpha}_D|\text{ps} = E(\text{DUC}_\text{i}|\text{treated} = 1, \text{ps}) - E(\text{DUC}_\text{i}|\text{treated} = 0, \text{ps}) \qquad (8)$$

where ($\hat{\alpha}_D|$propensity score) is the impact of receiving the benefit until the return to work. These conditional expectations are estimated by means of non-parametric regression methods.

6. Descriptive Analysis

This section includes a set of descriptive statistics of the treatment group, the self-employed workers who receive the benefit, and, subsequently, of the two groups of interest: the treatment group and the control group. Regarding the former group, the most relevant information concerns the period they collect the cessation benefit, which is shown in Table 4. This table was elaborated from the data of the MCVL2015 and for the years in which this policy was implemented.

On average, during the five years analyzed, the self-employed workers who subscribed to it have been receiving benefits for 116 days, which means, on average for the entire period of analysis, about four months. Moreover, the median value is 90 days. Analyzing the average benefit collection for each year, it can be observed that such a figure has been increasing as we approach the present. Thus, while in the first years it was just over two months, in 2015 it was around four months.

[Insert Table 4 here]

Additionally, we show the density function of the number of days that self-employed workers within the treatment group have been receiving some benefits (Figure 1). It is an asymmetrical distribution where most self-employed workers only receive the benefit for a few months (no more than 100 days) and only a few others manage to reach the maximum collection period of twelve months. Due to the asymmetry, it is satisfied that the mode is lower than the median and this, in turn, is below the mean.

[Insert Figure 1 here]

Once the average collection period of the benefit has been examined, information on the endogenous and explanatory variables for the two groups of interest in any impact evaluation (i.e. group of control and group of treatment) is provided. Table 5 shows a basic summary of the variables used in the study, differentiating between the two groups mentioned above. It also incorporates the test of difference between means that allows us to

analyze if there are significant differences between the two groups before applying the matching method.

[Insert Table 5 here]

In the present case, we observe some differences in several characteristics of the self-employed workers such as the age of cessation of activity, the one regarding the time of contribution condition, the education level, the number of months contributed or the region of residence.

Consequently, we do not know whether (or not) the differences existing in the outcome variable can be attributed to the reception of the benefit for the cessation of activity or to the disparities in the observed variables.

Similarly, Figure 2 shows the nonparametric estimator of the density function of our outcome variable, i.e. the one on which the impact of receiving the benefit is analyzed (DUC). This illustration is carried out by differentiating between the group of treatment and the group of control.

[Insert Figure 2 here]

The vertical line indicates the average number of days that self-employed workers receive the benefit, which are 116 days as it was established in Table 4. If instead of focusing on the average values we heed the behavior registered throughout the distribution, we find that both groups show remarkably different behaviors. This is so despite of the fact that the examination of the test of difference between means was indicating that there were no relevant divergences in statistical terms in the distribution's central value. We can highlight that the group of self-employed workers who do not receive the benefit need much less time to return to contributing, with a mode value much lower than the one perceived for the treatment group. Likewise, the vast majority of self-employed within the control group return to the contribution before the 500th day, while those who receive the benefit seem to delay the return to the contribution. However, this last fact is not indicative that receiving the benefit produces this behavior, since the exclusive effect of the program (receiving the benefit for cessation of activity) has not been isolated. In order to test whether there is a real causal effect is necessary to carry out a quasi-experimental design as we do in the following section.

7. Results

In the first stage of the PSM, we estimate the probability of a self-employed worker receiving the benefit after cessation of activity as a function of a set of some observed variables. The dependent variable of participating in the program (being a beneficiary) is represented by D_i, and it would equal 1 if the self-employed worker received the benefit and 0 otherwise.

From our database (i.e. MCVL2015), and using the econometric specifications given in (2) and (3), we get the results of Table 6, which shows the probit model estimation. There are several characteristics that increase the probability of being a beneficiary for cessation of activity, such as the age of retirement, the number of months of contribution, working in the industrial sector or having Spanish nationality, among others. On the other hand, there are some variables that reduce the probability of receiving the benefit, such as having secondary or higher education or living in certain Spanish Autonomous Communities (e.g. Catalonia, Murcia or Navarra).

[Insert Table 6 here]

Taking the probit estimates as a reference, we calculate the density function of being a beneficiary for cessation of activity differentiating again between the group of treatment and the group of control. Figure 3 shows that most of the observations are accumulated in the low probabilities of receiving the benefit, with values between 0% and 40% (the common support of the analysis). In the same way, the balancing test is verified, so that we can assume there are no differences in the explanatory variables between both groups.

[Insert Figure 3 here]

In the second stage, we estimate the impact of the program on the outcome variable: DUC. This variable can be considered as duration data, capturing the period until the individual changes his or her labor market status from non-contribution to return to work (and contribution). In this stage, we calculate the average difference of the variable DUC using the information given in Figure 4.

[Insert Figure 4 here]

Making use of this information, the impact of receiving the benefit for cessation of activity on a self-employed worker who stops working, compared to the labor market situation of not receiving this payment, is given by the estimator (5).

Table 7 shows the results of the impact estimate corresponding to the second stage of PSM. There is a delay in the return to work of 22 logarithmic points, using the nearest neighbor approach, and 33 logarithmic points of impact with the radius and kernel methods. The results are always statistically significant and provide a uniform impact according to the observed characteristics considered (and regardless of the probability of being a beneficiary).

[Insert Table 7 here]

Looking for heterogeneity, Figure 5 disaggregates the impact depending on the probability of receiving the benefit when a self-employed worker stops the activity. Put in other words, here we follow the approach developed by Lechner (2002). It shows the evolution of DUC for each group together with the corresponding confidence intervals (95% CI).

[Insert Figure 5 here]

Figure 5 (top graph) displays the outcome variable DUC, depending on the probability that the self-employed worker receives the benefit when he or she ceases activity. The black line represents the average value of DUC for the group of control, depending on the probability of receiving benefits. We can observe that it decreases linearly, from a starting value of 5.1 logarithmic days, for a zero probability of receiving the benefit up to 4.80, when the probability of receiving the payment is 0.6. Nonetheless, it should be pointed out that from a value of approximately 0.4 onwards the point estimates are not very precise in statistical terms. With regard to the group of treatment, represented by the red line, it can be noted that for those self-employed workers who stop working, the value of DUC is 5.4, which remains relatively constant until the individuals reach a probability of 0.4 of receiving the benefit. Afterwards, we observe that the value of DUC decreases considerably, with a minimum of 4.53. Again, it ought to be noted that our comments are made for point estimates. Notwithstanding, the relevance of Figure 5 is precisely to show the confidence intervals and thus the statistical precision of those point estimates, and it is clear from it that from likelihood values of 0.35 onwards those point estimates should be taken with some caution. This is so since the mass of individuals there is not very large and point estimates are less precise.

In order to study the impact of receiving benefits, it is necessary to analyze these figures considering a given value of the propensity. For this value, we compare the vertical difference between the red line and the black line, according to equation (8). This is the impact of receiving the benefit on the number of days to return to work, based on the probability of receiving the benefit when the self-employed person stops working. Comparing the vertical distance between the two lines, we detect that the impact increases slightly between the propensity score values between zero and 0.3. This is mainly because the control group regression (black line) shows a slightly negative trend. In other words, self-employed workers who do not receive the benefit, but that, according to their observed variables, were more likely to receive it when they ceased the activity, show a reduction in the outcome variable DUC. For this reason, the impact of being a beneficiary increases. For propensity values higher than 0.3, the impact is drastically reduced. This is mainly due to the fact that the self-employed workers of the group of treatment (red line) reduce the number of days until they go back to work.

Comparing this result of Figure 5 (top graph) with respect to those shown in Table 7, it is possible to state that heterogeneity is an important

issue. As can be seen in Figure 5, the impact is far for being constant throughout the likelihood of being treated. In fact, the constant point estimate of 0.33 logarithmic points obtained in Table 7, both in the case of the kernel and the radius, seems to be hiding important features. In order to delve into this question Figure 6 and Table 8 have been elaborated.

[Insert Figure 6 here]

[Insert Table 8 here]

In them we show the impact estimates for different probabilities together with their corresponding confidence intervals and the average impact estimate of 0.33 logarithmic points obtained in Table 7.

We focus our attention within the probability (of being treated) range of 0.05−0.30 since between those limits is where the point estimates seems to be more precise and reliable according to the confidence intervals. The impact is estimated to be about 30 logarithmic points for low probabilities of being treated. However, as such probability rises also does the impact. For instance, for values 0.15 and 0.20 (36 and 44 logarithmic points respectively) the estimated impact is already higher than the average impact estimated in Table 7 (33 logarithmic points). What is more significant, for probabilities of being treated of 0.25 and 0.30 the estimated impact reaches values of 63 and 64 logarithmic points, which practically doubles the average impact of 0.33. This non-constant impact of the CAB on the non-employment spells of self-employed workers is one of the main results of our research and it has important policy implications that will be discussed in the following section.

8. Conclusions

The central aim of this paper is to evaluate the effects of a public policy: the cessation of activity benefit (CAB) for Spanish self-employed workers. More specifically here we focus on the effects on non-employment duration spells observed for this type of workers. In a context of budget restrictions for the Social Security, it seems necessary to carry out periodic evaluations in order to verify the effectiveness of the measures and programs implemented. In this regard, the impact evaluation has recently been consolidated as an essential tool to advise policy makers in decision-making, as well as to define their priorities in the future. To the best of our knowledge, this is the first impact evaluation of the CAB program for Spain. Furthermore, as far as we know, this is the first impact evaluation of a similar program in Europe.

This CAB insurance system might be affected by adverse selection and up to three different kinds of moral hazard: (1) “ex ante incidence moral hazard”, (2) “ex post incidence moral hazard” and (3) “ex post duration

moral hazard". For all of these reasons we would expect that those self-employed workers being beneficiaries of the CAB experience longer non-employment spells compared to those not entitled. This is precisely what we find when by means of a PSM methodology and by using the MCVL we inspect our data.

More exactly, our results show that when we do not take into account heterogeneity in the treatment, self-employed workers receiving CAB experience non-employment spells 22 logarithmic points longer than their not entitled counterparts, when we adopt the nearest neighbor approach in the PSM procedure. When we implement the radius and the kernel approaches to the PSM that difference increases to 33 logarithmic points of impact. All these results are highly significant in statistical terms. Thus, the evidence obtained in this paper is quite coherent with the common result found in studies analyzing the effects of UB on unemployment spells for salaried workers. Put in other words, there is a powerful disincentive effect of public insurances on job-finding activities.

On the other hand, our empirical work not only assesses the average impact of the program but also allows for heterogeneity in the treatment. Put another way, we follow the approach developed by Lechner (2002) and take into account the likelihood of participation in the program according to the observed individuals' characteristics. Within the probability range of 0.05−0.30 (in which most individuals can be found) we find an increasing pattern of the impact. Likewise, the impact is estimated to be around 30 logarithmic points for low probabilities of being treated (i.e. for probabilities about 0.10) but that impact doubles when the likelihood of being treated is on the upper part of the previously mentioned limit (e.g. the impact is estimated to be 64 logarithmic points when the likelihood equals 0.3).

In order to conclude this paper, we briefly discuss three economic policy implications that can be attained from our empirical work. Firstly, we have identified a statistically significant opportunistic behavior carried out by self-employed workers as a consequence of the public insurance system implemented in Spain. This is important since, for the first time (as far as we know), the well-documented strategic behavior observed for salaried workers has been also detected for self-employed workers. Thus, the Social Security administration might have to put some effort into surveillance activities so as to avoid fraud. Secondly, we have measured the size of the problem. According to our estimates non-employment spells are artificially prolonged on average between 22 and 33 logarithmic points by entitled self-employed workers. Those figures might be used to calculate the financial cost of that opportunistic behavior. It is also important to know the monetary cost involved because the above mentioned surveillance activities are not free, and the Social Security administration ought to be efficient in allotting scarce resource devoted to fraud control. Finally, as it is clear from our outcomes that heterogeneity is an issue, and that the likelihood of being treated matters. We find that the impact on non-employment spells

increases as that probability rises. Our PSM estimates allow us to identify which socioeconomic factors raise the likelihood of being treated and so the Social Security Administration might make use of these results so as to target these socioeconomic groups more prone to develop an opportunistic behavior and, consequently, to watch them more intensively.

Tables

Table 1. Limits of the benefit for the cessation of activity

	% IPREM		Euros per month	
	Maximum	Minimum	Maximum	Minimum
General	175	80	1,087	497
One dependent child	200	107	1,243	665
Two dependent children	225		1,398	

Source: Own elaboration.
Note: IPREM 2016 increased by 1/6 amounts to 621.26 Euros.

Table 2. Duration of the benefit for the cessation of activity

Period of contribution (months)	Period of protection (general case)	Period of protection (>60 years old)
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 onwards	12 months	12 months

Source: Spanish Social Security system.

Table 3. Explanatory variables

Variable	Definition
Age not registered	Age when the individual stops being registered in the Social Security records within the CAB scheme.
Over60	Dummy variable taking value 1 when the individual has turned 60 years old when she stops being registered in the CAB scheme and 0 otherwise.
Contribution12	Dummy variable taking value 1 when the self-employed worker has been paying Social Security contributions in the last 12 months before her cessation in the CAB scheme.
Months contributed	Number of months contributed to the CAB scheme within the las 4 years.
Education	Dummy variable taking value 1 when the individual has completed a secondary or tertiary educational level and 0 otherwise.
Male	Dummy variable taking value 1 if the self-employed worker is a male and 0 if she is a female.
Spaniard	Dummy variable taking value 1 if the self-employed worker has been born in Spain and 0 otherwise.
Industry	9 dummy variables taking value 1 for the industry in which the self-employed workers carry out their economic activity and 0 otherwise. The industries considered are: (1) Agriculture (and fishing); (2) Manufacturing; (3) Commerce; (4) Transportation; (5) Hostelry; (6) Computing; (7) Banking; (8) Consulting. The industry of reference used is a mixture of construction, education, health, as well as economic activities with a coding value higher than 88 in the Spanish National Classification of Economic Activities (CNAE).
Region	16 dummy variables for the Spanish Autonomous Communities (regions) taking value 1 when the individual lives in that region and 0 otherwise. The region of reference is Andalucía.

Source: Own elaboration.

Table 4. Benefits for the cessation of activity of (treated) self-employed workers (number of days)

Year	Self-employed workers	Mean (Number of days)	Standard deviation
2011	4	61	2.7
2012	56	74.4	33.4
2013	80	118.4	47.8
2014	103	123.3	105.7
2015	101	133.3	119.9
Total	344	116.4	93

Source: Own elaboration from MCVL.

Table 5. Descriptive statistics and test of difference between means

	Group of control		Group of treatment		Test (difference in means)	
Variable	Mean	Standard deviation	Mean	Standard deviation	Estimator	p-value
Dependent variable						
Days until contribution (DUC)	262.351	339.489	269.415	203.123	7.064	0.740
Explanatory variables						
Age not registered	39.747	10.624	45.508	9.745	5.760	0.000
Over60	0.036	0.187	0.069	0.254	-2.603	0.009
Contribution12	0.084	0.277	0.126	0.333	0.042	0.030
Months contributed	6.600	9.241	8.959	11.622	2.359	0.000
Education	0.523	0.500	0.415	0.494	-0.108	0.000
Male	0.654	0.476	0.598	0.491	-0.056	0.121
Spaniard	0.766	0.424	0.890	0.313	0.124	0.000
Industry:						
(1) Agriculture (and fishing)	0.018	0.134	0.012	0.110	-0.006	0.436
(2) Manufacturing	0.053	0.224	0.077	0.268	0.024	0.074
(3) Commerce	0.244	0.430	0.260	0.440	0.016	0.801
(4) Transportation	0.032	0.176	0.041	0.198	0.009	0.367
(5) Hostelry	0.156	0.362	0.077	0.268	-0.078	0.008
(6) Computing	0.022	0.147	0.033	0.178	0.010	0.292
(7) Banking	0.026	0.160	0.024	0.155	-0.002	0.770
(8) Consulting	0.100	0.300	0.110	0.313	0.010	0.578
(9) Other[5]	0.001	0.028	0.000	0.000	-0.001	0.649
Region:						
Andalucía	0.162	0.368	0.215	0.412	-0.053	0.028
Aragón	0.019	0.138	0.016	0.127	-0.003	0.597
Asturias	0.016	0.124	0.028	0.167	0.013	0.117
Baleares	0.046	0.210	0.016	0.127	-0.030	0.037
Canarias	0.026	0.160	0.020	0.141	-0.006	0.619
Cantabria	0.009	0.097	0.012	0.110	0.003	0.851
Castilla y León	0.033	0.178	0.000	0.000	-0.033	0.487
Castilla La Mancha	0.044	0.205	0.041	0.198	-0.003	0.527
Cataluña	0.135	0.342	0.053	0.224	-0.082	0.047
Comunidad Valenciana	0.121	0.326	0.089	0.286	-0.031	0.404
Extremadura	0.016	0.124	0.102	0.303	0.086	0.271
Galicia	0.040	0.197	0.008	0.090	-0.032	0.316
Madrid	0.075	0.264	0.053	0.224	-0.022	0.174
Murcia	0.021	0.144	0.098	0.297	0.076	0.065
Navarra	0.004	0.063	0.004	0.064	0.000	0.057
País Vasco	0.029	0.167	0.012	0.110	-0.017	0.792
La Rioja	0.004	0.063	0.033	0.178	0.029	0.974

Source: Own elaboration from MCVL.

[5] See: Table 3.

Table 6. Probit estimation. Probability of receiving the benefit for cessation of activity (first stage of PSM)

Variables	Coefficient	Std. Error	t-stat	p-value	[95% Conf. Interval]	
Age not registered	0.0907	0.0356	2.55	0.011	0.0210	0.1604
Over60	-0.2259	0.1541	-1.47	0.143	-0.5280	0.0762
Contribution12	-0.2908	0.2195	-1.32	0.185	-0.7210	0.1394
Months contributed	0.0165	0.0062	2.65	0.008	0.0043	0.0287
Education	-0.2316	0.0649	-3.57	0.000	-0.3587	-0.1045
Male	-0.1520	0.0675	-2.25	0.024	-0.2843	-0.0197
Spaniard	0.4345	0.0933	4.66	0.000	0.2517	0.6173
Industry:						
(1) Agriculture (and fishing)	-0.3635	0.2779	-1.31	0.191	-0.9081	0.1811
(2) Manufacturing	0.1841	0.1319	1.40	0.163	-0.0745	0.4427
(3) Commerce	-0.0095	0.0830	-0.11	0.909	-0.1722	0.1532
(4) Transportation	0.0231	0.1778	0.13	0.897	-0.3254	0.3715
(5) Hostelry	-0.3611	0.1185	-3.05	0.002	-0.5934	-0.1288
(6) Computing	0.2569	0.1946	1.32	0.187	-0.1245	0.6383
(7) Banking	-0.2033	0.2084	-0.98	0.329	-0.6117	0.2051
(8) Consulting	-0.0123	0.1102	-0.11	0.911	-0.2282	0.2036
Region:						
Aragón	-0.1585	0.2448	-0.65	0.517	-0.6384	0.3213
Asturias	0.1403	0.2197	0.64	0.523	-0.2903	0.5709
Baleares	-0.3392	0.2188	-1.55	0.121	-0.7680	0.0896
Canarias	-0.0974	0.2192	-0.44	0.657	-0.5270	0.3323
Cantabria	-0.0370	0.2924	-0.13	0.899	-0.6102	0.5361
Castilla y León	0.0668	0.1705	0.39	0.695	-0.2674	0.4010
Castilla La Mancha	0.0448	0.1500	0.30	0.765	-0.2493	0.3388
Cataluña	-0.2560	0.1116	-2.29	0.022	-0.4747	-0.0373
Comunidad Valenciana	-0.1404	0.1087	-1.29	0.196	-0.3534	0.0726
Extremadura	-0.4105	0.3158	-1.30	0.194	-1.0294	0.2084
Galicia	-0.0111	0.1515	-0.07	0.942	-0.3079	0.2858
Madrid	0.0318	0.1188	0.27	0.789	-0.2011	0.2647
Murcia	-0.6097	0.3691	-1.65	0.099	-1.3332	0.1137
Navarra	0.6425	0.3494	1.84	0.066	-0.0424	1.3273
País Vasco	-0.0607	0.1839	-0.33	0.741	-0.4212	0.2998
La Rioja	-0.1434	0.5027	-0.29	0.775	-1.1286	0.8419
Constant	-2.7892	0.1872	-14.90	0.000	-3.1562	-2.4223

Source: Own elaboration from MCVL.

Table 7. Impact estimation of receiving the benefit for cessation of activity on the variable DUC (second stage of PSM)

	Nearest neighbor		Kernel		Radius	
Variable	Impact	t-stat	Impact	t-stat	Impact	t-stat
DUC	0.220	2.643	0.332	7.255	0.338	6.880
Individuals used in the calculations						
Treated units	N-N Control units		Kernel Control units		Radius control units	
246	229		4,761		3,862	

Source: Own elaboration from MCVL.

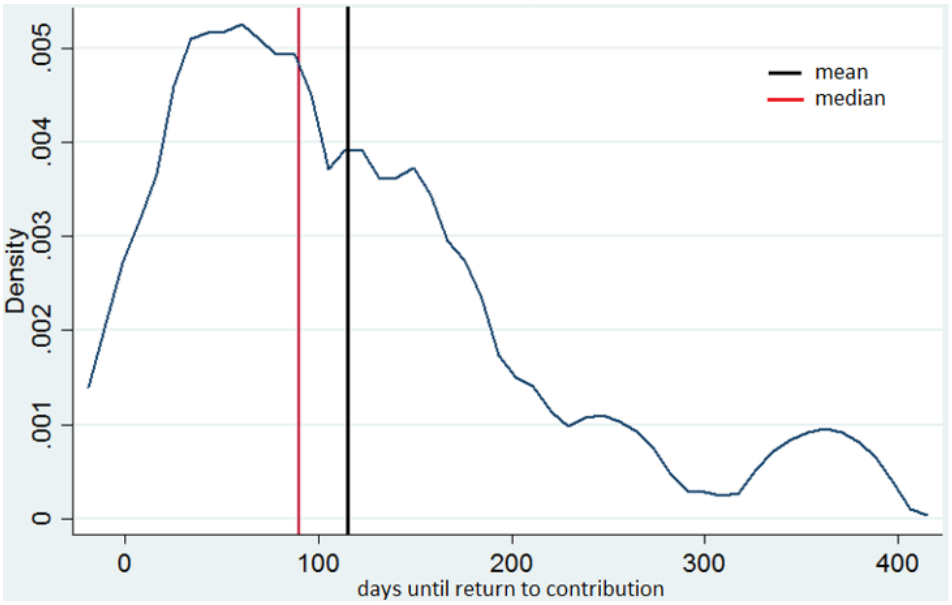
Table 8. Impact of CAB on DUC (probability of being a beneficiary)

Class mark / Midpoint	Impact	[95% Conf. Interval]		Average impact
0.05	0.307	0.023	0.674	0.332
0.10	0.269	0.085	0.437	0.332
0.15	0.357	0.169	0.548	0.332
0.20	0.435	0.179	0.634	0.332
0.25	0.634	0.276	1.016	0.332
0.30	0.638	0.350	0.924	0.332
0.35	0.219	-0.304	0.624	0.332
0.40	0.852	-0.171	1.880	0.332

Source: Own elaboration from MCVL.

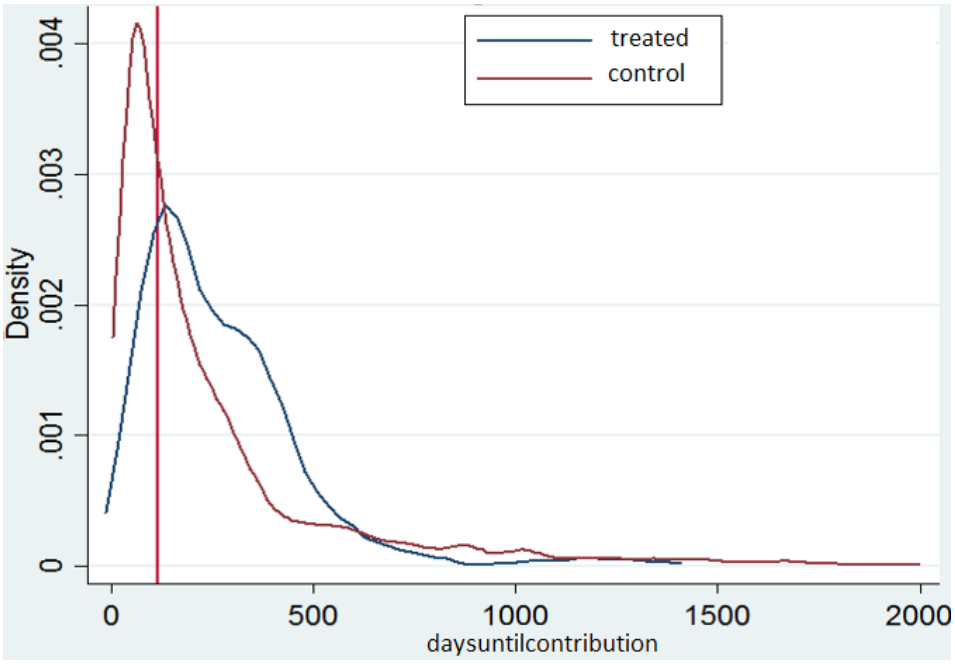
Figures

Figure 1. Number of days that self-employed workers in the group of treatment receive the benefit



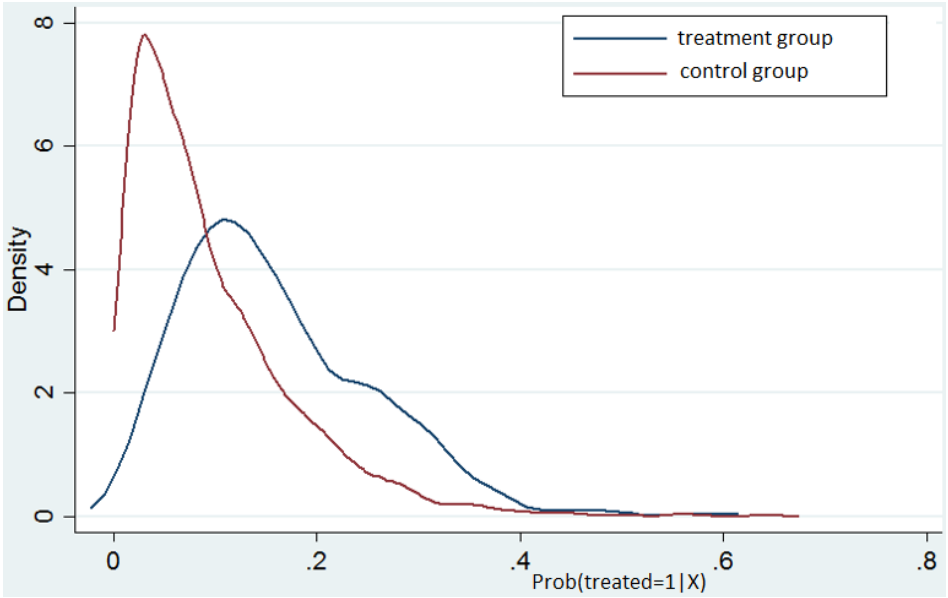
Source: Own elaboration from MCVL.

Figure 2. Non-parametric estimation of density of the variable DUC



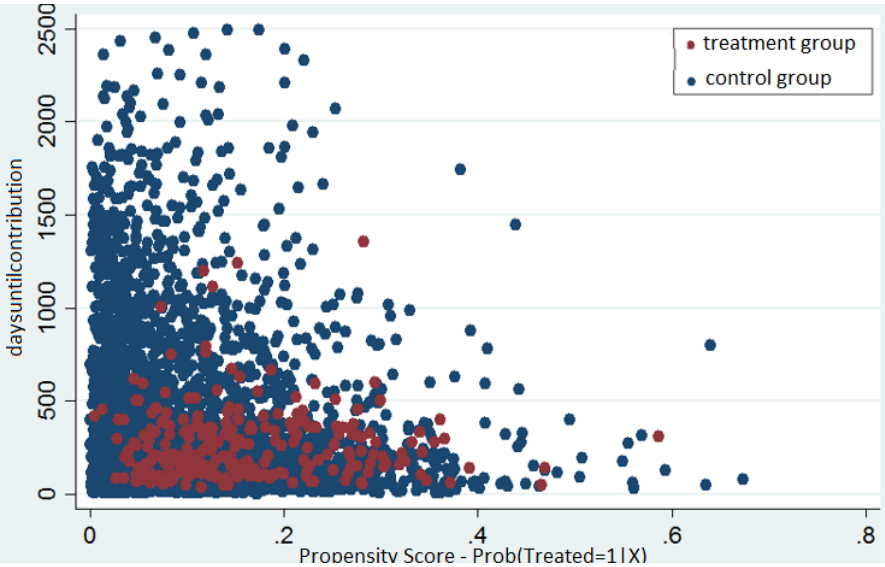
Source: Own elaboration from MCVL.

Figure 3. Probability of being a beneficiary. Non-parametric density estimation



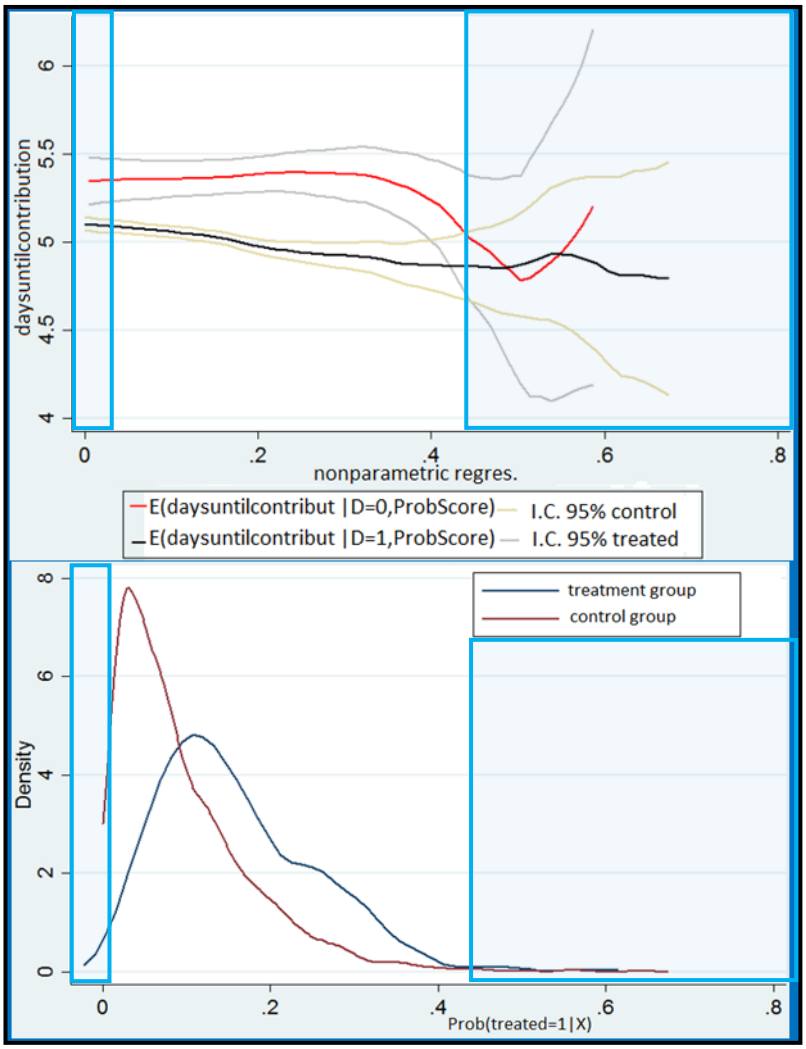
Source: Own elaboration from MCVL.

Figure 4. Information used in the calculation of the impact of receiving the benefit on the number of days elapsed until the return to contribution



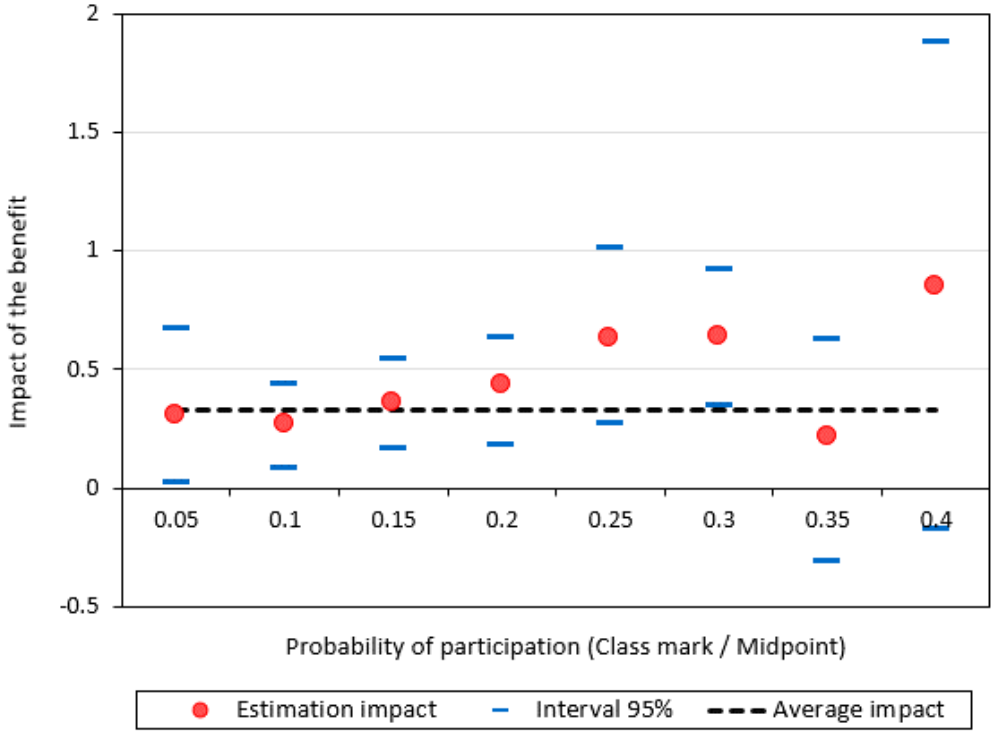
Source: Own elaboration from MCVL.

Figure 5. (1) Impact estimation by means of non-parametric regression of E(DUC|treated,ps) (top graph) and (2) non-parametric density estimation of being treated (receiving benefit for cessation of activity) (bottom graph)



Source: Own elaboration from MCVL.
Note: The non-blue-shaded area corresponds to the common support.

Figure 6. Impact of CAB on DUC (probability of being a beneficiary)



Source: Own elaboration from MCVL.

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