

# **How Effective are Training and Mentorship Programs for Entrepreneurs at Promoting Entrepreneurial Activity? An Impact Evaluation<sup>1</sup>**

Diego Aboal, Martin Pereyra and Flavia Rovira  
CINVE

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## **Abstract**

In this paper we analyze the impact of a government sponsored program aimed at promoting entrepreneurial activity in Uruguay. The C-Emprendedor program provides training and mentorship to potential entrepreneurs throughout the process of development of a business. Using regression discontinuity methods we assess the impact of the program on business creation, employment, actions taken to create a business, and investment. We find significant, although non-robust, effects on employment and the probability to take actions aimed at creating a business. No effects were found on investment and the rate of business creation. We contribute to the scarce literature on rigorous evaluations of programs designed to foster entrepreneurial activity and the creation of businesses in developing countries.

**Keywords:** Training and Mentorship Programs for Entrepreneurs, Entrepreneurial Activity, Impact Evaluation.

**JEL Classifications:** C31, H25, L26, M53.

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## 1. Introduction

The creation of new ventures, businesses or companies, is crucial for economic development. This is the main conclusion of a vast literature that focuses on the impact of entrepreneurship activities and small and medium-sized enterprises in both developed and developing countries (e.g. Baumol, 2004; Zacharakis et al., 2000; Scarpetta et al., 2002). Scholars relate this causality to the effect of new businesses on productivity growth, the driving force of economic development (Foster et al., 2002; Bartelsman et al., 2003; Butler et al., 2016).

The existence of market failures (restrictions on access to credit, lack of an efficient intellectual protection system, information asymmetries that make it difficult to understand markets' demand, uncertainty about the production function itself, etc.) or coordination failures (between agents that support entrepreneurship activities, or between entrepreneurs with potential complementary capacities) act as obstacles for entrepreneurship.

In these cases, public policies can intervene through a heterogeneous set of instruments, ranging from training and mentorship programs, promotion of coordination among entrepreneurs, technical advice, to financing of entrepreneurial activities at different stages of the business development process. In this paper we focus on first type of interventions: training and mentorship programs for entrepreneurs.

The institutions in charge of this program have been working to promote entrepreneurship in Uruguay since 2006, based on a methodology of support to entrepreneurs developed by the United Nations Industrial Development Organization (UNIDO) and implemented in several countries.

The program supports entrepreneurs who have a business idea, as well as newly created enterprises that are taking the first steps or micro and small companies that wish to start a new line of business. The program funds training in managerial skills, technical assistance and follow-up of the entrepreneur(s) until the concretion of her business ideas. In addition, the entrepreneur is assisted to understand the operation and the complexities involved in running a small business, to improve her entrepreneurial capacity if she has experience, and to network with other entrepreneurs and entrepreneurial support institutions.

The question that we want to address in this paper is: What is the impact of training and mentorship programs for entrepreneurs on actions taken to create a business, investment, business creation and employment? For this we will use data from a program in Uruguay (C-Emprendedor) and a regression discontinuity identification strategy.

This paper fits into the literature that evaluates entrepreneurial programs, a field of study that presents numerous challenges, particularly so in developing countries (López Acevedo and Tan, 2011). In general, problems to construct a valid counterfactual group arise mainly from two reasons: it is difficult to obtain reliable data about beneficiaries and non-beneficiaries of the

programs; and selection processes into the program are rarely random, so that beneficiaries and non-beneficiaries groups differ in explanatory variables of entrepreneurial performance. Our work is closely related to previous studies that measure the impact of entrepreneurial programs: Fiala (2014), Bonilla and Cancino (2011), particularly with those that use discontinuity regressions: Butler et al. (2016), Kerr et al. (2011), and Klinger and Schundeln (2007).

This paper contributes specifically to the segment of the impact evaluation literature that conducts a methodologically rigorous evaluation of entrepreneurial programs. Using regression discontinuity methods we evaluate the impact of a public program that provides training to potential entrepreneurs. We find significant, although non-robust, effects on employment and on the probability to take actions aimed at creating a business. Under the programs' rationale, the mere fact of taking informed action to create a business out of an idea is considered an intermediate result.

The remaining of the paper is organized as follows. Section 2 succinctly reviews the literature on impact evaluation of this type of programs. Section 3 describes the C-Emprendedor program. Section 4 presents the data and discusses its limitations. Section 5 describes the method for the identification of the impacts of the program. Section 6 presents the results. Finally, section 7 concludes.

## **2. Literature review**

Public and public-private programs intended to overcome market failures that prevent the creation of firms are a fundamental part of an economic development policy. Arguments in favor of such a practice are numerous, including reassuring the proper use of limited resources, and the fine tuning of present programs (to either increase their current impact or be potentially expanded).

According to Hopenhayn (2014), the allocation of entrepreneurial talent explains productivity differences between countries<sup>2</sup>. This author argues that both the incorrect allocation of entrepreneurial talent and the distortions to the entry of firms in different markets undermines productivity. From a theoretical point of view, this situation can be seen as the solution to the problem of choosing between categories of occupation for a potential entrepreneur (i.e. an individual who must choose between being an entrepreneur or an employee in another company). To solve this problem, the entrepreneur has to take into account some restrictions: entry costs and regulations; the opportunity cost of not being a paid employee; restrictions on access to credit and lack of specific skills, or limited skills and information regarding business management.

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<sup>2</sup> Improving upon the misallocation of entrepreneurial talent could increase productivity in developing countries by up to 25%, according to Hopenhayn (2014), cited by Butler et al. (2016).

The summation and interaction of these constraints results in fewer companies being created and of lower quality. Regarding the restrictions of access to credit, Buera et al. (2013) argue that new firms can be targeted to less capital intensive or less productive sectors because of credit constraints. Considering the skills' restriction, Bloom et al. (2013) find evidence that better techniques of business management have a positive and significant impact (of the order of 11%) on businesses' productivity. Finally, D'Erasmus and Moscoso (2012) argue that economies with high costs of formality are characterized by a low efficiency in the allocation of their resources, which helps explain the productivity gap between developed and developing countries.

New businesses can have higher growth rates, and, despite their small scale, they usually represent a significant part of job creation. This is particularly true in the case of what Schoar (2010) calls "transformational" entrepreneurs –those who create small startup businesses with the intention to innovate and grow. Subsistence entrepreneurs create small businesses that provide own employment and a few others at most. Survival businesses though, may enable some entrepreneurs to improve their incomes and assure education for their children – a critical precondition for both regular employment and growth-oriented entrepreneurship (Grosh and Somolekae, 1996).

Previous studies found contrasting results on the impact of programs such as C-Emprendedor. A meta-regression analysis conducted by Cho and Honoratis (2013) using a sample of 37 papers that evaluated entrepreneurship programs suggest that the effects of entrepreneurial programs vary, depending mostly on outcomes of interest, target groups and specific context of the programs (similar findings were informed by Karlan et al., 2012). The most relevant instruments to increase business performance are financing support (for women) and business training (for existing entrepreneurs). Additionally, they found that providing a joint package of training and financing is more effective for labor market activities than offering just one of these options.

Researchers often find it difficult to assess the impact of these types of programs. Indeed, program executing agencies usually prioritize that technical support to reach all potential candidates over the experimental design that would be needed for an ex-post evaluation. This is because randomly selecting treated and control projects might have a high cost in terms of the program goals (e.g. to enforce the entrepreneurial environment).

There are some exemptions to this extended fact. For instance, Fiala (2014) measures the impact of a training program implemented by the International Labor Organization (ILO) in Uganda in 2012. Since beneficiaries of the program were randomly selected to be accepted, the construction of the counterfactual group posed no further problem. Comparing measures of profits, revenue, and other household outcomes, between beneficiaries and non-beneficiaries (a total of 1550 microenterprise owners), concludes that the joint provision of loans and

training is the most effective combination for men in the short run. The impacts of the program fade as the time horizon increases, they are insignificant for women and there is no impact from transfers.

The rest of the programs in this review were implemented in a non experimental setting. Bonilla and Cancino (2011) evaluate the effects of a Chilean public financial and training program designed for microenterprises on small firm's sales and employment from 2006 to 2008. These authors estimate the effect of the program through a difference in difference estimator after matching their control and treatment groups using Propensity Score Matching (PSM) techniques. Considering 164 businesses (89 treated and 75 non-treated), they conclude that the program had a positive and significant effect on the number of workers hired, while there were no significant effect on sales.

Kerr et al. (2014) use the same methodology that we do (discontinuity regression analysis) although their subject of analysis was different. They assess the effectiveness of two angel groups funding and consultancy services on ventures with data from 2001 to 2006. Using data provided by the angel groups, authors consider a sample of 130 start-ups firms. They found positive effects of angel funding on survival, employee level, patenting, and web traffic growth. However, there is no impact of angel financing on subsequent financing.

A few impact analyses have been published in which both the type of program and the technique used to evaluate the results are comparable to ours. First, Klinger and Schundeln (2007) evaluate the effects of entrepreneurial training on small and medium enterprises in three Central American countries between 2002 and 2005. Outcome variables include the number of business start-ups and size of existing businesses. Data is collected through surveys conducted post training programs, and includes observations from 655 enterprises (377 treated and 278 non-treated). Exploiting the fact that potential beneficiaries are assigned a pre training score based on their capacities, authors use a regression discontinuity design to determine the effects of the training programs. Klinger and Schundeln (2007) conclude that receiving training business training increases the probability that applicants start a new business or expand an existing business. Authors also document financial constraints and gender differences in terms or outcome variables.

Later, Butler et al. (2016) evaluate the impact of the Buenos Aires Emprende (BAE) program between 2008 and 2011. The BAE program provides both funding and technical assistance to beneficiaries in no more than one year. Authors apply a regression discontinuity drawing upon the fact that potential program beneficiaries were tested on their entrepreneurial ability prior to be selected. They use the test's scores to analyze the observations near the cutting point that enabled entrepreneurs to be supported. Considering survey information from 108 firms (68 beneficiaries and 40 non beneficiaries), Butler et al. (2016) find evidence of positive and

significant effects of the BAE program on the probability of setting up a new business and the probability of survival, while there is no effect on net income and sales of beneficiaries.

### **3. The C-Emprendedor program**

#### **3.1 The program**

Uruguay is far from being characterized as an entrepreneur's country. For instance, the score in the indicator of "Entrepreneurship as a good career choice"<sup>3</sup> falls in the three bottom scores among South American countries. In this context, the C-Emprendedor initiative was created to promote an entrepreneurial culture in the country. The general objective of the C-Emprendedor program is to support the creation and development of new ventures, mentoring entrepreneurs to transform their ideas into viable businesses.

From an institutional point of view, it is part of the DINAPYME<sup>4</sup> Entrepreneurship Promotion Area, whose main goals are: to promote an entrepreneurial culture at the national level, to facilitate the conditions to become an entrepreneur, and to strengthen the capacity of entrepreneurs to create and develop enterprises with potential for growth and employment generation. The institutions in charge of this program have been working to promote entrepreneurship in Uruguay since 2006, based on a methodology developed by the United Nations Industrial Development Organization (UNIDO) and implemented in several countries. This methodology was the origin of C-Emprendedor.

The program gives technical support to ventures at different levels of evolution: from business ideas to newly created enterprises that are taking the first steps in the market, to micro and small companies that wish to start a new line of business. The program funds training in managerial skills, technical assistance and follow-up of the entrepreneur until the concretization of her business ideas. In addition, the entrepreneur is assisted to understand the operation and the complexities involved in running a small business, to improve her entrepreneurial capacity if she has experience, and to network with other entrepreneurs and entrepreneurial support institutions.

C-Entrepreneur seeks to promote the entrepreneurial culture and the development of ideas in commercial ventures. The basic idea is to select individuals based on their entrepreneurial talent and the potentiality of their projects, for which they resort to interviews with individuals potentially interested in participating in the program.

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<sup>3</sup> Global Entrepreneurship Monitor (GEM)

<sup>4</sup> DINAPYME is the Spanish acronym for Direction of Small and Medium Enterprises, belonging to the Ministry of Industry, Energy and Mining.

The support lasts a limited period of time (usually between one and two years after the start). The objective is to limit the existence of non-competitive businesses. The entrepreneurs do not receive any type of subsidy and/or aid from the program after the treatment ends. A substantial difference between this program and the BAE program from Argentina is that in the later, entrepreneurs receive both technical advice and funding, while C-Emprendedor beneficiaries receive training and technical advice.

This characteristic is of paramount importance for the evaluation of the impact of these programs and to understand the possible effects (or lack of them) on some variables. In light of some results mentioned in the literature review, it is expected that programs such as C-Emprendedor to have a smaller impact on the generation of employment, business creation and other result variables (investments, sales, etc.) than programs that also offer financing.

Participation into the program starts with the selection of those entrepreneurs/ideas that meet a certain profile. The selection is carried out by the Selection Committee, composed of the technical team of C-Emprendedor, local government agents, as well as representatives of business organizations. According to a pre-defined evaluation criteria based on three dimensions: the entrepreneurial potential, the business idea and the degree of progress, an order of preference is established among the applicants. The Program considers the total score obtained in the evaluation and in the interview (the maximum score is 18 points, it is considered that scores higher than 11 are the ones that best fit the entrepreneur profile sought for the Integral Program although there is some flexibility in the criterion). On the basis of the above, the Committee will resolve by consensus the potential beneficiaries.

In those cases in which the profile of the entrepreneur and/or ideas does not qualify as recipients of the integral program, it is recommended to them to participate in validation ideas workshops to deepen their analysis and validation in the market and to encourage the definition of a sustainable business model.

For the selected entrepreneurs, the program finances successively the training, technical assistance and follow-up of the entrepreneur until the development of her business ideas. After completing each stage of the program, the Evaluation and Monitoring Area conducts a formal and anonymous evaluation of each stage. In addition, the management team of C-Emprendedor coordinates a meeting with the entrepreneur to evaluate what was done in the previous stage and decide if it corresponds to move to the next stage. For the development of these support activities, C-Emprendedor has defined a manual of good practices that guides the consultants in charge of carrying out these activities.

In addition to the specific tools of the program, the whole process encourages networking. The goal is for entrepreneurs to attend these instances and for them to contact customers,

suppliers, improve their business idea, motivate themselves and acquire knowledge to strengthen their ventures.

### **3.2 Theory of change**

There are several obstacles in the Uruguayan entrepreneur environment that inhibit the development of potentially viable ventures. The lack of entrepreneurial culture is an example of this type of obstacles as it has been highlighted in several diagnostic studies (e.g. Aboal et al. 2016). So, one of the goals of the program is to help revert the low rate of entrepreneurship. For this, the main instruments are periodical workshops to promote entrepreneurial spirit and the launch of calls to present business ideas. If successful, these actions would translate into a critical mass of potential business projects, out of which some could become a feasible venture.

The lack of market knowledge can lead potential entrepreneurs to fail too soon for going into markets with an immature product, or in a wrong timing. This can lead the entrepreneur to quit a potential good project. The lack of managing experience could also prevent an individual with a good profile and a good idea to materialize it into a feasible project for the materialization of a new product or service. The program goal is then to help individuals develop a commercial project. But, responding to financial restrictions, the second action is to select those individual/ideas that have the potential to become successful. For this end, the evaluation and interview are used, delimiting the accepted and rejected individuals with a fixed score but with flexibilities around that benchmark. The expected result is that entrepreneurs with high potential enter the support program.

The program believes that for good projects not to fail when becoming ventures, entrepreneurs need to incorporate business management practices, planning, market analysis and to define a business model (draw a roadmap, set goals and deadlines, etc.). The third action consists of providing entrepreneurs with training to generate a business plan and skills to develop an action plan which include marketing, legal, financial strategies. The results of this action should be that entrepreneurs have checked the market, adjusted their business model if necessary, and acquired funding if needed. With the action guides she can start taking actions to create a company, which is the expected result of the program action.

Even with a good planning and previous market analysis, the first months in the life of new ventures are challenging and it is very often than firms die before consolidating (between years 0-2). To decrease the impact of the obstacles that affect firms in this period, the program finances a group of specialists in charge of mentoring the new venture, providing accompaniment in the search of financing, or other practical difficulties. Making the necessary



changes, taking informed decisions, making investments, etc., would supposedly increase the probability that the company survives this first period, increase sales revenue, hire personnel, and formalizes the company.

In the long run, the actions taken by C-Emprendedor would have an impact on the rate of entrepreneurship, higher survival rates of new ventures, and an increase in employment.

In this paper, we evaluate the impact of the program over some of the expected results in the middle and long term.

**Diagram 1: Logical framework of the C-Emprendedor program**

| Goals                                                                                                      | Logical framework                                                                                                       |                                                                                                                                                               |                                                                                                                                               |                                                                                                                  | Long term objectives                                                                                                    |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|                                                                                                            | Actions                                                                                                                 | Product (inmediat result)                                                                                                                                     | Result                                                                                                                                        | Impact                                                                                                           |                                                                                                                         |
| Contribute to revert the low rate of entrepreneurship                                                      | Workshops to promote the entrepreneurial attitude / calls to present ideas                                              | Assistance from a significant number of potential entrepreneurs                                                                                               | Critical mass of projects to support in later instances of the program                                                                        | Contribute to the promotion of greater offer of entrepreneurial ideas                                            | Increase the rate of entrepreneurship in the country<br><br>Higher survival rate of ventures<br><br>Increase employment |
| Decrease the restrictions that prevent good ideas from becoming commercial projects                        | Selection of entrepreneurs whose ideas have the potential to become successful companies (form evaluation + interview)  | Potential entrepreneurs are selected to participate in the integral program.<br>Entrepreneurs with immature ideas are derived to an ideas validation workshop | Entrepreneurs with high potential enter the comprehensive support program.<br>Program resources focused on companies with potential           |                                                                                                                  |                                                                                                                         |
| Decrease the factors that restrict the realization of projects in new ventures                             | Training and support in setting up the action plan                                                                      | Entrepreneurs with an action plan evaluated to carry out their entrepreneurship (defined business model and target audience).<br>Draft of business plan       | Entrepreneur takes actions to evaluate the market, adjust his business model if necessary, or give up if it is unfeasible after the analysis. |                                                                                                                  |                                                                                                                         |
|                                                                                                            | Advice on Business Planning                                                                                             | Entrepreneur makes a business plan                                                                                                                            | The business plan facilitates access to financing if necessary. The entrepreneur has an action guide to start his project                     | Entrepreneur takes actions to create a company.                                                                  |                                                                                                                         |
| Decrease the restrictions that hinder the consolidation of enterprises in formal and competitive companies | Mentoring in action plan<br>Accompaniment in search of financing / investors<br>Accompaniment in practical difficulties | Companies implement training and mentoring apprenticeships                                                                                                    | The entrepreneur makes the necessary investments to develop his business                                                                      | The project takes shape in a formalized company<br>Sales revenue is created<br>Paid wages (generates employment) |                                                                                                                         |

#### 4. Data

We use data from two sources: administrative files provided by DINAPYME and data obtained from a survey created by our team. The survey was delivered to all individuals that ever signed up for the program (treated and non-treated). In both cases, data covers the 2009 – 2015 period.

Administrative data provided by DINAPYME included sociodemographic information of all potential entrepreneurs that postulated to the program. This information was registered when applications forms were filled by individuals at the time of signing up for the program. Sociodemographic information includes ID number, name, gender, date of birth, highest formal education attainment, present occupational condition, previous experience as a business owner or employee, address, contact information (phone and/or email), and a brief description of the business idea.

A second administrative database contains the names and scores of both the entrepreneurial profile test (out of 54 points, normalized to 3 points) and the evaluation interview (composed of five sections, each one with a maximum of 3 points). This database also includes the decision taken by the evaluation committee (to be allowed into the program or not). Note that the maximum number of points one individual could earn was 18, and the cutoff to enter the program was set at 11.

The third database includes follow up information about the performance of treated individuals only during their transit through the different stages of the program. Follow up information tell us if individuals successfully completed every step of the program and if they eventually created a business. Based on this database one can identify when an individual did not successfully complete a stage.

Summing up, the administrative information contained sociodemographic and evaluation information about treated and non-treated individuals, and performance information about treated individuals only. This database included 2,420 observations.

The second source of data was a survey sent to all individuals for whom we had a unique valid email account: 2,305 individuals. Each questionnaire referred to the year that the individual signed up for the program, to be able to construct a baseline corresponding to information of every potential entrepreneur at the same point in time (whenever they applied for the program's activities). This implied constructing seven different surveys, one for each sign up year.

The survey contained a total of 65 questions, distributed in six parts: individual characteristics; actions taken to create a business; support from other entrepreneurship programs;

characteristics of the business; personal traits and motivations; and characteristics of the program itself.

Out of 2,305 emails sent, we received 555 answers, a 24% response rate. This response rate is along the lines of the ones obtained by similar exercises conducted by Aboal et al. (2016) and Butler et al. (2016). After deleting 2 outliers, we merged survey information for 553 individuals (213 treated and 340 non-treated) into the administrative base to create our panel data. In Table 1 we show descriptive statistics for the population and the surveyed individuals.

**Table 1. Mean of variables at the time of registration**  
(applicants and surveyed individuals)

| Variable                | Mean       |                      |
|-------------------------|------------|----------------------|
|                         | Applicants | Surveyed individuals |
| Women                   | 53%        | 57%                  |
| Age                     | 35         | 35                   |
| 0-6 years of education  | 4%         | 3%                   |
| 7-12 years of education | 54%        | 47%                  |
| >12 years of education  | 43%        | 50%                  |
| Inactive                | 11%        | 7%                   |
| Unemployed              | 8%         | 6%                   |
| Employed                | 82%        | 87%                  |
| Capital of the country  | 57%        | 67%                  |

**Source:** administrative records.

## 5. Methodology

We claim that the regression discontinuity method (RDM) is a valid approach to evaluate the impact of the C-Emprendedor program in variables that measure the performance of entrepreneurs. This claim is based on the design of the C-Emprendedor program: participation in the program is partially determined by the score assigned to each potential participant and there is an exogenous cutoff point in the distribution of that score that is not subject to manipulation by potential participants. This method is able to identify the effect of the program on individuals that are similar in managerial skills and other relevant characteristics and on projects that have potentially similar expected success, using a control group composed of non-treated individuals that received a similar score in the evaluation process. We expect to find an effect of the program that is independent of the potential effect of better entrepreneurial abilities of the treated group.

The regression discontinuity method is one tool amongst many that have been used widely in the last 15 years in impact evaluation exercises. Although the RDM is one of the best approaches to isolate the effect of programs, it has some limits, which will be discussed later.

The selection of potential entrepreneurs to be admitted into the program relies heavily in the characteristics of the project or idea to be further developed with the help of the program and the individual characteristics of the entrepreneur.

The selection process evaluates six dimensions, using a standardized questionnaire and individual interviews with the potential entrepreneur. Each dimension receives a score between 0 and 3, so that the total score ranges from 0 to 18. To conclude the evaluation process, a selection committee composed of three representatives decides whether individuals will be admitted or not into the program.

The score works in practice as an important guide for the decision to be admitted into the program. Although a score of 11 is considered to be acceptable to receive the benefits of the C-Emprendedor training and mentorship, in practice the limits are fuzzy around this cutoff value.

It is evident that the decision to include an individual in the program is not random, and that there could be systematic differences between treated and non-treated individuals. The regression discontinuity method exploits the (almost) deterministic discontinuity in the forcing variable to identify the impact of the program. The method relies on the fact that the admission into the program in an interval of the cutoff values can be considered random, since it is impossible to implement a criterion that offers no mistakes while admitting or not individuals into the program in that interval. In other words, treated and non-treated individuals whose scores belong to a relatively small interval centered in 11 are very similar, and their admittance into the program can be considered random. Consequently, differences in result variables between these two groups, under some assumptions, can be attributed to the program.

## **6. Results**

Results presented in this section were estimated using the Stata `rd` routine proposed by Nichols (2011). This is a case of a fuzzy discontinuity regression, as the probability of entering the program does not jump from 0 to 1 at 11 (see Graph 2). Since estimation results are sensitive to the bandwidth used (and therefore to the number of observations considered), we conducted estimations for many bandwidths. In general, fuzzy discontinuity regression exercises require considerable bandwidth, as in our case. An increase in the bandwidth reduces the variance of the estimators (by considering more observations) at the cost of increasing potential biases (by using more heterogeneous individuals).

We estimate a non-parametric local kernel regression at both sides of the cutoff of the forcing variable (11 points). We use a polynomial of order 1. Estimations can be sensitive to the observations weights as we move further away from the cutoff point. We use Gaussian weights, or a Gaussian kernel, implying that observations closer to 11 receive a higher weight than those that are further away.

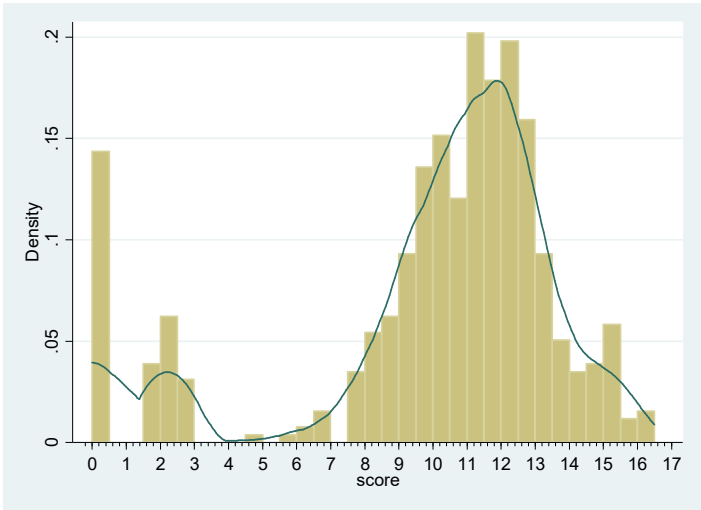
Optimal bandwidth is computed resorting to the cross validation method proposed by Ludwig and Miller (2007). Noting that in fuzzy discontinuity regression exercises we have to perform two regressions, we report optimal bandwidths for both (one for the outcome variable, penultimate column in tables 2-6, and one for the probability of participation into the program, last column in tables 2-6). In general, our optimal bandwidth is 5.

In Graph 1 we show the density function of the score variable. The identification strategy relies on the assumption that there is no jump in the density at the score 11. We have formally tested this hypothesis in Table 2 using the rddensity command proposed by Cattaneo et al. (2018). As can be seen in the table the results depend on the bandwidth and kernel function chosen. In 9 out of 15 alternative specifications we cannot reject the null of continuity of the density function.

In the Appendix we show evidence supporting the assumption of continuity of exogenous variables prior to the intervention.

Graph 2 shows the probability of participation in the program. As we expect, there is jump in the probability of participation at the cutoff.

**Graph 1. Density of the Score (Blue Line: Kernel Epanechnikov)**



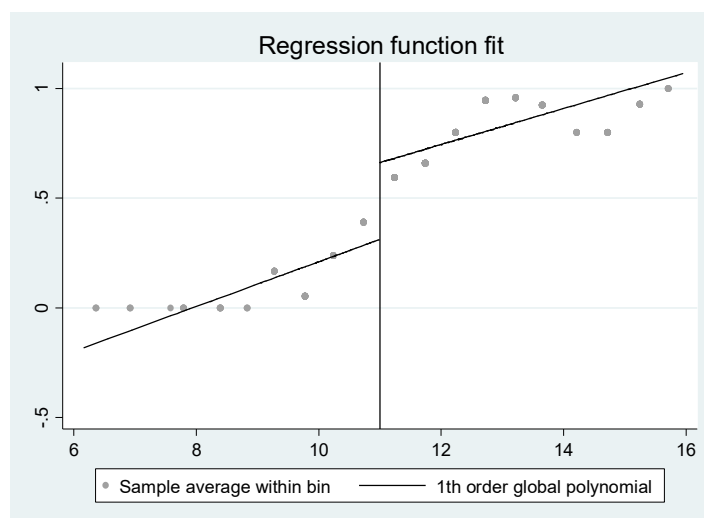
**Table 2. Continuity of the Score Density Function around the cutoff point**

| Bandwidth | Kernel Function |
|-----------|-----------------|
|-----------|-----------------|

|          | Epanechnikov |              | Uniform |              | Triangular |              |
|----------|--------------|--------------|---------|--------------|------------|--------------|
|          | T            | p-value      | T       | p-value      | T          | p-value      |
| <b>1</b> | 1.216        | 0.224        | 0.799   | 0.425        | 1.245      | 0.213        |
| <b>2</b> | 2.413        | <b>0.016</b> | 2.384   | <b>0.017</b> | 2.409      | <b>0.016</b> |
| <b>3</b> | 1.672        | <b>0.095</b> | 1.165   | 0.244        | 1.854      | <b>0.064</b> |
| <b>4</b> | 1.345        | 0.179        | 1.414   | 0.157        | 1.473      | 0.141        |
| <b>5</b> | 1.608        | 0.108        | 1.947   | <b>0.052</b> | 1.615      | 0.106        |

**Note:** jackknife standard errors; density estimation: unrestricted.

**Graph 2. Probability of participation**



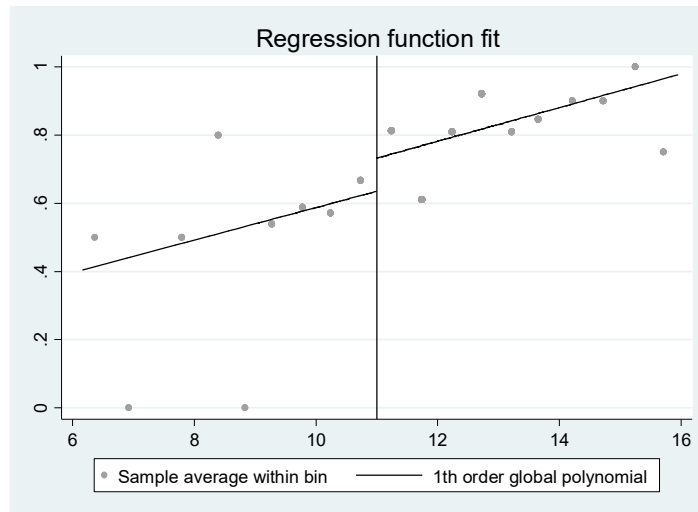
We estimate the impact on beneficiaries of the program (of any stage of it) with respect of those non-beneficiaries of any stage of the program or the ideas validation workshop. We measure the effects of the program 2 years after the individual signed up for the program.

In graphs 3-6 we show the variables at either side of the cutoff point, using the `rdplot` command for Stata proposed by Calonico et al. (2014).

In tables 3-6 we present the estimations following the `rd` routine proposed by Nichols (2011). We find significant effects on the probability of actions undertaken to set up a business and on employment. To participate into the program implies 40 percentage points more in the probability of actions undertaken to set up a business, such as looking for equipment, organizing a work team, looking for funding, etc.

Beneficiaries create on average 3 jobs more per each 4 entrepreneurs (the point estimate is 0,75) as compared to non-beneficiaries. We do not find a significant effect on the creation of business or on the probability of investing.

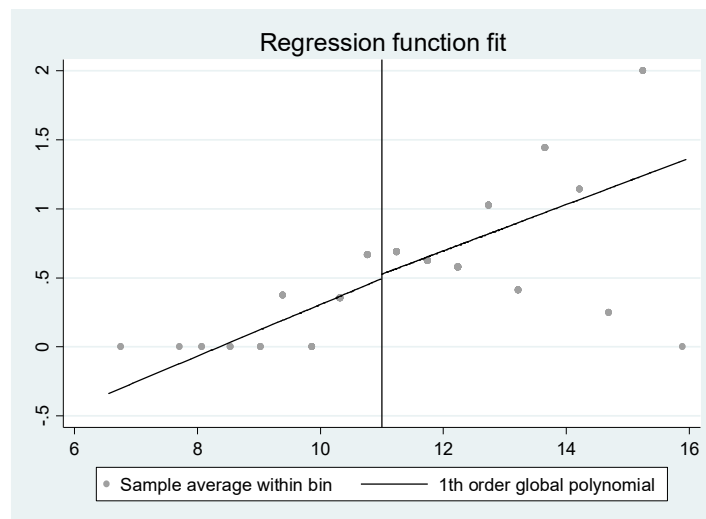
**Graph 3. Activities to startup a business up to year 2**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 1.

**Source:** own estimation.

**Graph 4. Total employees in year 2**

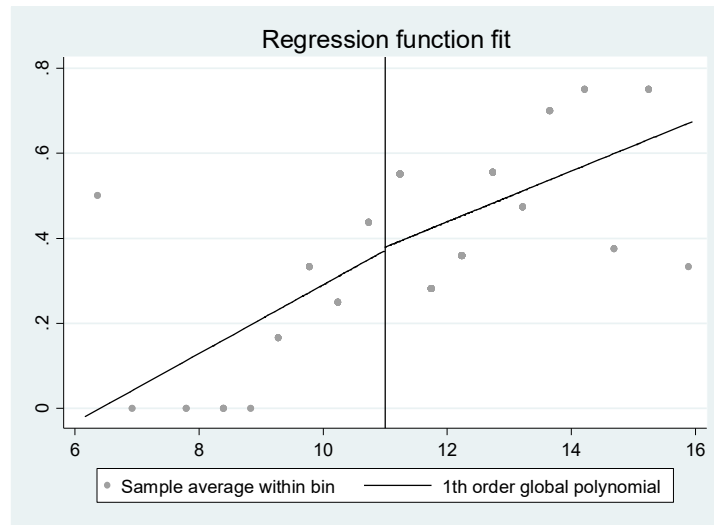


**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 1.

**Source:** own estimation.

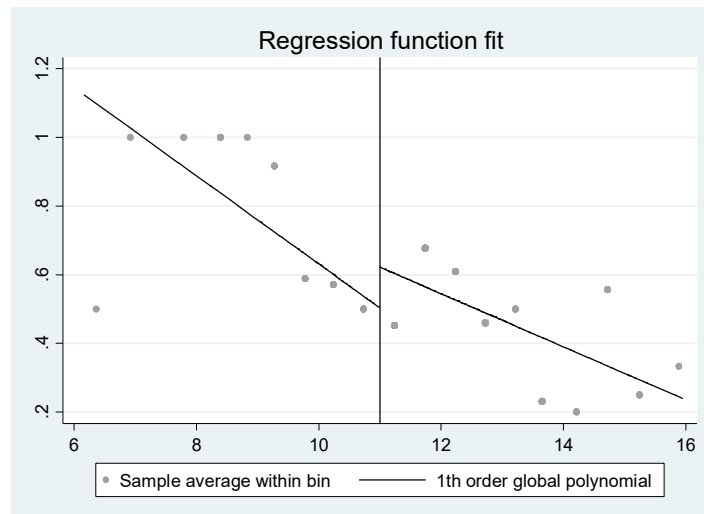


**Graph 5. Invested up to year 2**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 1.  
**Source:** own estimation.

**Graph 6. Did not pay salaries up to year 2**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 1.  
**Source:** own estimation.

**Table3. Impact of the program on the probability of carry out activities to start-up a business in the first 2 years of the program**

| Bandwidth | Impact | SD    | t-stat | Optimal bandwidth<br>Cross Validation Criteria |              |
|-----------|--------|-------|--------|------------------------------------------------|--------------|
|           |        |       |        | Activities<br>to startup                       | Probability  |
| 1         | 0.66   | 60.15 | 0.01   | 0.213                                          | 0.234        |
| 2         | 0.36   | 0.80  | 0.45   | 0.198                                          | 0.228        |
| 3         | 0.34   | 0.31  | 1.11   | 0.189                                          | 0.209        |
| 4         | 0.38   | 0.24  | 1.56   | 0.185                                          | 0.185        |
| 5         | 0.40   | 0.16  | 2.43   | <b>0.182</b>                                   | <b>0.174</b> |

**Note:** Number of observations between 107 and 307, depending on the bandwidth. Stata rd routine proposed by Nichols (2011). Gaussian weights.

**Table 4. Impact of the program on the probability of carry out investments in the first 2 years of the program**

| Bandwidth | Impact | SD    | t-stat | Optimal bandwidth<br>Cross Validation Criteria |              |
|-----------|--------|-------|--------|------------------------------------------------|--------------|
|           |        |       |        | Invested                                       | Probability  |
| 1         | 0.11   | 22.26 | 0.00   | 0.280                                          | 0.234        |
| 2         | -0.21  | 2.49  | -0.08  | 0.245                                          | 0.228        |
| 3         | 0.05   | 0.25  | 0.20   | 0.250                                          | 0.209        |
| 4         | 0.20   | 0.24  | 0.82   | 0.247                                          | 0.185        |
| 5         | 0.23   | 0.23  | 1.01   | <b>0.245</b>                                   | <b>0.174</b> |

**Note:** Number of observations between 107 and 307, depending on the bandwidth. Stata rd routine proposed by Nichols (2011). Gaussian weights.

**Table 5. Impact of the program on the probability of not paying wages until year 2 (a proxy of not opening a business)**

| Bandwidth | Impact | SD   | t-stat | Optimal bandwidth<br>Cross Validation Criteria |              |
|-----------|--------|------|--------|------------------------------------------------|--------------|
|           |        |      |        | Did not paid wages                             | Probability  |
| 1         | 0.57   | 4.54 | 0.13   | 0.272                                          | 0.234        |
| 2         | 0.67   | 2.00 | 0.33   | 0.263                                          | 0.228        |
| 3         | 0.28   | 0.30 | 0.95   | 0.271                                          | 0.209        |
| 4         | 0.05   | 0.23 | 0.23   | 0.268                                          | 0.185        |
| 5         | 0.00   | 0.20 | 0.01   | <b>0.262</b>                                   | <b>0.174</b> |

**Note:** Number of observations between 107 and 307, depending on the bandwidth. Stata rd routine proposed by Nichols (2011). Gaussian weights.

**Table 6. Impact of the program on employment in year 2**

| Bandwidth | Impact | SD    | t-stat | Optimal bandwidth<br>Cross Validation Criteria |             |
|-----------|--------|-------|--------|------------------------------------------------|-------------|
|           |        |       |        | Employment                                     | Probability |
| 1         | -1,05  | 37,21 | -0,03  | 1,402                                          | 0,234       |
| 2         | -0,04  | 12,49 | 0      | 1,733                                          | 0,228       |
| 3         | 0,42   | 0,78  | 0,53   | 1,609                                          | 0,209       |
| 4         | 0,69   | 0,55  | 1,25   | 1,522                                          | 0,185       |
| 5         | 0,76   | 0,41  | 1,83   | 1,685                                          | 0,174       |

**Note:** Number of observations between 107 and 307, depending on the bandwidth. Stata rd routine proposed by Nichols (2011). Gaussian weights.

As a robustness check we estimate the effects assuming Triangular weights (a Triangular kernel). In this case we cannot reject the null of no effect for all the four variables (results are available upon request). This indicates that the results found in the previous subsection are not robust to alternative estimation methods.

## **7. Conclusions**

In the baseline estimation we find significant effects on the probability of actions undertaken to set up a business and on employment. However, we do not find a significant effect on the creation of business or on the probability of investing.

The C-Emprendedor program has invested nearly USD 1.6 million in 7 years, which means around USD 1,400 per entrepreneur considering all participants (complete program and ideas validation workshops), or around USD 2,100 considering only participants of the complete program.

In the baseline estimation C-Emprendedor exhibits some noteworthy results given the relatively small amount of resources allotted per entrepreneur. Note that the BAE program granted around USD 12,000 per entrepreneur, with impact on employment of between 1.5 and 2.4 jobs per entrepreneur (Butler et. al., 2016). This impact is around 2 or 3 times higher than the C-Emprendedor point estimate, but it was obtained using funds 6 times higher.

However the above mentioned results are not robust to alternative specifications. Therefore we must be cautious with the interpretation of the positive effects found with the baseline estimation.

If we have to trust the no effect hypothesis, one possible explanation is that the funds allocated for training and mentorship (a proxy to the importance of the intervention) are very small. In addition, no funding for projects is given to participants. Therefore, this null effect could be explained by both elements, small impact in training and mentorship activities given the scarce investment and, perhaps, lack of funding to set up new businesses.

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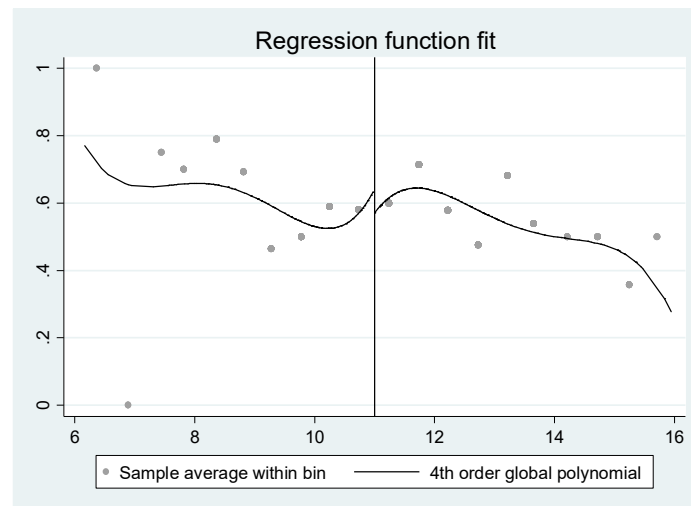
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## Appendix

### Assumption of continuity of variables prior to intervention around the cut-off point

For the discontinuous regression method to be valid, the variables exogenous to the program that may influence the results on which impact is measured should not present relevant discontinuities at cut-off point 11. In the following graphs we show evidence in that direction. Note that at the cutoff point the differences should not be significant, which does not imply that they have to coincide exactly.

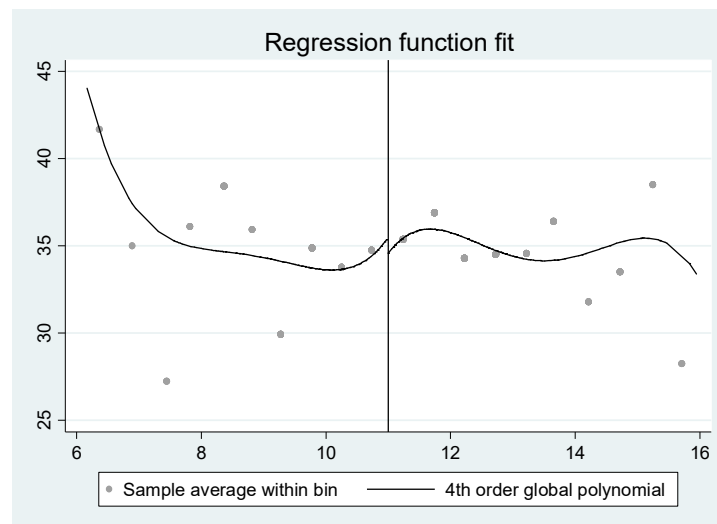
**GraphA.1.Gender**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

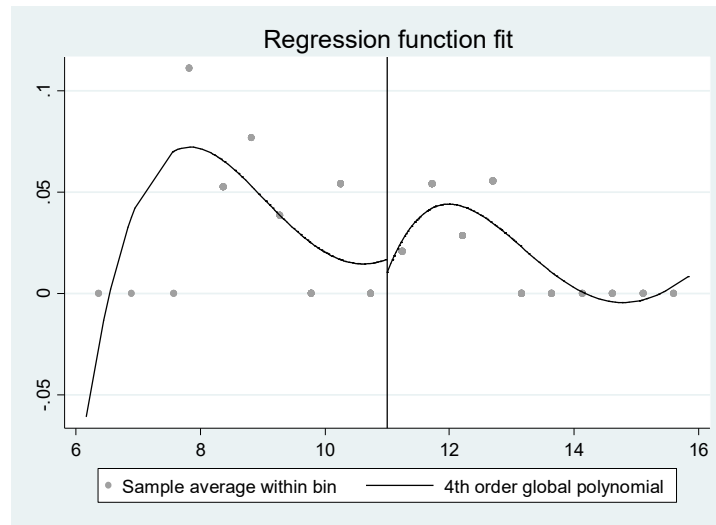
**Graph A.2. Age**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

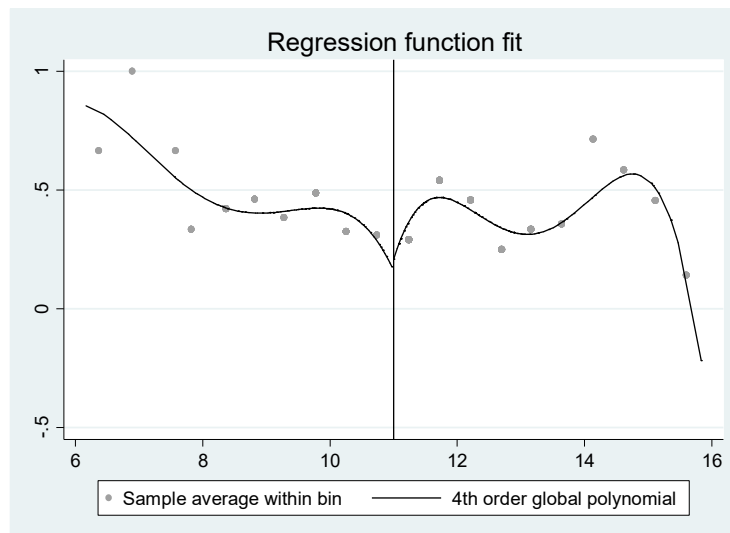
**Graph A.3. Education (0-6 years)**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

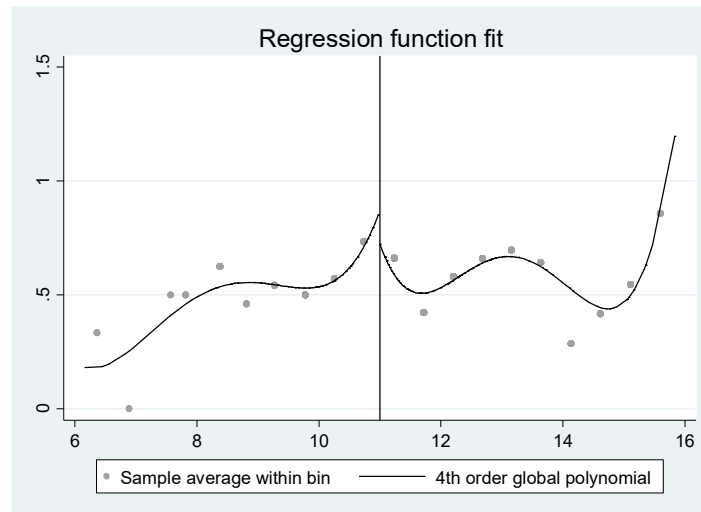
**Graph A.4. Education (7-12 years)**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

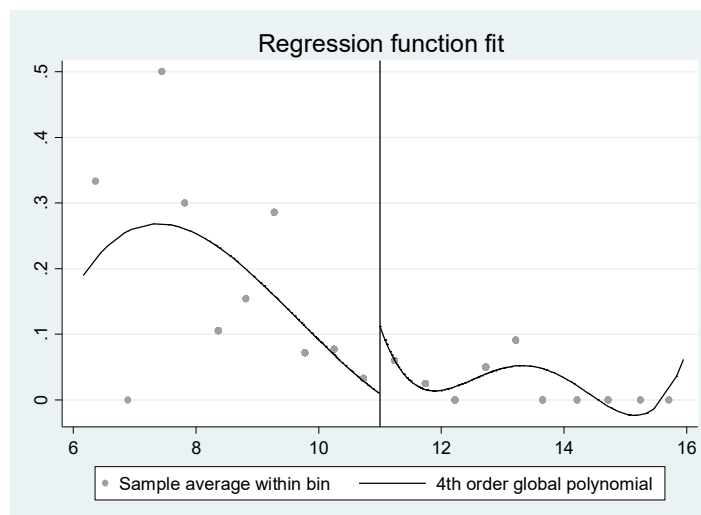
**Graph A.5. Education (>12years)**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

**Graph A.6. Inactive**

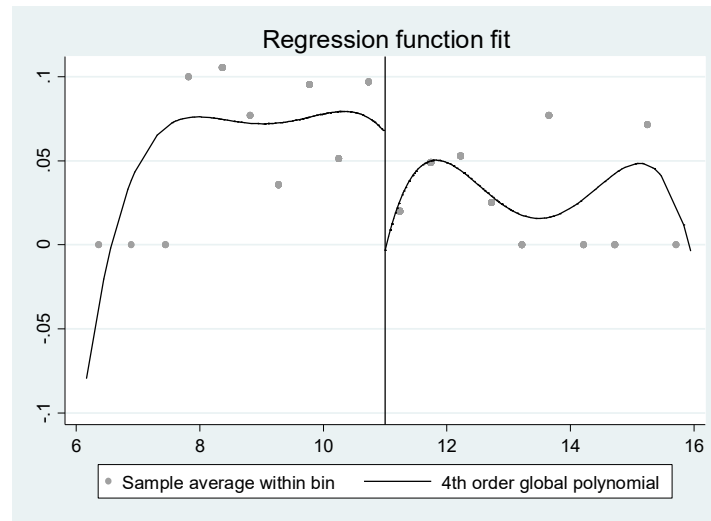


**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.



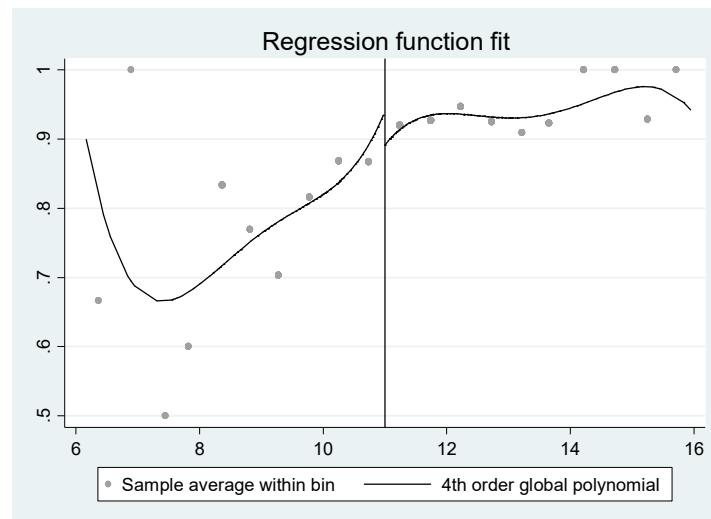
**Graph A.7. Unemployed**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

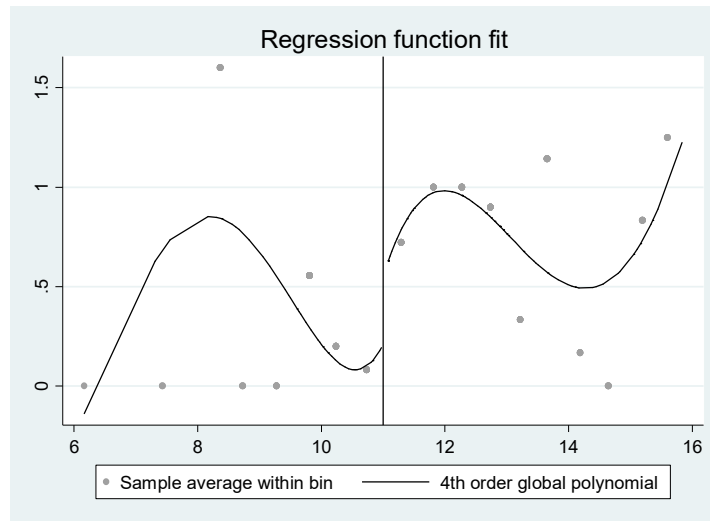
**Graph A.8. Employed**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

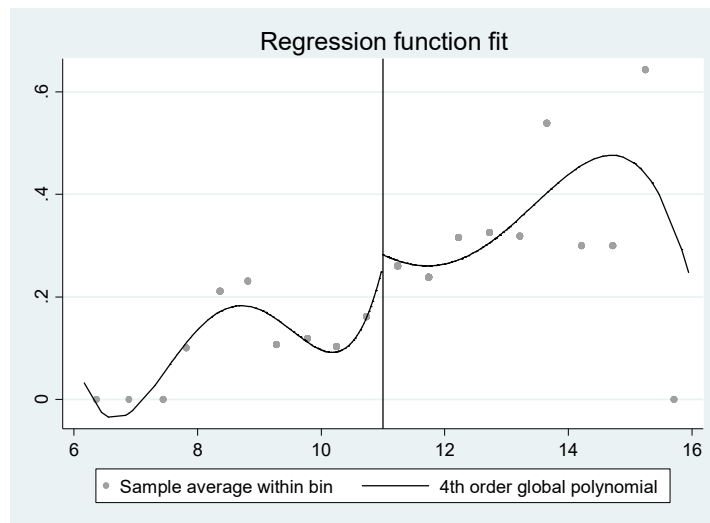
**Graph A.9. Capital**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

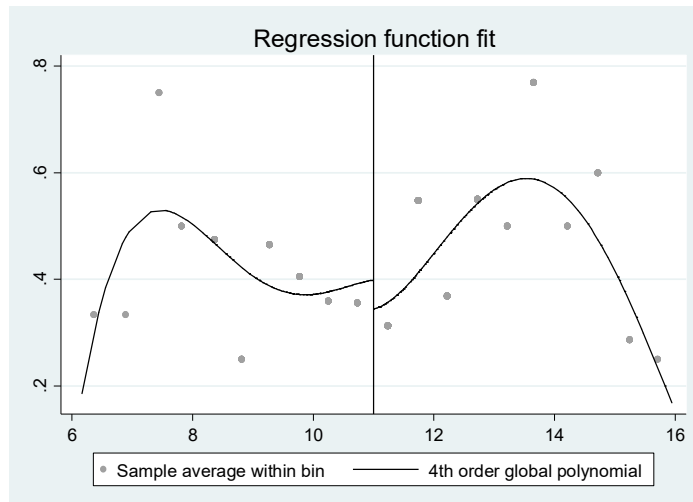
**Graph A.10. Owner of a business**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.

**Graph A.11. Parents are owners of a business**



**Note:** average of the interval, 10 intervals on each side of the cutoff point; polynomial regression of order 4.

**Source:** own estimation.