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Evidence on Rule Manipulation and Moral Hazard in the Brazilian Unemployment Insurance Program

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Abstract

This article aims to examine the existence of rule manipulation and moral hazard in the Brazilian Unemployment Insurance Program. For empirical analysis, the rule manipulation test by Cattaneo, Janson and Ma (2016) was used, as well as fuzzy and sharp regression discontinuity. The data was built using data from the National Employment and Unemployment Survey from January 2008 to June 2014 due to the greater homogeneity of the rules for benefit access. Based on the results, the program is an influence on the length of employment of Brazilian workers given the existence of rule manipulation, assessed by the length of stay in the last job. Furthermore, it was found that heads of families and their children were less likely to search for employment. This findings were corroborated when data from the program beneficiaries only was assessed, showing a lower job search probability, between -21.80 p.p. and -15.08 p.p. for the children, and between -39.40 p.p. and -28.50 p.p. for the heads of families. Thus, it is possible to confirm the existence of both rule manipulation the access of the program, as well as moral hazard, which points to the need to restructure the program, and above all, have less influence on the national labor market.

Keywords: rule manipulation, moral hazard, Unemployment Insurance Program

1. Introduction

There is a consensus that the Unemployment Insurance Program – UIP is very important for the Brazilian Social Security. However, with evidence of rule manipulation in the program, it is important that changes are made to reduce its influence on the labor market and increase its allocative efficiency. Therefore, the present article aims to examine the existence of rule manipulation and moral hazard in the Brazilian Unemployment Insurance Program. For the empirical analysis, the rule manipulation test by Cattaneo, Janson and Ma (2016a) was used, as well as fuzzy and sharp regression discontinuity.

To measure the presence of moral hazard in the Brazilian UIP, Fuzzy and Sharp Regression Discontinuity Designs – RD were used, as well as the rule manipulation test indicated by Cattaneo Janson and Ma (2016), a sophistication of the test proposed by McCrary (2008)[i]. The Employment and Unemployment Survey (Pesquisa de Emprego e Desemprego-PED) database was used from January 2008 to June 2014, given the homogeneity of the rule that gives access to the benefit. The results found indicate the existence of the manipulation of the rule that gives access to the UIP, and that the benefit negatively influences the job search time by workers considered as the heads of families and those considered children within the families.

In Brazil, the structural importance of the UIP and its impacts on the beneficiaries has been emphasized by authors such as Chahad (1984, 1999a, 1999b, 2000), Amadeo and Camargo (1995), Balbinotto Neto and Zylberztajn (1999, 2002), Barros, Corseuil and Foguel (2000), Chahad and Fernandes (2002), Ambrózio (2003), Andrade, Leite and Ramos (2010), Carvalho (2010), Hijzen (2011), Gerard and Gonzaga (2012), and Teixeira and Balbinotto Neto (2013, 2016). These authors point out that, from the worker point of view, the Brazilian UIP functions as a temporary source of income following involuntary dismissal, allowing the unemployed worker to be more selective in the choice of his/her next employment. On the other hand, the authors particularly criticize the standardization of benefit distribution, the lack of professional qualifications, and the incentive for turnover in the Brazilian labor market[ii].

This study advances in the methodology to be used in evaluating the existence of moral hazard in the program; it also opens new horizons in the assessment analysis of the Unemployment Insurance Program, through the effect it exerts on the turnover in the labor market. This aspect is important since one of the issues in the Brazilian economy is low worker productivity, and a reason given by the national companies is the low motivation to invest in human capital which occurs, among other aspects, due to incentives for employee dismissal exercised by the Government Severance Indemnity Fund for Employees and by the Unemployment Insurance Program, as emphasized by (Shavell e Weiss, 1979; Chahad, 2000; Hopenhayn e Nicolini,1997 e 2002; Camargo, 2004; Pavoni, 2006).

The findings are corroborated when data from only the program's beneficiaries only is assessed, where a lower job search probability was observed, between -21.80 p.p. and -15.08 p.p. for the children, and -39.40 p.p. and -28.50 p.p. for the heads of families. Thus, it is possible to confirm the existence of both rule manipulation to the access of the program, as well as moral hazard, which points to the need to restructure the program, and above all, have less influence on the national labor market.

In addition to this introduction, the article comprises four more sections; the second section is a literature review of the influence of UIP on the labor market at an international and national level; the third section focuses on the empirical strategy and the development of the database; in the fourth section, the results are analyzed; and, finally, in the fifth section, the final considerations are discussed.

2. Empirical Review

Due to space limitations, as well as a vast literature regarding the effects of UIP on the labor market, only data from the late 1990s onward is shown. Empirical studies in Brazil have also increased since that decade.

Card et al. (2007) explored the discontinuity of the relationship between the length of stay in the last job and entitlement to the benefit in the Austrian UIP. Under the program's legislation, workers who were employed for less than 36 months in the last 5 years could be eligible to a 20-week benefit when dismissed, whereas those who were employed for 36 months or more could receive a 30-week benefit. With a sample of workers aged between 20 and 50, the authors found that the workers eligible for the 30-week benefit searched for a new job 5% to 9% less in the first 20 weeks than those eligible for the 20-week benefit.

In Finland, January 2003, the Unemployment Insurance benefit was extended to workers with a long-term history of employment; the system of indemnity for length of employment was abolished as well. The average benefit had a 15% increase in the first 150 days of unemployment. Uusitalo and Verho (2010) used this change in policy to evaluate the impact of the benefit on the unemployment duration rate and found that such a structural change to the benefit reduced the unemployment duration rate by an average of 17%. According to the authors, this effect was identified mainly for the workers who were in the first months of the benefit and tends to disappear with the length of time in the program.

Lalive (2007) used the method of regression discontinuity to assess the impact of the increase in the number of payments by the Austrian UIP, when the coverage changed from 32 to 54 weeks for workers younger than 50 years old and 32 to 209 weeks, in some regions, for the other workers. The results found by the author indicate that the increase in the number of payments by the program promoted an increase in unemployment duration, the probability of finding a job did not increase, and the regular job transition was reduced, particularly for women older than 50 years of age. As a matter of fact, the program ended up stimulating a rise in the transition period between one job and another for the beneficiaries.

Schmieder et al. (2012) assessed the impact of the German UIP using regression discontinuity, with a focus on the benefited workers aged between 40 and 49 from July 1987 to March 1999, when the program was created. The results showed that for each month of the benefit the unemployment duration increased on average from 0.10 to 0.13 months[iii].

With regard to the Brazilian UIP, the studies of Cunningham (1997), based on the models of differences in differences, stand out for trying to identify if the increase in the number of payments by the Brazilian UIP created in 1995, affected the possibility of the beneficiaries return to the labor market with a higher salary or if they would be more likely to re-enter in the informal labor market. The results found by the author suggest that the changes in the program did not induce reemployment with higher salaries in the formal labor market, nor was there significant change to the workers migrating from the formal to the informal market due to the expansion of the benefit.

Margolis (2008) used simulations to examine the effect of UIP and the amount paid by the Government Severance Indemnity Fund for Employees on the reintegration rates of beneficiaries from the formal sector in relation to those unemployed from the informal sector. According to the author, both the government severance indemnity and unemployment insurance accelerate the transition rate from one formal job to another. In addition, the author indicates that the program may be reducing the intensity of searching for employment in the informal sector.

Moreover, Zylberstajn and Ribeiro (2010) used different specifications of logistic regressions and a monthly job survey

to measure the impact of the UIP on the probabilities of job dismissal. According to the authors, the benefit affects, more significantly, the risk of job loss for married women, as well as single men with a lower income.

Robalino et al. (2011), using a job search model and a rotating panel design as a theoretical basis, found that the workers who were registered in the program had a higher probability of getting more job offers from the formal sector. Moreover, the saving effect generated by the program, had the greatest impact among the less qualified workers and women. The authors also simulated a rise in the worker's contribution to the program which generated a higher level of formal unemployment in the economy.

Hijzen (2011), based on an econometric instrument of regression differences, evaluated the impact of the Brazilian UIP on unemployment duration and on the moral hazard related to informal work while receiving the benefit. Analyzing the results found by the author, it is possible to identify the increase in both unemployment duration and incentive for informal work generated by the Brazilian UIP.

Gerard and Gonzaga (2012) used an econometric instrument based on regression discontinuity to estimate the effect of an extension of UIP payments on the search for employment as well as on the Brazilian labor market. The authors used the monthly job survey from 2003 to 2010 and RAIS data. One of the main results found by the authors was that with the expansion of the insurance coverage from three to five payments at most, there was a 50% decrease in the percentage of reemployment in the informal sector, and also that the moral hazard was reduced with the completion of the benefit.

Teixeira and Balbinotto Neto (2013, 2016) pointed out that the program does not have any influence on the beneficiaries' reemployment income, controlled by the length of stay in the last job. This result was obtained based on sharp discontinuity regression, as well as by the propensity score matching, based on the Brazil's National Sample Household Survey (PNAD) data for the years 2006 to 2009. In addition, the authors also used sharp discontinuity regression to analyze data only from the Brazilian Employment and Unemployment Survey from 2008 to 2012 and found that the program had a negative influence on the search for new jobs by both heads of families and children.

However, gaps are yet to be filled regarding the program, such as its effect on the length of employment for Brazilian workers, as well as on the probability of seeking employment while receiving the benefit, with little explored instruments, such as fuzzy discontinuity regression, which allows greater flexibility around the discontinuity point. These subjects will be highlighted next.

3. Indicators, Data, Manipulation Test and Discontinuity Regression

3.1 Indicator and Data

The analysis proposed uses data from the National Employment and Unemployment Survey (PED) by the Inter-Union Department of Statistics (DIEESE), from 2008 to 2014. This employment and unemployment survey refers to the metropolitan areas of the capital cities Fortaleza, Recife, Salvador, Belo Horizonte, São Paulo, Porto Alegre, and Brasília. The number of workers studied was 91,797, of which 8,024 were beneficiaries (treated group) and the others non-beneficiaries (control group). The data was grouped by year and the database was built with the following filters: (i) at the time of the survey workers were in an open unemployment situation, with no links to formal or informal work and not searching for a new job; (ii) workers had a signed employee's record book for the last job; (iii) workers had been dismissed without just cause from their last job; and (iv) the length of stay in the last job was greater than zero.

The first filter was used precisely because in order to have access to the benefit, the worker must be unemployed, that is, without any formal work links. The second concerns an important point which is to have worked formally in the last job, otherwise workers are not entitled to claim the benefit. The third is also a rule that defines the access to the benefit, since only workers dismissed without just cause are entitled to claim the benefit. Finally, the fourth filter is the tool that will be used to determine whether workers had access to the Unemployment Insurance Program.

The fourth filter has an important role in the analysis as this will simulate the experiment given that a worker will be registered as a claimant of the benefit or not according to the length of stay in the last job. However, since not everyone who is entitled to the benefit will claim it, for reasons that range from not meeting the minimum interval between one application and another for the benefit, to not using it due to the low value of the payment, the methodology based on a fuzzy regression discontinuity will be used firstly, followed by a sharp regression discontinuity. The descriptive statistics of the database are highlighted in table 1.

Table 1 shows that the majority of workers who were dismissed from their jobs in the period from 2008 to 2014 remained, at most, 12 months in their last job (60.59%) and this percentage is still higher among those considered children (69.08%), which reinforces the fact that young workers are the ones with the greatest incentive to change jobs in Brazil. Next, the total number of benefited and non-benefited workers is highlighted, and the beneficiaries are segmented by Unemployment Insurance payments (Table 2).

Table 1. Family position and length of time in the last job

Time in the last job (months)	Total		Head of Family		Partner		Child	
	Abs	%	Abs	%	Abs	%	Abs	%
1-3	21,967	23.93	4,035	17.81	4,909	21.08	13023	28.39
4-6	13,936	15.25	2,774	12.25	3,156	13.55	8006	17.48
7-9	7,888	8.66	1,845	8.14	1,869	8.02	4174	9.16
10-12	11,705	12.75	2,444	10.79	2,824	12.13	6437	14.05
13-15	2,756	3.06	792	1.32	658	2.82	1306	2.89
16-18	4,266	4.66	1,109	4.89	1088	4.67	2069	4.59
19-21	1,616	1.76	444	1.96	451	1.93	721	1.59
22-24	7,838	8.54	1,859	8.21	2131	9.16	3848	8.39
25 or more	19,631	21.39	7,293	32.21	6151	26.42	6187	13.49
Total	91,767	100	22,644	100	23279	100	4874	100

Source: National Employment and Unemployment Survey (2008-2014).

Table 2. Non-beneficiaries and beneficiaries by payments

Payments	Total		Head of Family		Partner		Child	
	Abs	%	Abs	%	Abs	%	Abs	%
0	83773	91.26	19126	84.46	21903	94.09	42744	93.18
1	2242	2.44	956	4.22	359	1.54	927	2.02
2	1870	2.04	822	3.63	294	1.26	754	1.64
3	1627	1.77	719	3.18	284	1.22	624	1.36
4	1441	1.57	628	2.77	277	1.19	536	1.17
5*	844	0.92	393	1.74	162	0.70	289	0.63
Total	91797	100	22644	100	23279	100	45874	100

Source: National Employment and Unemployment Survey (2008-2014). *Due to the low number of workers observed in the sixth and seventh payment, they were grouped into the fifth payment.

Table 2 shows that the proportion of beneficiaries represents about 8% of the sample, with a higher proportion of children (49.97%), followed by partners (25.35%) and heads of families (24.68%). However, among the latter, the greatest number of beneficiaries is about 13.54%, and most of them in the first three payments. Thus, the database can be characterized mostly by non-beneficiaries and children in the family position; for this reason, the analysis will be segmented into family positions, given the different proportions in the sample, as well as the responsibilities within the family. In the following section, the possibility of rule manipulation by the beneficiaries will be analyzed based on the test developed by Cattaneo, Janson and Ma (2016).

3.2 Manipulation Test and Discontinuity Regression

The rule manipulation analysis, based on Cattaneo, Janson and Ma (2016), defines that for a given sample, the random variable $\{X_i: i = 1,2 \dots, n\}$ has a cumulative distribution function (c.d.f) and a probability density function (p.d.f) given respectively by *F(x)* and *f(x)*. Each unit will be treated or control from a cutoff value of *X* denoted by c= 6 months in the last job. So, groups can be:

$$\text{Individual } i \text{ will be from the control group if } X_i < (c = 6\, months)$$
$$\text{Individual } i \text{ will be from the treatment group if } X_i \geq (c = 6\, months)$$

In the case under analysis, the variable X_i to be tested is the length of stay in the last job and *i* is the worker who is in the situation of open unemployment, that is, searching for a job and without any work links. The manipulation test evaluates the continuity hypothesis of the density function *f(.)* around the point *c* (cutoff). Formally, the following hypotheses are tested:

$$H_0 = \lim_{x \uparrow c} f(x) = \lim_{x \downarrow c} f(x) \qquad vs \qquad H_1 = \lim_{x \downarrow c} f(x) \neq \lim_{x \uparrow c} f(x)$$

In the construction of the test, we use the estimation of a density function $f(x)$ based on a local polynomial from the cumulative distribution function (c.d.f) of the sample. This estimator has several interesting features, including the fact that it does not need a predefined functional form and it is implemented quite intuitively. In addition, the estimator also

allows incorporating constraints on (c.d.f) and allows higher order derivatives in the density function, providing the test with a greater power of properties and implications[iv]. The statistical implementation of the test is performed as follows:

$$T_p(h_n) = \frac{\hat{f}_{+,p}(h_n) - \hat{f}_{-,p}(h_n)}{\hat{V}_p(h_n)}, \qquad \hat{V}_p^2(h_n) = \hat{V}[\hat{f}_{+,p}(h_n) - \hat{f}_{-,p}(h_n)] \tag{1}$$

where $T_p(h_n)$ is the critical value calculated in the test, based on the differences of the distributions estimated from the local polynomials of the values before and after the cutoff, and $\hat{V}_p(h_n)$ is the standard deviation estimator of the difference between distributions.

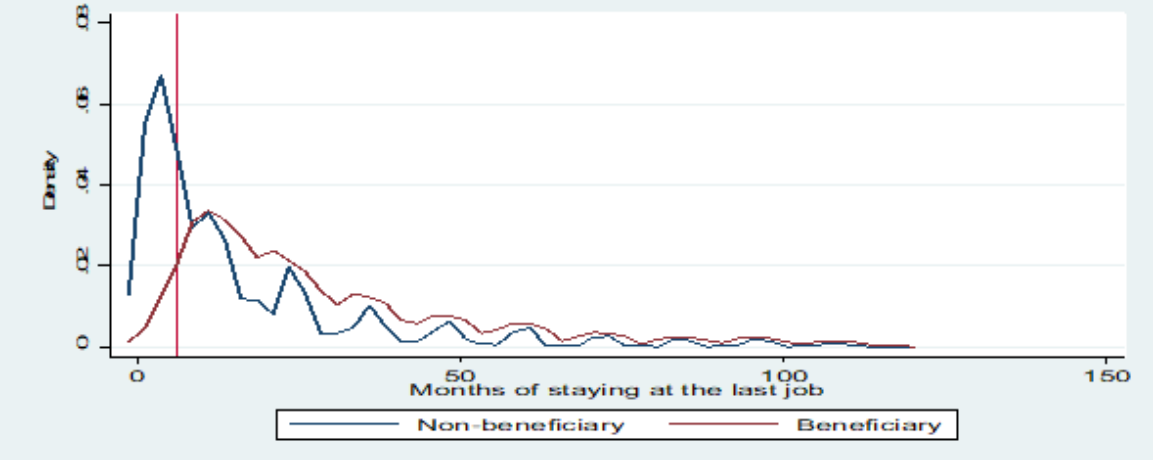

Figure 1. Kernel Density of the length of stay in the last job

Source: National Employment and Unemployment Survey (2008-2014).

Figure 1 shows that there is strong evidence that the distributions of length of stay in the last job concentrate around six months (red vertical line), which is the necessary time to be eligible for the program. This indicates the presence of rule manipulation; however, it is still a preliminary and not very robust result. Next, the formalization of regression discontinuity is discussed, a methodology that will be used to evaluate the presence of moral hazard.

The main virtue of using regression discontinuity instruments is that they explore arbitrary rules that determine the treatment, thus generating natural experiments. Therefore, based on the discontinuity point, the treatment is locally random, enabling the estimation of the treatment mid effect without the problem of selection bias. However, the limitation of the method is directly associated with the cutoff distance and the randomness of the variable to be used as an instrument (LEE AND LEMIEUX, 2010).

According to Lee (2008), when the treatment variable is fully defined by x_i, the sharp regression discontinuity can be applied. Conversely, when the treatment variable is determined by x_i, but with some residue, then the fuzzy regression discontinuity should be used. In practice, a sharp regression discontinuity is rarely observed, since access to the treatment is defined by many aspects and cannot always be captured entirely.

However, for this case the selection on observables is given by $x \simeq \tau$, x is the length of stay in the last job, and τ is the time required to apply for the benefit, if the propensity score $E(d|x)$ has any breaks around τ, and if $lim_{x \to \tau} E(u_j|x) = 0$, then the fuzzy regression discontinuity can be applied.

The main difference between fuzzy and sharp regression discontinuity is that $E(d|x)$ has a break in $x = \tau$, but with unknown magnitude.

$$lim_{x \downarrow \tau} E(d|x) - lim_{x \uparrow \tau} E(d|x) \neq 0 \tag{2}$$

Therefore, the characterization of the treatment effect on the subpopulation $x \simeq \tau$ in the fuzzy regression discontinuity can be seen in the following model:

$$lim_{x\uparrow\tau}E(y|x) = \beta_d lim_{x\uparrow\tau}E(d|x) + lim_{x\uparrow\tau}\, g(x) + lim_{x\uparrow\tau}E(u|x) \quad (3)$$

and

$$lim_{x\downarrow\tau}E(y|x) = \beta_d lim_{x\downarrow\tau}E(d|x) + lim_{x\downarrow\tau}\, g(x) + lim_{x\downarrow\tau}E(u|x) \quad (4)$$

$$=> lim_{x\uparrow\tau}E(y|x) - lim_{x\downarrow\tau}E(y|x) = \beta_d[lim_{x\uparrow\tau}E(d|x) - lim_{x\downarrow\tau}E(d|x)] \quad (5)$$

$$\beta_d = \frac{lim_{x\uparrow\tau}E(y|x) - lim_{x\downarrow\tau}E(y|x)}{lim_{x\uparrow\tau}E(d|x) - lim_{x\downarrow\tau}E(d|x)} \quad (6)$$

Note that $lim_{x\to\tau}E(u|x) = 0$. Where β_d is seen as the ratio between the differences, and the denominator is equal to one, this is a case of sharp regression discontinuity, otherwise it is the fuzzy design.

In a more instructive way, β_d can be represented as:

$$\beta_d = \frac{The\ total\ effect\ of\ \ x\ on\ y\ given\ x=\tau}{the\ effect\ of\ x\ on\ d\ where\ x=\tau} \quad (7)$$

The direct effect refers to $lim_{x\uparrow\tau}\, g(x) - lim_{x\downarrow\tau}\, g(x)$ which is zero given $x = \tau$. Then the local effect becomes the indirect effect of *x* on *y* from the relation of $x \to d \to y$, which is the effect produced by *x* (time in last job) on *d* (program access) and the effect of *d* on *y* (job search in the last week). In the structural Sharp model, with a pth-order polynomial, the estimates can be represented by:

$$Y_i = \propto + \beta_1 x_i + \beta_2 x_i^2 + \cdots + \beta_p x_i^p + \rho D_i + \vartheta_i \quad (8)$$

where again, $D_i = 1(x_i \geq c)$ is discontinuous in $x_i = c$ and ρ is the local effect the unemployment insurance benefits about job search in the last week.

When exploits discontinuities in the probability of treatment conditional on x_i, we use a Rd Fuzzy, in two stage. The first stage in this case is:

$$D_i = \gamma_0 + \gamma_1 x_i + \gamma_2 x_i^2 + \cdots + \gamma_p x_i^p + \pi T_i + \varepsilon_{1i} \quad (9)$$

where π is the first-stage effect to T_i.

The Fuzzy Rd is obtained by substituting (8) into (9):

$$Y_i = \mu + k_1 x_i + k_2 x_i^2 + \cdots + k_p x_i^p + \rho\pi T_i + \varepsilon_{2i} \quad (10)$$

where $\mu = \propto + \rho\gamma_0$ and $k_j = \beta_j + \rho\gamma_i$ for *j*=1,…, *p*. In this case, the local UIP effect about job search in the last week is $\rho\pi$ when $T_i = 1(x_i \geq c)$.

4. Results and Discussion

The table 3 highlights the estimated levels of the "T" statistic, which indicates whether rule manipulation exists based on the instrument defined as length of stay in the last job. The null hypothesis of the test indicates that there is no manipulation, since the alternative indicates the existence of manipulation, as defined by Cattaneo, Janson and Ma (2016), based on the *rddensity* algorithm and six-month cutoff windows.

Table 3. Analysis of rule manipulation

		Windows in months				
Family position	Tests	<=0.8	<=1	<= 1.5	<= 2	<=2.5
Head of family	Conventional	32.8169*** (0.000)	28.9022*** (0.000)	29.1577*** (0.000)	29.0102*** (0.000)	29.0501*** (0.000)
	Undersmoothed	32.6611*** (0.000)	30.2498*** (0.000)	30.8329*** (0.000)	30.3408*** (0.000)	30.4018*** (0.000)
	Robust	32.8082*** (0.000)	34.5283*** (0.000)	33.5696*** (0.000)	34.0103*** (0.000)	33.8428*** (0.000)
Partner	Conventional	30.2703*** (0.000)	33.1359*** (0.000)	33.1749*** (0.000)	33.0881*** (0.000)	33.0796*** (0.000)
	Undersmoothed	-0.7339 (0.4630)	-0.7339 (0.4630)	-0.7339 (0,4630)	-0.7339 (0.4630)	-0.7339 (0.4630)
	Robust	6.6573*** (0.000)	14.7297*** (0.000)	14.7297*** (0.0000)	14.7297*** (0.000)	14.7297*** (0.000)
Child	Conventional	56.5497*** (0.000)	56.5420*** (0.000)	56.5491*** (0.000)	56.5493*** (0.000)	56.5539*** (0.000)
	Undersmoothed	56.5678*** (0.000)	56.5704*** (0.000)	56.5579*** (0.000)	56.5579*** (0.000)	56.5712*** (0.000)
	Robust	56.0928*** (0.000)	56.3893*** (0.000)	56.4951*** (0.000)	56.4930*** (0.000)	56.4566*** (0.000)

Source: Research results.

The results of the "T" statistics show the presence of manipulation in the rule that gives access to the UIP to the three positions analyzed in the family and in five different time windows within the six months. The closer the window is to zero, the greater the proximity of the distributions observed around the cutoff point, which is six months. The results indicate that there is no randomness around the cutoff point, that is, the length of stay in the last job is manipulated based on the time required to access the benefit. This result supports the fact that the UIP promotes turnover in the labor market, with implications for investment in human capital and consequently, the low productivity of the Brazilian worker, as indicated by Camargo (2004).

What follows in table 4 is an analysis of the effect of receiving the benefit on the probability of job seeking by the workers who are in an open unemployment situation. Since there is evidence on the manipulation of the rule that gives access to the benefit, as shown in table 3, , it was decided that the test would be done with different windows of length of stay in the last job and with a first-degree polynomial.[v]

Table 4. Probability of searching for employment non-parametric fuzzy regression

Payment	Position	Intervals with cutoff = 6 months (180 days)					
		0.5		1.0		1.5	
		β/1°	β/2°	β/1°	β/2°	β/1°	β/2°
1st	Head	0.031*	1.213	0.027*	-2.245*	0.0196*	-3.233*
	n=6192	(0.004)	(13.257)	(0.004)	(1.119)	(0.0568)	(1.998)
	Partner	-0.001	-0.988	0.004*	-3.995	0.004*	-3.789
	n=6244	(0.003)	(22.118)	(0.002)	(4.991)	(0.002)	(5.415)
	Child	0.008	-3.444	0.008*	-3.444	0.015*	-2.700*
	n=15905	(0.002)	(3.493)	(0.002)	(3.493)	(0.002)	(0.875)
2nd	Head	0.020*	1.687	0.022*	-2.740*	0.014*	-4.521
	n=6166	(0.003)	(10.908)	(0.005)	(1.355)	(0.005)	(2.922)
	Partner	0.0004	4.816	0.004	-3.942	0.004*	-3.721
	n=6238	(0.003)	(33.114)	(0.002)	(4.830)	(0.002)	(5.209)
	Child	-0.102	2.040	0.011*	-3.742*	0.011*	-3.911*
	n=15849	(0.117)	(3.723)	(0.001)	(1.209)	(0.001)	(1.248)
3rd	Head	0.025	1.496	0.019*	-3.398*	0.017*	-3.889
	n=6157	(0.003)	(16.662)	(0.004)	(1.743)	(0.004)	(2.366)
	Partner	0.003	1.938	0.005*	-2.865	0.005*	-2.612
	n=6236	(0.002)	(10.099)	(0.002)	(3.698)	(0,002)	(3.845)
	Child	0.009*	-3.749	0.009*	-4.454*	0.009*	-4.603*
	n=15867	(0.001)	(2.533)	(0.001)	(1.503)	(0.001)	(1.536)
4th	Head	0.014	2.824	0.014*	0.006	0.003	-1.6824
	n=6127	(0.002)	(29.494)	(0.002)	(0.004)	(0.005)	(2.6114)
	Partner	-0.003	-0.773	0.0006	-2.722	0.0003	-4.373
	n= 6218	(0.004)	(7.673)	(0.002)	(10.891)	(0.002)	(32.049)

	Child	0.002*	-1.378	0.002*	-1.970*	0.002*	-2.166*
	n=15795	(0.0007)	(10.678)	(0.0009)	(1.019)	(0.0009)	(1.178)
	Head	0.004*	8.040	0.003	-1.831	0.003	-1.893
	n=6068	(0.001)	(9.420)	(0.002)	(1.343)	(0.002)	(1.543)
5th	Partner	0.001*	3.3199	0.002*	-7.182	0.0002	-6.542
	n=6199	(0.0009)	(22.438)	(0.0008)	(9.071)	(0.0008)	(9.408)
	Child	0.002*	-12.356	0.0003	-11.113	0.0002	-2.014
	n=15753	(0.0007)	(9.423)	(0.0008)	(24.622)	(0.0008)	(7.942)

Source: Research results from National Employment and Unemployment Survey data. Significance p≤0.1 *.

Although evidence of rule manipulation indicates non-randomness at around six months, estimates were still made with three intervals of 3 months, 6 months and 12 months of difference in relation to the cutoff, as a way to identify some patterns regarding the search for employment by the workers under analysis. The results show that the length of stay in the job is a significant tool to indicate receipt of the unemployment insurance and that workers considered heads of families and children who were receiving the benefit showed lower probabilities of searching for a job in the previous week than workers in the same category who were not. However, as a way of adding robustness to these studies, other analyses were carried out with small changes in the cutoff, in order to reduce the effect of non-randomness indicated by the rule manipulation tests. Table 5 shows the analysis when the time required for the worker to be considered for the benefit was five months in the last job.

Table 5. Search for employment non-parametric fuzzy regression[vi]

Payment	Position	Intervals with cutoff = 5 months (150 days)					
		0.5		1.0		1.5	
		β/1°	β/2°	β/1°	β/2°	β/1°	β/2°
	Head	0.007	-8.2615	0.016*	-4.312*	0.009	-6.394
	n=6192	(0.009)	(13.504)	(0.005)	(2.216)	(0.007)	(6.886)
1st	Partner	-0.0005	-2.431	-0.0005	4.822	-0.004	2.747
	n=6244	(0.003)	(3.875)	(0.002)	(19.608)	(0.003)	(6.740)
	Child	-0.0004	3.471	0.009*	-4.957*	0.012*	-3.043*
	n=15905	(0.003)	(4.122)	(0.002)	(1.954)	(0.002)	(1.232)
	Head	-0.018*	3.515	0.011*	-5.975*	-0.005	10.802
	n=6166	(0.009)	(3.086)	(0.005)	(3.550)	(0.007)	(15.102)
2nd	Partner	-0.003*	-2.971	0.0004	-4.779	0.002	5.470
	n=6238	(0.0003)	(5.066)	(0.002)	(5.032)	(0.003)	(16.033)
	Child	0.007*	-2.904	0.009*	-4.997*	0.010*	-3.943*
	n=15849	(0.003)	(3.686)	(0.001)	(1.741)	(0.001)	(1.502)
	Head	0.021*	-2.775	0.010*	-6.725*	0.018*	-3.205
	n=6.157	(0.007)	(2.515)	(0.004)	(3.955)	(0.005)	(2.397)
3rd	Partner	-0.0021*	-5.393	0.0006	-2.907	0.001	-4.970
	n=6.236	(0.0003)	(9.757)	(0.002)	(10.354)	(0.002)	(9.993)
	Child	0.0009	6.233	0.004*	-9.893*	0.006*	-5.876*
	n=15.867	(0.003)	(8.546)	(0.001)	(4.622)	(0.001)	(2.542)
	Head	-0.003	-5.7857	0.00217	-3.462	-0.0002	-6.587
	n=6.127	(0.007)	(6.965)	(0.004)	(6.405)	(0.006)	(7.889)
4th	Partner	0.153	1.153	0.153	1.153	-0.0005	3.891
	n= 6.218	(0.134)	(1.214)	(0.134)	(1.214)	(0.001)	(4.566)
	Child	-0.004*	4.108	-0.001*	2.012	-0,0004	1.349
	n=15.795	(0.001)	(6.264)	(0.0009)	(3.412)	(0.008)	(1.528)
	Head	-0.0004	1.419	0.003*	-1.362	0.001	-6.534
	n=6.068	(0.003)	(1.512)	(0.002)	(1.356)	(0.002)	(19.793)
5th	Partner	-0.0001	-7.328	0.0008	-2.393	0.001	-5.761
	n=6.199	(0.0001)	(15.282)	(0.001)	(3.913)	(0.001)	(20.086)
	Child	0.0002	-7.842	0.0002	2.163	0.0003	-11.109
	n=15.753	(0.001)	(25.625)	(0.0008)	(8.319)	(0.0008)	(27.487)

Source: Research results from National Employment and Unemployment Survey. Significance p≤0.1*.

Analyzing the results with the change in the cutoff to five months, it can be observed that there was practically no change, which indicates that there is a lower probability of searching for employment among the heads of families and children, particularly up to the third benefit payment. From the fourth to the fifth payment, the probability of searching for employment among beneficiaries and non-beneficiaries did not show statistically significant differences. These

results indicate the presence of moral risk in the Unemployment Insurance Program, especially among the first three payments of the benefit.

In order to deepen the analysis on the beneficiaries, the search for employment among the benefited workers was investigated. The analysis was performed using the length of stay in the last job, because according to the benefit regulations until 2014, if the worker proved to have worked between six months up to 11 months, he/she would be entitled to three payments, between 12 months and 23 months, he/she would be entitled to four payments, and if he/she could prove 24 months or more, that would correspond to five payments. The analysis in table 6 evaluates, at first, the effect of workers who stayed approximately 12 months or 360 days in the last job, given that if the worker stayed for less than 12 months, he/she was entitled to three payments, and four payments for those who worked more than 12 months. In the second moment, the analysis was performed with the focus on the workers who were receiving between the fourth and fifth payment of the benefit, since the focal point of the analysis was 24 months or 720 days. Estimates were made based on the sharp regression discontinuity design.

Table 6. Search for employment non-parametric regression

Grade	Position	Cutoff (360 days)			Cutoff (720 days)		
		0.5	1.0	1.5	0.5	1.0	1.5
		B	β	B	B	B	β
1 °	Head	0.040	-0.069	0.034	0.050	0.079	0.080
		(0.109)	(0.082)	(0.107)	(0.107)	(0.097)	(0.084)
	Partner	0.451	0.330	0.250	0.041	0.042	0.042
		(0.273)	(0.210)	(0.186)	(0.104)	(0.106)	(0.105)
	Child	-0.160*	-0.164*	-0.158*	0.171	0.038	0.076
		(0.069)	(0.072)	(0.068)	(0.159)	(0.060)	(0.076)
2 °	Head	-0.073	-0.054	0.087	-0.090	0.096	0.056
		(0.115)	(0.106)	(0.146)	(0.263)	(0.108)	(0.127)
	Partner	0.809	0.294	0.283	0.156	0.154	0.195
		(0.465)	(0.251)	(0.210)	(0.203)	(0.203)	(0.220)
	Child	-0.196*	-0.166*	-0.161*	0.470	0.275	0.256
		(0.098)	(0.082)	(0.081)	(0.383)	(0.169)	(0.149)
3 °	Head	-0.285*	-0.394*	-0.318*	-0.180	0.060	0.057
		(0.115)	(0.125)	(0.118)	(0.278)	(0.134)	(0.146)
	Partner	0.396	0.352	0.314	0.176	0.162	0.197
		(0.332)	(0.311)	(0.282)	(0.247)	(0.233)	(0.270)
	Child	-0.218*	-0,178*	-0,201*	0.529	0.357	0.261
		(0.123)	(0.079)	(0.116)	(0.474)	(0.250)	(0.176)

Source: Research results from National Employment and Unemployment Survey. Significance p≤ 0.1*.

Table 6 shows that the search for employment by beneficiaries was different, particularly among beneficiaries who stayed more than one year in their last job, compared to those who remained for less than one year. This result indicates that workers entitled to more than three payments showed a decreased search for employment, especially the children and the heads of families. Among the children, the values found for the probability of searching for employment were between -21.80% and -15.08%, whereas for the heads of families, the values were statistically different only when a third degree polynomial was used, leaving a difference of between -39.40% and -28.50%, which demonstrates reduced robustness.

Thus, the results point to the existence of rule manipulation by workers to have access to the UIP, which in turn intensifies the increase in turnover of the Brazilian labor market and generates low incentives for investment in human capital by companies, as well as a significant increase in the number of benefits paid by social security. In addition, when entering the program, the workers who are heads of families and the children presented lower probabilities of searching for employment, particularly up to the third payment of the benefit, demonstrating the existence of moral hazard in the Brazilian UIP.

5. Conclusions

The purpose of this article was to examine the existence of rule manipulation and of moral hazard in the Brazilian UIP. The analysis of rule manipulation was based on the benefit's eligibility rule, and the moral risk issue based on the search for employment by the workers. This paper contributes to the literature, especially about the influence of the program on the Brazilian labor market, which has been discussed but has not yet evaluated, as well as strengthening the fact of the presence of moral hazard.

Concerning the results for rule manipulation, it was found that for the heads of family, the partners, and the children, there

is manipulation of the length of stay in the job, based on the minimum time necessary to access the UIP. This fact reveals that the Brazilian workers are influenced by the program as to the length of stay in the job. This means the benefit could be encouraging turnover in the Brazilian labor market, enhancing the low incentive for companies to invest in human capital and with this, generating the average low productivity of the national worker. Moreover, when analyzing the presence of moral hazard based on the search for employment between the beneficiaries and non-beneficiaries, there was an indication that there is a difference in the search for employment, especially between the heads of families and the children. When the analysis is restricted to the beneficiaries, the workers entitled to more than three payments showed a reduction in the search for employment, especially the children and the heads of families, compared to workers who were entitled to just three payments. Among the children, the values for the probability of searching for employment were between -21.80% and -15.08%, while for the heads of families the values were statistically different only when a third-degree polynomial was used, leaving the difference between -39.40% and 28.50%, corroborating with the results stated by authors such as Gerard and Gonzaga (2012) and Teixeira and Balbinotto Neto (2013).

Therefore, with these results, a reformulation of the Brazilian UIP is suggested in order to minimize the interference of the program with the national labor market, organized in such a way as to encourage a greater length of stay for workers in their jobs, which will motivate companies to invest in training and professional qualifications of their employees. In addition, the program with greater inclusion restrictions should offer vocational training vacancies to workers who indeed need retraining or even training. This in turn would facilitate monitoring and assist in employability and will impact the increase in the reinsertion wage for Brazilian beneficiaries and the efficient allocation of the resources coming from the workers themselves to the Workers Assistance Fund.

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References

Amadeo, E., & Camargo, J. M. (1995). *Regulations and flexibility of the labor market in Brazil (No. 335)*. Texto para discussão.

Ambrózio, A. M. H. P. (2003). *Três Ensaios sobre Imperfeições no Mercado de Trabalho*. Rio de Janeiro. Tese de doutorado, PUC/RJ.

Andrade, C. S. M., Leite, A., & Ramos, F. (2010) *Problemas de incentivo no Seguro-Desemprego brasileiro:* Abordagem através de um modelo principal agente dinâmico. XXXVIII Encontro Nacional de Economia. Salvador, Bahia.

Balbinotto, N. G., & Zylberstajn, H. (1999). *O seguro desemprego eo perfil dos segurados no Brasil: 1986-1998*. Universidade Federal do Rio Grande do Sul, Programa de Pós-Graduação em Economia.

Balbinotto, N. G., & Zylberstajn, H. (2002) *Uso repetido do Seguro-Desemprego no Brasil-1986-1998*: teorias e evidências. *Economia, 3*, 265-301.

Barros, R. P., Corseuil, C. H., & Foguel, M. N. (2000) *Os incentivos adversos e a focalização dos programas de proteção ao trabalhador no Brasil*. Brasília, DF: IPEA, Texto para discussão, nº784, 2000.

Camargo, J. M. (2004) *Política social no Brasil*: prioridades erradas, incentivos perversos. *São Paulo em Perspectiva, 18*(2), 68-77. https://doi.org/10.1590/S0102-88392004000200008

Card, D., Chetty, R., & Weber, A. (2007). Cash-on-hand and competing models of intertemporal behavior: New evidence from the labor market. *The Quarterly journal of economics*, *122*(4), 1511-1560. https://doi.org/10.1162/qjec.2007.122.4.1511

Carvalho, A. B. (2010). *Unemployment Insurance an analysis of Optimal Mechanisms under aggregate shocks.* Dissertação de mestrado, Fundação Getúlio Vargas-FGV/RJ, p.44.

Cattaneo, M., Janson, M., & Ma, X. (2016). *Rddensity: Manipulation Test based on Density Discontinuity***.** *The Stata Journal (xxxx), vv*(ii), 1-18. https://doi.org/10.1177/1536867X1801800115

Chahad, J. P. Z. (1984). *O Seguro-Desemprego no Cenário Internacional*. Instituto de Pesquisa Econômica - IPE-USP.

Chahad, J. P. Z. (1999a). As transformações no mundo do trabalho e o futuro do Seguro-Desemprego no Brasil: Elementos a serem considerados num programa moderno. In: *VI Encontro Nacional de Estudos do Trabalho – ABET*. RJ, 3, 20-35.

Chahad, J. P. Z. (1999b). *As bases para a reformulação do programa brasileiro de Seguro- Desemprego e sua integração com o sistema público de emprego*. São Paulo: Convênio Fipe/MTE, (Relatório Final de Pesquisa).

Chahad, J. P. Z. (2000). O Seguro-Desemprego no Contexto do sistema público de emprego e o seu papel no combate à pobreza no caso brasileiro. In*: Desigualdade e Pobreza no Brasil*. Cap.20. São Paulo, USP.

Chahad, J. P. Z., & Fernades, R. (2002). O Seguro - Desemprego e a trajetória ocupacional na força de trabalho brasileira. In: *Mercado De Trabalho No Brasil: Salário, Emprego e Desemprego Numa era de Grandes Mudanças*. (org) Chahad, J. P. Z.; Menezes Filho, N. A. São Paulo: LTr, p.20-53.

Cunningham, W. V. (1997). Unemployment Insurance in a Multi-Sectoral Labor Market: The Case of Brazil. *processed, University of Illinois, Urbana-Champaign*.

DIEESE. Departamento Intersindical de Estatística e Estudos Sócio-Econômicos. *Pesquisa de Emprego e Desemprego – PED, 2008 a 2014*. Disponível em: http://www.dieese.org.br

Fan, J., Gijbels, I., Hu, T. C., & Huang, L. S. (1996). A study of variable bandwidth selection for local polynomial regression. Statistica Sinica, 113-127.

Firpo, S., Pieri, R., Pedroso, J., & Souza, A. P. (2014). Evidence of elegibility manipulation for condicional cash transfer programs. *Revista de Economia, 15,* 243-260. https://doi.org/10.1016/j.econ.2014.09.001

Gelman, A., & Imbens, G. (2014). *Why High-order Polynomials Should not be Used in Regression Discontinuity Designs*. NBER Working Paper n °20405. https://doi.org/10.3386/w20405

Gerard, F., & Gonzaga, G. (2012) *Social Insurance under Imperfect Monitoring*: Labor market and welfare impacts of the Brazilian UI program. Texto para discussão.

Hijzen, A. (2011). *The Labour Market Effetcts of Unemployment Compesantion in Brazil.* OECD Social, Employment and Migration. Working Papers, n °119.

Hopenhayn, H., & Nicolini, J. P. (1997). Optimal unemployment insurance. *Journal of Political Economy, 105*(2), 412-438. https://doi.org/10.1086/262078

Hopenhayn, H., & Nicolini, J. P. (2002). *Optimal unemployment insurance and employment history.* Mimeo, Universidad Tourcuato Di Tella.

Lalive, R. (2007). Unemployment benefits, unemployment duration, and post-unemployment jobs: A regression discontinuity approach. *American Economic Review*, *97*(2), 108-112. https://doi.org/10.1257/aer.97.2.108

Lee, D. S. (2008). Randomized experiments from non-random selection in US House elections. *Journal of Econometrics, 142*(2), 675-697. https://doi.org/10.1016/j.jeconom.2007.05.004

Lee, D. S., & Lemieux, T. (2010) Regression discontinuity designs in economics. *Journal of Economic Literature, 2,* 281-355. https://doi.org/10.1257/jel.48.2.281

Margolis, D. N. (2008). *Unemployment Insurance versus Individual Unemployment Accounts and Transitions to Formal versus Informal Sector Jobs*. Centre d'Economie de la Sorbonne mimeo.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of econometrics, 142*(2), 698-714. https://doi.org/10.1016/j.jeconom.2007.05.005

Pavoni, N. (2006). On optimal unemployment compensation. Journal of Monetary Economics, p.1-19.

Robalino, D. A., Zylberstajn, E., & Robalino, J. (2011). *Incentive effects of risk pooling, redistributive and savings arrangements in unemployment benefit systems: Evidence from a job-search model for Brazil.* IZA Discussion Papers 5476, Institute for the Study of Labor (IZA).

Schmieder, J. F., Von Wachter, T., & Bender, S. (2012). The long-term effects of UI extensions of employment. *American Economic Review, 102,* 514-519. https://doi.org/10.1257/aer.102.3.514

Shavell, S., & Weiss, L. (1979). The optimal payment of unemployment insurance benefits over time. *Journal of Political Economy, 87,* 1347-1362. https://doi.org/10.1086/260839

Teixeira, G., & Balbinotto Neto, G. (2016). *Seguro-Desemprego brasileiro e salário de reinserção*: análise empírica com regressão com descontinuidade e propensity score matching. *Revista Nova Economia, 26*(3). https://doi.org/10.1590/0103-6351/2215

Teixeira, G., & Balbinotto, N. G. (2013). *Ensaios sobre o Seguro-Desemprego no Brasil*: *teorias e evidências.* Programa de Pós-Graduação em Economia – UFRGS. Tese de doutorado, p.150.

Uusitalo, R., & Verho, J. (2010). The effect of unemployment benefits on re-employment rates: Evidence from the Finnish unemployment insurance reform. *Labour Economics, 17*(4), 643-654. https://doi.org/10.1016/j.labeco.2010.02.002.

Zylberstajn, E., & Ribeiro, F. (2010). *Unemployment insurance and transitions into unemployment: Evidence from Brazil.* In 4 ªConfer ência Brasileira de Rela ções de Emprego e Trabalho, 2010, S ão Paulo.

Notes

Note i: An application of the McCrary test for Brazil can be found in Firpo et. al. (2014).

Note ii: According to Barros, Corseuil and Foguel (2000), for the employed worker, unemployment insurance represents a subsidy to the search for a better employment to which access should be given only when dismissed without just cause. In this sense, unemployment insurance encourages the induced dismissal, especially during periods of economic recovery. As a result, this reduction in the length of an employment relationship has negative impacts on investments in specific human capital, productivity and wage level.

Note iii: In Schmieder et al. (2012), the authors replicated their results using the impact of the program only on the workers aged 42 and found a result of 0.20 months.

Note iv: For an introduction to the conventional technique of local polynomials, see Fan and Gijbel (1996).

Note v: As suggested by Gelman and Imbens (2014), polynomials were used in the estimations up to a maximum of three degrees, but due to space limitations the results had to be suppressed from the analysis, however the results remained stable.

Note vi: In addition to the 5-month analysis, the results were also tested for 7 and 9 months of stay in the last job, and the results were similar, but due to space limitations, the results were not presented.