THE EFFECTS OF BEING OUT OF THE LABOR MARKET ON SUBSEQUENT WAGES: EVIDENCE FOR URUGUAY

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The effects of being out of the labor market on subsequent wages: evidence for Uruguay[1]

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Abstract

Based on administrative data combining workers' earnings histories and unemployment insurance benefits, we document short and long term wage losses for a large sample of Uruguayan formal workers with high tenure. We are able to study how wage losses vary across age groups, gender, industry and size of the firm. We also assess differences between switchers and non switchers, and consider the effect of the economic cycle. Our data allows providing original evidence about the smoothing role of the unemployment insurance program, even in a developing country. Our main findings indicate that workers loose around 48% of their pre-displacement wages in the first quarter after displacement, and after five years, losses are still 3%.

Keywords: wage losses, displacement

JEL: J31, J63, 65

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Introduction

In any economy enters and exits from the labor market may obey to different reasons: sectoral reallocation, technological change, growth fluctuations, low employee performance, voluntary quits, among other reasons. Evidence has shown that events of displacement have a cost in terms of wage or earning looses, and this cost may be significant and persistent. This evidence on this topic mainly comes from developed countries, as longitudinal data at the individual level is still scarce in developing ones. The objective of this paper is to explore the wage loss associated with episodes out of the formal labor market in Uruguay. We consider the magnitude and the temporal pattern of these losses, using program evaluation techniques as proposed by Jacobson, LaLonde and Sullivan (1993). Our study is based on administrative records from the main Uruguayan social security institution (*Banco de Previsión Social),* and covers the period 1997-2010. We analyze heterogeneity in wage looses considering different groups of workers. We are also able to combine labor history and unemployment insurance records, to illustrate about the smoothing role of unemployment insurance in Uruguay.

1. The effects of job separation on subsequent wages

The common understanding of the term displacement in the related literature is that a displaced worker is an individual with established work history, involuntary separated from his job by mass layoff or plant closure and who has little chance of being recalled to job with his previous employer (Kletzer, 1998). Displacement is then usually associated with structural change, sectoral reallocation or technological innovation. Under this definition, those who loose their jobs because of their individual performance, or those who quit their jobs, should not be included in the population of displaced workers, although deviations from this strict definition are usually found in the empirical literature. In some cases the distinction between quits and displacement is not clear, for example if wage changes induce some workers to quit. In other cases, like ours, the information does not allow to strictly identify displaced workers, as explained later. Nevertheless, the theoretical explanations for the wage loss associated to displacement are still valid for our population.

The literature identifies several reasons that may explain the negative displacement effects found in the empirical literature (see Fallick, 1996; Kletzer, 1998; among others)

The main argument comes from human capital theory, as displaced workers may lose firm specific or industry specific human capital when out of the labor force. Theory suggests that displaced workers with longer tenure should be the most negatively affected, as they have more specific skills and earned a tenure wage premium in their previous job. Nevertheless, in order for this explanation to account for the persistent drops in wages found in the empirical literature, the deterioration of human capital should be highly persistent. On this line, the wage loss should be higher if the industry implies high specific human capital accumulation, and if workers change industries when they return to the labor market. Moreover, if employers invest less in specific human capital for women, given their higher probability of interruption during labor life, female wage losses should be less than male ones.

Other explanation comes from the job search and matching theory. It is postulated that displaced workers end up accepting job matches of worse quality than the previous they had. Workers may end up lowering their reservation wage and incurring in a wage loss. Again, effects should be higher for longer tenure workers, as they had fewer quits and layoffs, indicating that their previous job match was a good one.

The signaling argument postulates that employers may consider unemployment as an indicative of the quality of the worker, and this may result in wages lower than marginal productivity in the beginning of a new labor relation after an unemployment episode (Lockwood, 1991).

Wage losses after displacement may also obey to the fact that workers where paid a wage premium in their previous job. In these cases, job separation may imply the loss of industrial or union wage premiums, for example associated to the presence of strong unions. Wage premium in pre displacement jobs may also be explained by efficiency wages theory, as a way to improve workers' productivity.

Macroeconomic factors may be important in the analysis of losses of displaced workers. Outcomes for displaced workers are heavily influenced by the economic conditions: poor local and industry conditions increase wage losses (Fallick, 1996). Cyclical conditions at the time of workers' job losses have substantial and long lasting effects on their earnings (Jacobson et al, 1993).

As argued by Appelqvist (2007), although there are several frameworks that may explain empirical findings, little theoretical research has been done to model the mechanism related to displacement effects, and it has not been possible to distinguish empirically between different alternatives. For example, the fact that post displacement

earnings of workers who change industry are lower than those of comparable individuals who stay in the same industry may reflect loss of specific human capital, but it may also be the consequence of union rents, incentive pay schemes or internal labor markets. Moreover, alternative explanations probably operate jointly, making the empirical separation even more difficult.

2. Evidence on wage losses of displacement

The first empirical studies were undertaken during the 80s for the US, estimating the difference between pre and post displacement earnings of displaced workers (Addison and Portugal, 1989; Kletzer, 1989, for a revision see Hammermesh, 1989). Three main drawbacks in this methodology are identified by Jacobson, LaLonde and Sullivan (1993) (JLS). First, macroeconomic conditions which make workers' earnings change, even if they are not displaced, are not considered. Second, it does not account for the earnings growth that would have occurred in the absence of job loss. Third, the economic situation of the firms may have negatively affected workers' earnings before the event of displacement takes place. In an innovative attempt to avoid these problems, JLS propose a new method, borrowing techniques from impact evaluation literature. They define displaced workers' earnings losses as the difference between their actual and expected earning if the displacement had not taken place. In this way, they are comparing the earnings of displaced workers with a similar control group that did not experience displacement. This methodology has been widely used in more recent empirical studies. The review presented in Couch and Placzek (2010) indicates that a broad spectrum of studies for U.S have found that displaced workers suffer substantial and persistent reductions in wages, on the order of 10 to 25 percent. Most of these estimations are based on the Displayed Workers Survey (DWS) and the Panel Study of Income Dynamic (PSID). Among these studies, JLS find that workers in Pennsylvania lose around 40% of their wages in the first year after displacement, and six years after displacement the loss is still very high, around 25%. Results from Couch and Paczek (2010) for Connecticut indicate that initial wage losses range from 32 to 33% in cases of mass layoff, and are still 12 to 15% six years later. Workers not dismissed as part of a mass layoff present similar initial wage losses, but after six years the earnings reduction is around 7 to 9%.

The evidence for European countries is less clear, as some studies conclude that wage loss is large, while others argue that it is reduced. Despite their different results, studies seem to agree on the fact that the loss is larger for workers who experience unemployment or non-employment episodes for more than one year (Carneiro and Portugal, 2006; Appelqvist, 2007).

When it comes to developing countries, the evidence is scarce. Kaplan *et al* (2005) study the Mexican case and find that longer tenure workers experience bigger wage losses in some periods but not in others. According to them, variations in labor market conditions explain the wide range of displacement effects produced in the literature. In periods of economic expansion, displaced workers receive higher wages than non-displaced workers when obtaining a new job. Galiani and Sturzenegger (2005) study the effects of job displacement from a big state owned enterprise as a result of its privatization in Argentina. They find long term reductions in earnings, but not associated with specific human capital loss, but with loss of wage rents, as post displacement wages are similar to competitive market wages.

The general message of the wide empirical literature in this topic is that separated workers earned more in their previous job than in the subsequent ones, and the size and persistence of this scarring effect varies with the type of data used in the analysis, the industry of displacement and the business cycle. Earning losses are higher for workers who change their industry after displacement, and contrary to expectations, are of similar magnitude for men and women.

For Uruguay, the effects of unemployment episodes on subsequent wages have only been analyzed by Bucheli and Furtado (2001), but based on household survey data for the nineties. They find that private workers who experience an unemployment episode face a wage loss of 23% in the beginning of the nineties, and 34% points by the end of the decade. The wage loss is higher for household heads, for older workers and for workers of longer tenure. No differences are found by educational level. Estimations of wage losses based on longitudinal data are not available for Uruguay.

3. Methodological aspects

3.1 Data

Our analysis is based on sample data drawn from the longitudinal data set of administrative records of contribution to social security, which include monthly

earnings of all formal workers, from January 1997 to April 2010.[1] We focus on private workers with high tenure, defining high tenure as those with at least three years of service with their pre-displacement employer. In this way, we are considering for our analysis a true layoff sample of workers vulnerable to displacement. Our data therefore include quarterly earnings for high tenure displaced and non-displaced private formal workers.[2] This leaves us with a sample of 32,182 registered private workers, which represent around 5.3% of total Uruguayan private formal workers in 2008. Of this total sample, 46.7% experienced at least one displacement episode in the period (the total number of displacement events is 21,312). Our data set contains information on earnings, industry of work, size of the firm, and workers' characteristics (only sex and date of birth).[3] Unfortunately, information on educational attainments, occupations and other personal characteristics is not included in our data set, although our analysis does control for fixed unobserved or unmeasured attributes of workers. Workers who move to the public sector or who become self-employed are eliminated from the sample.

Displacement events refer to workers' disappearance from administrative records of contribution to social security. Probably the major problem in our data involves the impossibility of identifying whether workers' lack of contribution to the social security is due to informal work, inactivity or unemployment, as any of those reasons may be behind the zeros in our data. Also, we cannot tell if they are due to quits, layoffs, justified dismissals, retirements, or migration—a common shortcoming of studies based on administrative data. If workers who quit have better labor market prospects, the estimates of displacement effects would be upwards biased, but we cannot control for that. We try, instead, to control for retirements, eliminating all post-retirement age observations for workers who left the formal labor market and did not return by April 2010. When workers present multiple employers in a month, the information was gathered in a simple observation. Wages from different occupations were added up, and the characteristics of the firm (sector and size) correspond to the employer paying the higher salary.

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[1] The distribution of our sample by age and sex is very similar to that of formal workers in the household survey, reflecting the representativeness quality of our sample. Comparisons are available upon request.

[2] We tried an alternative definition of high tenure workers, defined as those with at least six years of service in the firm. We decided not to use that definition, as we would have ended up with 16,854 displacement episodes (out of 159,135 of the original data base)..

[3] Formal workers represent 76.3% of private workers in 2009. This figure has been increasing during the last years: they represented 63.6 in 2004.

An advantage of our data is that we also have information about unemployment insurance beneficiaries, so we can identify if the worker entered the unemployment insurance program, as well as the period of payment and the exact amount of the benefit.[4]

To carry out our estimation of wage losses, we considered different groups of workers: men, women, young, middle aged and old, switchers and non switchers, industry, size of the firm, if they were dismissed during the economic crisis or not, and if they were dismissed as part of a mass layoff. Young workers are those aged 25 and younger, whereas middle aged include those aged 26 to 55. The group of switchers includes those workers who reentered the formal labor market in another industry, considering the definition of industry at one, two and three digits SIC classification. Results are very similar; we only report those corresponding to the two digit definition. Small firms were defined as those employing less than 20 workers, and all the other firms were considered jointly. We considered separately those who were displaced during the important economic crisis that took place in Uruguay in 2002, and the rest of separators.[5]

Finally, to consider if a worker was dismissed as part of a mass layoff, we restricted the analysis to firms with 20 or more workers and defined an *ad hoc* criterion. For the lay off to be considered massive, median firms (up to 500 workers) must have fired at least 10 workers or 10 percent of their employees in the last quarter, whereas firms with more than 500 workers should have dismissed at least 15 workers or 10 percent of their employees. Table 1 presents some basic statistics on our data.

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[4] The unemployment insurance program depends on the Ministry of Labor but is administered by the social security institution, *Banco de Previsión Social*.

[5] During this crisis, the unemployment rate reached the highest value since statistics are available, 17%.

Table 1. Characteristics of the sample	Observations				Age		Earnings	
	Total	In 1997	In 2009	% with UI	Mean	St dev.	Mean	St dev.
Separators								
All	**15,026**	**1,248**	**1,053**	**56.1**	**40.6**	**11.6**	**11,541**	**13,745**
With UI	8,427	557	530	100.0	40.6	11.3	13,394	12,457
Without UI	6,599	691	523	0.0	40.0	12.1	7,528	15,445
Mass layoffs	1,675	68	119	79	41.8	11.1	17,607	13,537
Non mass layoffs	13,351	1,180	934	53	40.3	11.7	10,250	13,440
Males	8,087	713	534	62.7	41.0	12.0	13,903	15,369
Females	6,939	535	519	48.4	40.1	11.0	8,348	10,357
Young in 1997	117	117	-	43.6	22.5	1.5	8,452	6,241
Midde aged in 1997	905	905	-	47.6	38.9	8.5	10,710	12,301
Old in 1997	226	226	-	33.2	59.0	3.5	13,238	14,227
Young in 2009	70	-	70	31.4	22.7	1.3	8,135	6,247
Midde aged in 2009	840	-	840	50.8	38.5	8.5	11,112	15,734
Old in 2009	143	-	143	56.6	58.9	3.6	12,083	24,953
Switchers (3 dig)	11,297	757	673	50.7	40.1	11.8	10,742	14,979
Non switchers	3,729	491	380	72.4	41.6	11.0	13,131	10,706
Manufacture	-	355	254	76.0	39.2	11.8	13,907	14,660
Trade, rest and hotels	-	201	151	58.1	38.7	12.4	9,963	13,973
Other services	-	204	209	35.6	42.1	11.0	8,262	11,848
Medium and big firms	9,610	632	598	66.7	40.1	11.4	13,766	14,430
Small firms	5,416	616	455	37.4	40.1	11.8	6,483	7,485
During crisis	2,763	0	0	78.3	41.2	11.1	12,763	10,652
During non crisis	12,263	1,248	1,053	51.1	40.3	11.7	11,093	14,691
Stayers	**17,156**	**12,496**	**17,480**		**42.3**	**11.6**	**16,352**	**23,746**

Source: authors' calculations using administrative records from BPS

In our sample, stayers are two years older than separators, and there is an important difference in mean wages among them. Separators who enter the UI program present higher mean wages. Although differences in mean ages are not very big, earnings differences between separators and stayers are considerable, suggesting that there may be important individual heterogeneity that must be controlled for.

3.2 Methodology

We follow the methodology of Jacobson, LaLonde and Sullivan (1993), hereafter referred to as JLS, defining displaced workers' earnings losses as the difference between their actual and expected earning if the displacement had not taken place.

In this way, we are comparing the earnings of displaced workers with a similar control group that did not experience displacement.[6] As in JLS, we introduce a set of dummy variables for the number of quarters before or after workers' separations. In effect, the displacement indicator $D_{it}^k = 1$ if the worker i was displaced in period *t-k*. We allowed displacement to affect earnings up to 12 quarters prior separation and 20 quarters after separations. Accordingly, workers' earnings at a given time[7] depend on set of dummy indicators of displacement and some controls for fixed and time-varying characteristics:

$$y_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_{k \geq -m} D_{it}^k \delta_k + \varepsilon_{it} \qquad (2)$$

where *k* goes from *–m, -(m-1), …, 0, 1,2….* and the set of dummy variables jointly represent the event of displacement. The parameter δ_k is the effect of displacement on worker's earnings after *k* periods of the occurrence of the event, so the evolution of this parameter allows plotting the path of wage difference over time. The parameter α_i is the individual fixed effect and γ_t represents a set of year-quarter dummy variables. X_{it} are the observable time varying characteristics of the worker. We include as regressors: age, age squared and cubed, and its interactions with sex, prior tenure and its square. We condition not only on personal characteristics, but also include controls for pre-displacement industry and pre-displacement firm size, assuming that workers are similar or comparable when they work in similar industries or firms.

We consider two alternative specifications of the earnings variables. The first one consists on monthly earnings, and so is zero when the worker is out of the labor force. In the second specification, if the worker is out of the labor force but receiving the unemployment benefit, this benefit is included to compute monthly income. As discussed above, we are able to do this because we also have data on unemployment insurance beneficiaries. In this way, our study can assess the smoothing effect of the

[6] An approach also based on comparison of treatment and control groups was previously used by Ruhm (1991). These estimations consisted of cross sectional regressions for post displacement earnings, and pre displacement earnings were included among the independent variables. The control group included workers displaced at other dates.

[7] Ideally, we would like to compare hourly wages, but unfortunately information about hours of work is not reliable in our data.

unemployment insurance[8] All regressions were run including and excluding quarters with zero earnings. When quarters with zeros are excluded, we are comparing the change in wages for workers who lost their job and then returned to the formal labor market (considering their last wage in the previous job and their wages in the new job) with that of workers who did not loose their jobs. In this case, as episodes with zero earnings are not considered, the loss compares pre and post displacement wages, not taking into account the effect of workers out of the labor force (with zero earnings) in the post displacement period. We report all results for regressions excluding zero earnings, the dependent variable is expressed in constant Uruguayan *pesos* of December 2009. We express this wage loss as a percentage loss considering, for each group, mean wages of 1997.

4. Results

As a first illustration, we present the evolution of earnings between those who experienced a separation on a given date and the stayers, to have a picture of earnings losses in the long term. We considered high-tenure workers who were displaced in two different moments in time: the second quarter of 2001 (the onset of the Uruguayan economic crisis)[9], and the second quarter of 2004, when economic recovery had already began. In each case, we compared the evolution of their wages with that of workers who stayed in the labor force at least two more quarters.

A first striking fact refers to the important real earnings loss that formal workers experienced in the period considered as a whole, fostered by the big economic crisis that Uruguay suffered in 2002. The labor market adjusted not only through a very significant increase in unemployment, but also through an important decline in real earnings for private formal workers who kept their jobs during the whole period. By the end of the period, real wages for high tenure private formal workers have still not recovered to their levels at the beginning of the period. The unadjusted comparison of earnings between separators and non separators shows that earning losses for displaced were of important magnitude in the long run (Graph 1). It also shows (i) that workers who

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[8] Earnings and UI benefits are expressed in real values of December 2009 using the Consumer Price Index (from Instituto Nacional de Estadística).

[9] Uruguay experienced a severe economic and financial crisis by July 2002. Per capita GDP fell 11% and unemployment rates became peaked to 17%.

access the UI benefits are the ones with higher relative earnings, and (ii) that there are important differences in wages between stayers and separators.

Graph 1. Evolution of earnings of high tenure workers separating in 2001 and stayers

a) Displaced in 2001.2   b)Displaced in 2004.2
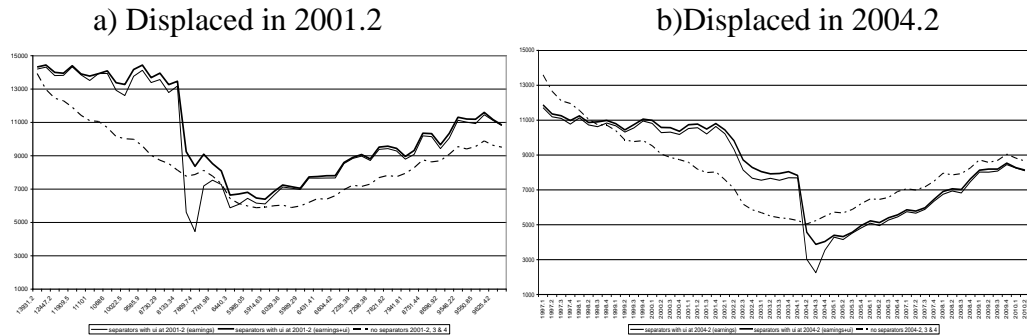
Source: authors' calculations using administrative records from BPS

In order to control for observed individual heterogeneity, we estimated earnings losses as the difference between actual earnings and those earnings that would have prevailed if displacement had not taken place. With this purpose, we first estimated equation (1) for all individuals in the sample, considering two alternative dependent variables. One is monthly earnings, and the other one includes earnings and UI benefits (they are equal for workers who do not enter into the UI). As discussed before, all regressions were run including and excluding quarters with zero earnings. As expected, coefficients on earnings losses are lower when zeros are excluded. In effect, when zeros are included, the evolution of the wage loss is affected by quantities, as those without a job are included in the estimation. We report all results for regressions excluding zero earnings. The estimations of parameters δ_k are displayed in Graph 2. It shows that earnings of displaced workers tend to be above that of non separators before the displacement event, and that they present a downward trend that can be detected since two years before the displacement. This is consistent with previous empirical evidence, where previous earnings for displaced workers are lower to their expected levels three years before separation (JLS, 1993). The reduction for displaced workers is $U 7,462 (or 48% of the average separator wage in 1997).[10]

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[10] The estimation including quarters with zero earnings gives an earning loss of $U 4,481 in the moment of displacement. Comparisons of both estimations (with and without zeros), considering earnings and earnings and UI benefits are presented in Graph A.1.

Around 56% of this sample of high tenure displaced workers enter the UI program and receive UI benefits for some months, so the income loss is lower for them. If we consider not only earnings but earnings plus UI benefits, losses at the quarter of displacement are considerable lower, amounting $U 3,200 (20%). This result illustrates the important income smoothing effect of UI benefits, even in a developing country like Uruguay. Two quarters after the separation both patterns become similar (the UI duration was six months during this period). One year after displacement, earnings losses are still 8%. Estimated losses decrease with time, and five years after displacement, they are around 3% of the average wage of the beginning of the period.

Graph 2. Earnings losses for separators. All observations
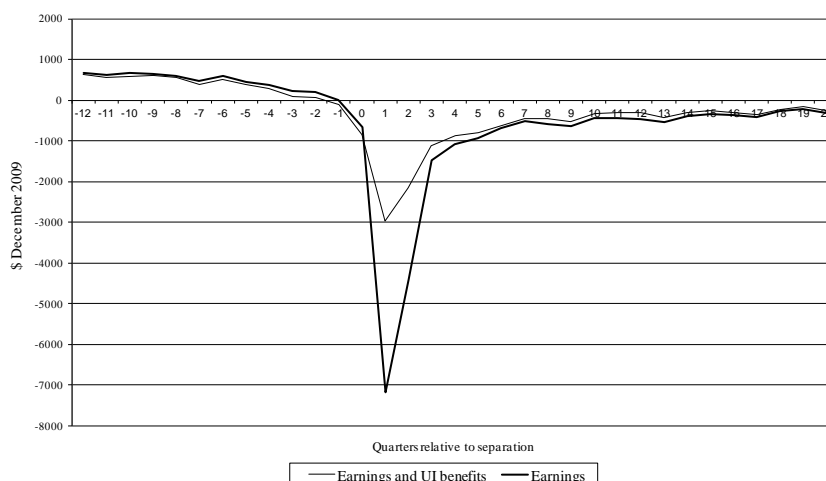
Source: authors' calculations using administrative records from BPS

Another illustration of the role of UI benefits is provided in Graph 3, where equation (1) is estimated considering all observations but separating them into two samples: one of workers who enter UI program after displacement (covered workers), and the other for workers who do not receive UI benefits after displacement (non covered workers). The first sub-sample has pre-displacement earnings somehow above that of non displaced workers, whereas the contrary happens to workers who do not enter the UI program after displacement. Covered workers would lose around 46% of their earnings during the first quarter after displacement if they did not receive UI benefits, but thanks to the insurance their loss is only 20%. For workers not covered by the UI, the loss in the first quarter is 14% (compared with their own initial earnings).

**Graph 3. Earnings losses for separators. Workers covered and not covered by the UI**
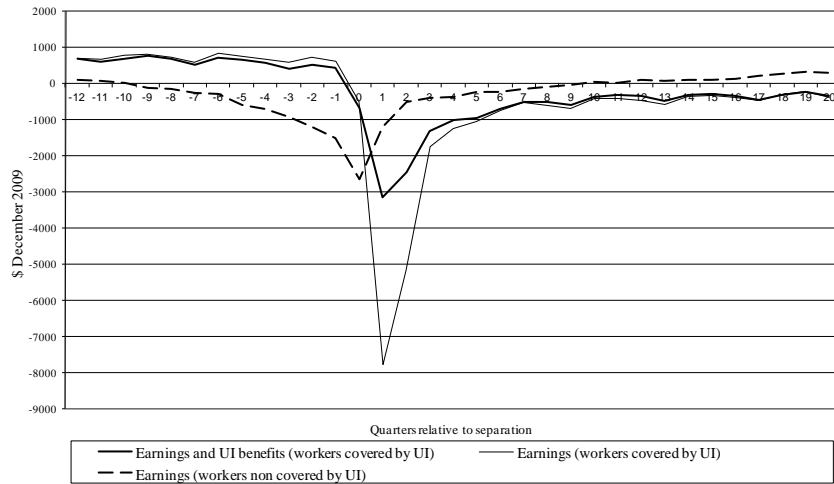
Source: authors' calculations using administrative records from BPS

Earning losses are bigger in absolute terms for men than for women (3,600 vs. 1,500 $U in the first quarter after displacement). In relative terms, these losses correspond to 46% and 34% respectively, and if the role of UI benefits is considered, women lose 13% and men 20% in the first quarter after displacement (Graph 4).

Graph 4. Earnings losses by sex

a) Earnings   b) Earnings and UI benefits
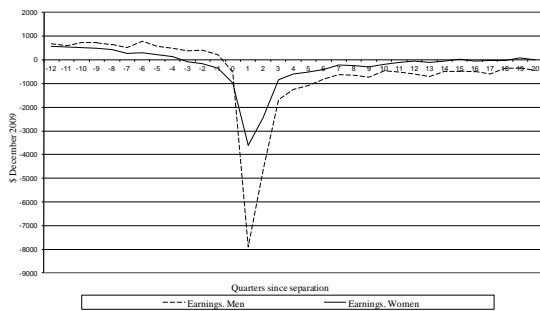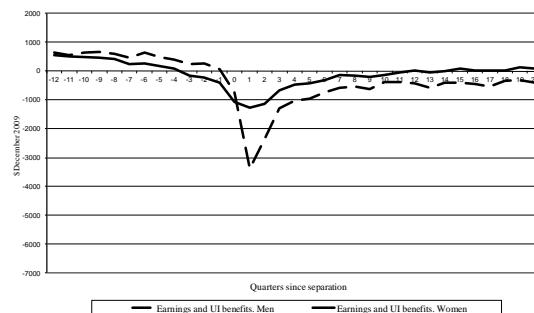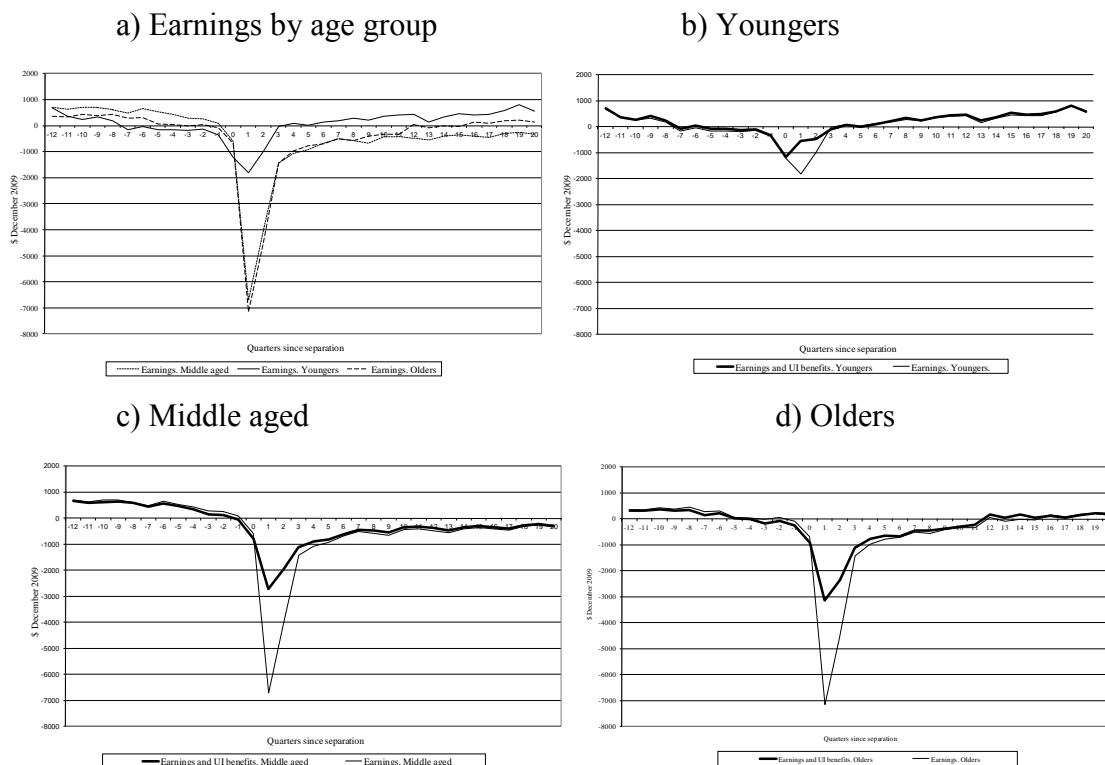

Source: authors' calculations using administrative records from BPS

In relation to age, variations in absolute losses are similar for middle aged and older workers and quite smaller for younger workers. It must be stressed that younger workers are underrepresented in this sample of high tenure workers (see table 1). In relative terms, youngsters lose 28% of their earnings, middle aged workers 47% and older workers 57%. When the dependent variable includes UI benefits, the estimations of wage losses for different age groups become more concentrated in relative terms:

14% for youngsters, 20% for middle aged and 27% for older workers. UI benefits have an increasing role as workers become older (Graph **5**5).

Graph 5. Earnings losses by age

a) Earnings by age group

b) Youngers

c) Middle aged

d) Olders

Source: authors' calculations using administrative records from BPS

Earning losses are considerably higher for workers whose new job is in a different three digit SIC industry (

Graph **6**). Their estimated loss at the first quarter after displacement is 59% of their initial wages, whereas for those whose new job is in the same industry, it is 32% of their initial wages. Again, the role of unemployment benefits as buffers of losses is important for both groups, as when earnings and UI benefits are considered, switchers lose 31% of their initial earnings, whereas non switchers lose only 12%.[11]

Patterns of recovery also differ substantially between industry switchers and non switchers. After one year, switchers' earnings loss is around 22%, whereas for non switchers it is only 4%. After five years, there is no wage loss for non-switchers, whereas switchers' lose around 10% of their initial wages.
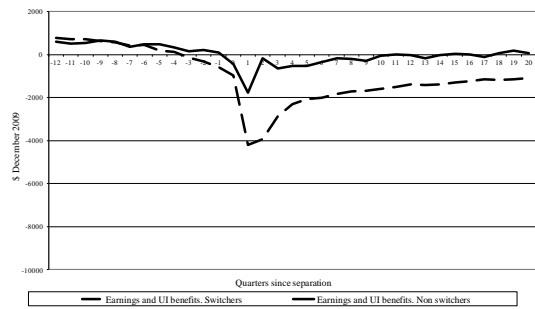
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[11] Results are practically the same when switchers are considered at two or one digit SIC industry. Graphs are reported in the annex (graphs A.2 and A.3).

Graph 6. Earnings losses for switchers and non switchers

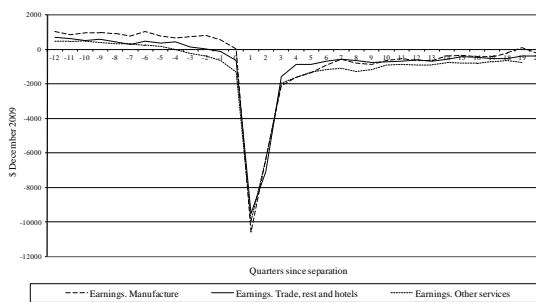| a) Earnings | b) Earnings and UI benefits |
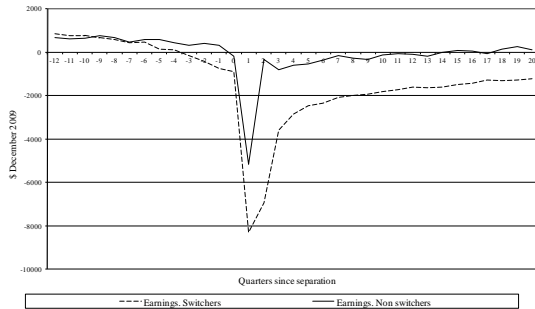
Source: authors' calculations using administrative records from BPS

The three major industries of the country show similar losses in absolute terms. Relative earnings losses are bigger for workers from other services (80% of their initial earnings) and from trade, restaurants and hotels (73%), and smaller for those coming from manufacture (around 60% of their pre displacement wages). When UI benefits are considered, losses are considerably reduced (39, 35 and 27% respectively) (
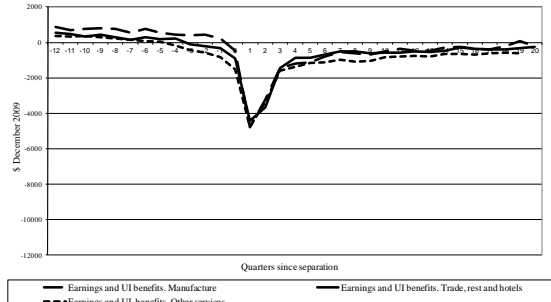
Graph **6**).

Graph 7. Earnings losses by industry

| a) Earnings | b) Earnings and UI benefits |

Source: authors' calculations using administrative records from BPS

Workers from medium and bigger firms present bigger earnings losses in absolute terms (

Graph **8**). In the first quarter after displacement, their loss is $U 8639 against $U 3378 for workers from smaller firms. These figures represent similar relative losses, of around 40% of their previous wages. When UI benefits are included in the wage variable, the loss is around 18% for both types of workers.

Graph 8. Earnings losses by size of the firm

a) Earnings   b) Earnings and UI benefits
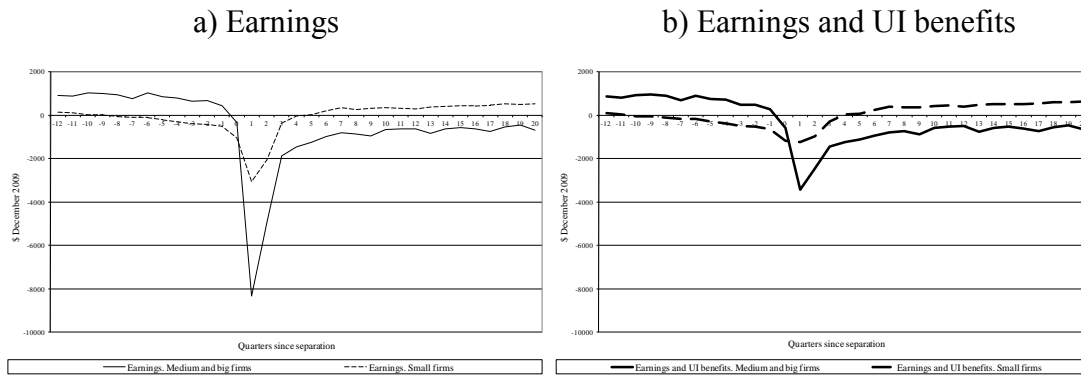
Source: authors' calculations using administrative records from BPS

We analyzed the pattern of wage losses comparing those who were displaced during the important economic crisis that took place in Uruguay in 2002 and the rest of separators.[12] Workers dismissed during the crisis tend to have higher pre displacement wages, and the decreasing pre-displacement trend is not detected for them (Graph 9). The earning loss in the first quarter after separation for those separated during the crisis was $U 5175, whereas for the other group it was $U 7316. This may in part reflect the lower real wages in the crisis period. In relative terms, those displaced during the crisis lose 31% of their initial earnings, whereas the other group loses 48% of their previous earnings.

UI benefits played an important role during the economic crisis, as displaced workers reduced their relative loss to 11%. The path of recovery was faster for workers who were separated during the economic crisis, two years after displacement they have reached their expected wages.

**Graph 9. Earnings losses during crisis and non crisis times**
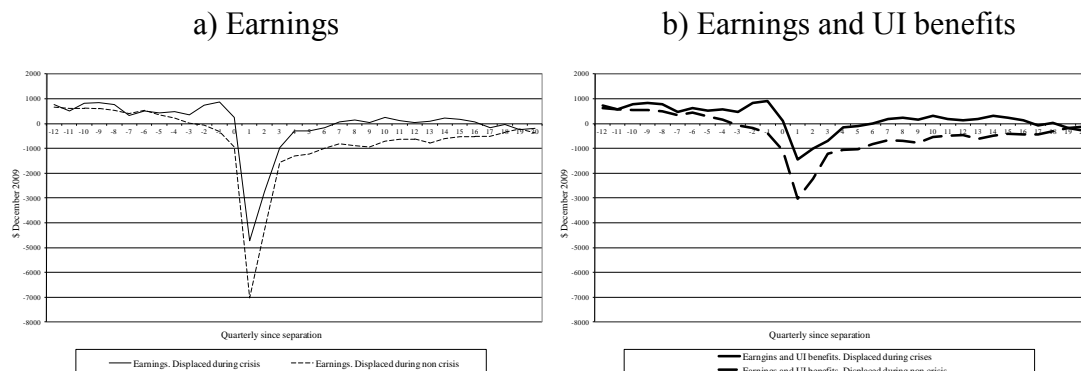
a) Earnings   b) Earnings and UI benefits

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[12] During this crisis, the unemployment rate reached the highest value since statistics are available, 17%.

Finally, using the definition of mass layoffs presented above, we estimated earnings losses separating between mass layoffs workers and the rest. As explained, for this purpose the sample was restricted to firms with 20 or more workers. So we are only considering around 10% of the sample of separators. For this reason, results must be taken with caution. Reduction in wages is similar for both groups in absolute terms (graph 10), but contrary to what is found for other labor markets, earnings losses are bigger in relative terms for non mass lay off workers (66 vs 42%). The UI benefit reduces the loss: in the first quarter after displacement, losses become 33 and 18% respectively.

Graph 10. Earnings losses for mass layoffs and non mass lay offs

a) Earnings   b) Earnings and UI benefits
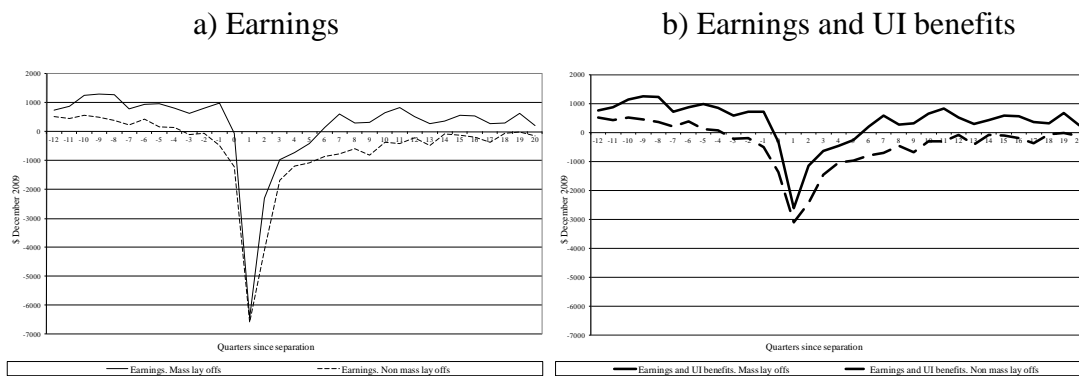
Source: authors' calculations using administrative records from BPS

A summary of our estimations of wage losses, in absolute and relative terms, is included in Table A.1.

5. Conclusions

Our estimations of wage losses for high tenure workers in a developing country indicate that displaced workers loose 48% of their previous wages in the first quarter after displacement. A year later, wage losses are 8%, and five years later, they still persist at the level of 3%. We find considerable heterogeneity between workers. Consistent with previous evidence, losses are higher for workers who switch sectors, and for them the reduction persists to be significant after five years from displacement. Wage losses are higher for men and for workers from small firms, and increase with the age of displaced workers. Those who exit from the formal labor market due to mass layoffs suffer smaller losses, and the wage loss of workers displaced during the last

economic crisis is smaller than the one corresponding to displacements that did not took place during the economic crisis. Finally, we provide evidence about the important role of unemployment insurance benefits as a buffer for workers who lose their jobs.

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Annex

Table A.1. Estimated earning losses												
	First quarter	First year	Fifth year	First quarter	First year	Fifth year	First quarter	First year	Fifth year	First quarter	First year	Fifth year
	Earnings (in $U)			Earnings+UI benefits(in $U)			Earnings (in %)			Earnings+UI benefits (in %)		
All	-7,462	-1,233	-468	-3,212	-1,004	-398	-48%	-8%	-3%	-21%	-7%	-3%
Mass layoffs	-6,977	-1,059	-194	-3,018	-779	-137	-42%	-6%	-1%	-18%	-5%	-1%
Non mass layoffs	-7,164	-1,499	-490	-3,560	-1,307	-454	-66%	-14%	-5%	-33%	-12%	-4%
Men	-8,209	-1,453	-654	-3,623	-1,210	-605	-46%	-8%	-4%	-20%	-7%	-3%
Women	-3,986	-799	-203	-1,563	-655	-111	-34%	-7%	-2%	-13%	-6%	-1%
Youngers	-2,563	-613	58	-1,284	-643	99	-28%	-7%	1%	-14%	-7%	1%
Middle aged	-7,004	-1,225	-497	-2,967	-1,029	-449	-47%	-8%	-3%	-20%	-7%	-3%
Olders	-7,777	-1,409	-413	-3,603	-1,166	-365	-58%	-10%	-3%	-27%	-9%	-3%
Switchers (3)	-8,749	-3,276	-1,545	-4,584	-2,719	-1,386	-59%	-22%	-10%	-31%	-18%	-9%
Non switchers (3)	-5,427	-747	-34	-1,977	-655	-84	-32%	-4%	0%	-12%	-4%	0%
Switchers (2 digit)	-9,064	-3,666	-1,667	-4,782	-3,088	-1,550	-61%	-24%	-11%	-32%	-21%	-10%
Non switchers (2)	-5,408	-712	-38	-1,990	-619	-76	-33%	-4%	0%	-12%	-4%	0%
Switchers (1)	-8,933	-3,386	-1,522	-4,681	-2,811	-1,424	-60%	-23%	-10%	-31%	-19%	-10%
Non switchers (1)	-5,574	-805	-77	-2,110	-708	-119	-34%	-5%	0%	-13%	-4%	-1%
Manufacture	-10,913	-1,863	-477	-5,031	-1,424	-443	-60%	-10%	-3%	-27%	-8%	-2%
Trade, rest and hotel	-9,939	-1,245	-729	-4,791	-1,222	-583	-73%	-9%	-5%	-35%	-9%	-4%
Other services	-10,573	-2,046	-1,176	-5,224	-1,778	-1,012	-79%	-15%	-9%	-39%	-13%	-8%
Med. and big firms	-8,639	-1,658	-883	-3,688	-1,403	-847	-41%	-8%	-4%	-18%	-7%	-4%
Small firms	-3,378	-242	347	-1,503	-165	445	-40%	-3%	4%	-18%	-2%	5%
During crisis	-5,176	-580	-458	-1,782	-436	-400	-31%	-3%	-3%	-11%	-3%	-2%
During non crisis	-7,317	-1,482	-529	-3,275	-1,212	-448	-48%	-10%	-3%	-22%	-8%	-3%
With UI	-8,078	-1,393	-541	-3,401	-1,144	-503	-46%	-8%	-3%	-19%	-7%	-3%
Without UI	-1,823	-828	-91	-1,577	-692	29	-16%	-7%	-1%	-14%	-6%	0%

Source: authors' calculations using administrative records from BPS

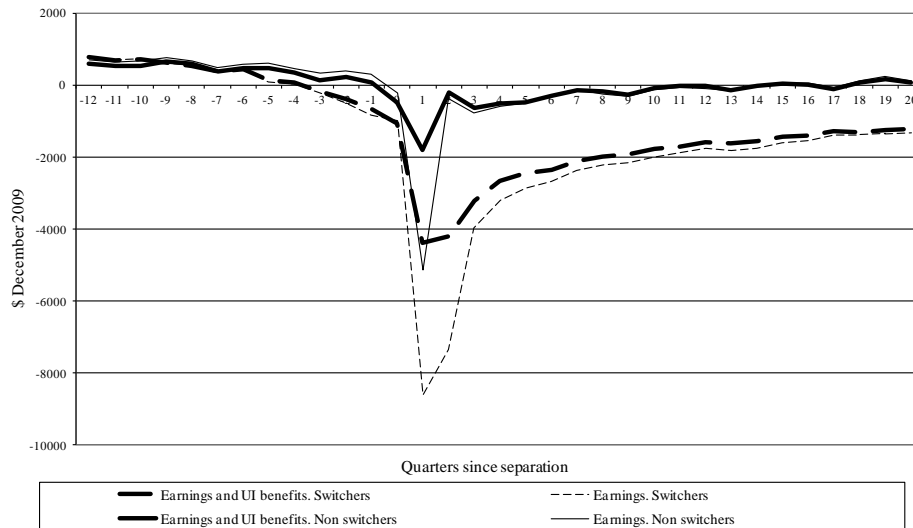# Graph A.1. Earnings losses for high tenure workers.
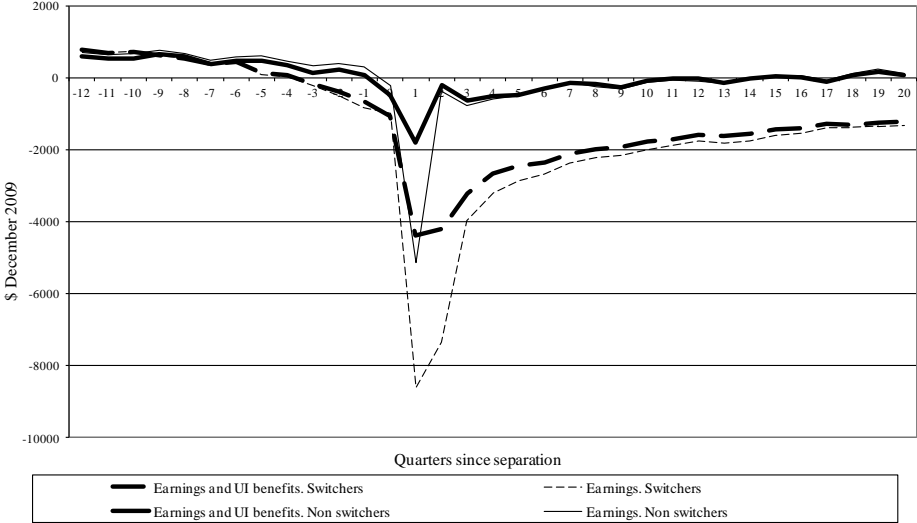
a)Earnings

b) Earnings and UI benefits
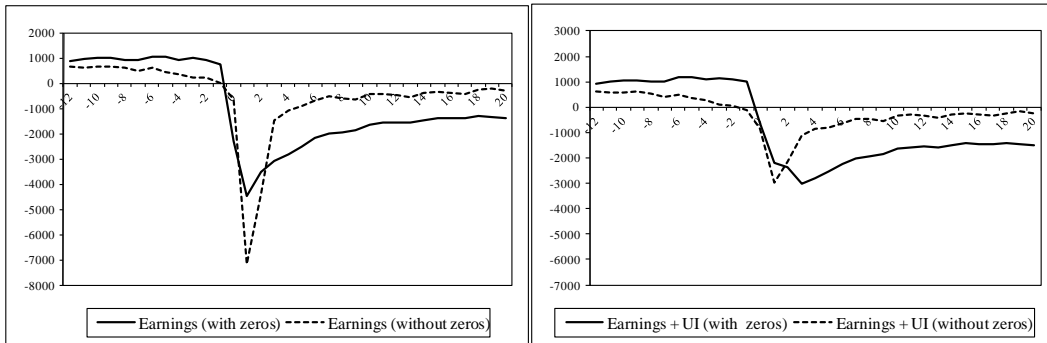
Source: authors' calculations using administrative records from BPS

Graph A.2. Earnings losses for switchers and non switchers (2 digit ISIC)

Source: authors' calculations using administrative records from BPS

Graph A.3. Earnings losses for switchers and non switchers (1 digit ISIC)

Source: authors' calculations using administrative records from BPS