The Persistent Effects of Entering the Labour Market in a Recession: Evidence from Portugal

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Dissertation written under the supervision of Professor Joana Silva

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Abstract

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This paper examines the effects of entering the labor market during a recession on subsequent labor market outcomes. Using longitudinal matched employer-employee data from Portugal for the period 2002-2017, this paper estimates the impacts of the unemployment rate at the time of labour market entry on subsequent earnings of university graduates. Using a fixed effects model controlling for potential experience, regional and labour market entry-year, it finds that university students that graduated during the Great Recession of 2008-2012 were negatively affected by the initial conditions even after these conditions have subsided. The so-called "unlucky" cohort, that graduated between 2008 and 2012, has a penalty on the initial level of annual earnings of around 8 percent. This penalty fades over time but is still present in 2017. The effect on initial earnings is stronger and more prolonged among women than men, suggesting that recessions can be a potential source of gender wage inequality in Portugal. The results presented are supportive of persistent, and, large negative impacts on youth of the Great Recession of 2008-2012 in Portugal.

Resumo

Título: Os Efeitos de Ingressar no Mercado de Trabalho durante uma Recessão: Evidência Portuguesa
Autor: Catarina Claro Lopes
Palavras-chave: Efeito de "Scarring", Mercado de Trabalho, Recessão, Grande Crise de 2008-2012, Habilitações Superiores, Desemprego, Rendimento Anual

Este artigo examina os efeitos de entrar no mercado de trabalho numa recessão nos salários subsequentes. Utilizando dados longitudinais com informação cruzada entre empregadores-empregados portugueses, para o período compreendido entre 2002 e 2017, este estudo estima que os estudantes universitários que se licenciaram durante a Grande Recessão de 2008-2012 foram negativamente afetados pelas condições iniciais no mercado de trabalho mesmo quando estas já tinham melhorado. Utilizando um modelo de efeitos fixos, com controlos para potencial experiência, região e ano de entrada no mercado de trabalho, é possível concluir que o grupo "azarado" de recém-licenciados, que terminou os seus estudos universitários entre 2008 e 2012, sofreu uma penalização de cerca de 8 por cento sobre o nível inicial de salário anual. Esta penalização desvanece-se com o tempo, sendo, no entanto, ainda substancial em 2017. Entre as mulheres, o efeito no salário inicial é maior e mais prolongados do que entre os homens. Os resultados apresentados sugerem impactos negativos significativos na juventude da Grande Recessão de 2008-2012 em Portugal.

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I. Introduction

Entering the labour market for the first time is a milestone in any individual's life. Often times, both economic conditions and circumstances dictate the career path of new entrants. Several years of microeconomic research concentrated its attention on the effect of the business cycle on labor market outcomes. Since the 2008/2009 Global Financial Crisis there has been a renewed interest in studying how entering the labor market during a recession affects subsequent medium- and long-term labor market outcomes of university graduates (in addition to its effects on initial earning).

A large body of research studies the effect of economic downturns and crises on employment and earnings in the United States and Canada (e.g. Kahn 2010, Oreopoulus et al. 2012, Altonji et al. 2014). They conclude that a recession at the time of labour market entry causes recent graduates to be placed into a more unfavourable departure point than their "luckier" counterparts that instead graduated a few years before or a few years post-recession period. This disadvantage is translated not only on scarce job opportunities due to a rise in the unemployment rate, highly probable job mismatching cases and a persistent but fading penalties on the initial level of earnings.

Evidence for other countries is more limited. In Europe, evidence from Germany, Austria and Belgium (Wachter and Bender 2006, Brunner and Kuhn 2013, Cock and Ghirelli 2016) shows that the impacts of a recession early on a recent graduate's career, are not only negative but also persistent over a decade, and visible in terms of both earnings and number of moths employed. These studies also suggest that job mobility and accurate job matching are key factors to mitigate the negative impacts imposed by a substantial increase in unemployment rates which characterize a recession. The larger, and different, type of scarring effects observed in Europe than in the United States and Canada could result from differences in labor market flexibility. Genda, Kondo and Ohta (2010) and Kawagushi and Murao (2014) find that scarring effects from a recession are significantly more persistent in more rigid labour markets.

This thesis examines the effects of entering the labor market during a recession on subsequent labor market outcomes of university graduates. It uses Portuguese administrative data, *Quadros de Pessoal*, which allows to build a uniquely detailed panel dataset with matched employer-employee data for the period 2002-2017. This information is further complemented with reginal statistics provided by the Portuguese national statistical agency, *Instituto Nacional de Estatística* (INE), concerning unemployment rate levels. The analysis covers 666.705 higher

educated individuals that exercised their professional occupation over the time span considered and reported a positive level of earnings at least once. The methodological approach applied builds on Genda, Kondo and Ohta (2010). Using repeated cross-sectional household surveys, this paper explores the long-term implications of a rise in the unemployment rate at the time of labour market entry and the contemporaneous unemployment rate on the annual earnings level of workers with different levels of education. The methodological approach employed in this thesis departs from Genda, Kondo and Ohta (2010) because it uses longitudinal panel data with fixed effects to infer the effects of an increase in the unemployment rate on the earnings level of Portuguese university graduates. The estimated models control not only for potential experience and education level, but also form the graduation or labour market entry year and region. Furthermore, by considering cohorts with the same potential experience, the evolution of the such effects can be observed as the potential experience of a worker increases.

This paper contributes to the literature by estimating the scarring effects of entering the labour market during a recession for virtually all Portuguese university graduates. Firstly, it estimates the long-term effects abovementioned by exploiting the variation of the unemployment rate at a regional level. This variation is observed over seven NUT II regions, and by graduation or entry year in the labour market, for high education individuals. The analysis covers twenty-eight graduation years, between 1990-2017. The unemployment rate level and its variation are used to measure the conditions that university graduates face at entry. If graduates are aware of such indicator they may or may not postpone entry in the labour market and avoid such effects. To reduce the noise in the sample, this thesis assumes that new entrants followed a regular schooling path until entering labour markets.

Secondly, this research offers a more comprehensive analysis of scarring effects considering three key periods that uniquely identify the pre-, during- and post-recession period. For the past few decades, Portugal has shown a relatively stable unemployment rate levels across the country. From the beginning of the 21st century, unemployment rate levels have gradually risen from a stable 7,6 percent to 16,2 in 2013. This is particularly important since the main focus of this analysis is to examine the effects on the "unlucky" cohorts that graduated during the recession period. Estimates show that in Portugal the impacts are up to eight times more severe for the cohorts that entered the labour market between 2008 and 2012, in comparison to the previous and subsequent groups in the analysis, the considered "lucky" cohorts. Thirdly, this thesis does a thorough analysis of heterogeneity of these results by gender, shedding further light on a potential source of gender wage inequality in Portugal.

Finally, to my knowledge, the type of research conducted in this paper had been conducted for Portugal and can have important implications for understanding wage dynamics in the country. This thesis finds a robust, persistent, negative impact of a rise in the unemployment rate at graduation on annual labor earnings. The magnitude of this effect is larger among cohorts that entered the labour market during a recession. Examining the effects on base earnings (which exclude irregular and overtime payments), a one percentage point rise in the unemployment rate at entry reduces annual wages by 1,2 percent, which is even higher when all earning parcels are considered. Furthermore, by means of observing individuals over a period of twelve years of potential experience, although fading over time, results show that university graduates are subject to a decrease in the level of earnings and even in 2017 the difference remains significant. Furthermore, if we consider cohorts that entered the labour market specifically during a recession, the magnitude of the effect is even larger.

Considering the existence of heterogeneous effects at the gender level, estimates show that for the female fraction of the sample the penalty imposed by the increase in the unemployment rate at the time of labour market entry is slightly lower, though more persistent over the catch-up period, it decreases from a 1,1 percent to 0,5 percent after a twelve year period. Establishing a comparison with the male counterpart, which is expected to suffer from a decrease at the earnings level of 1,2 percent, the latter is foreseen to fade away to 0,3 percent. If instead, the type of contract offered to university graduates is concerned, it is found that those who are offered an open-ended contract are expect to suffer from a higher penalty at the time of entry in the labour market, although the impacts taking into account the contemporaneous unemployment rate are significantly lower. The heterogeneity analysis shows that gender differences are statistically significant at least at a 5 percent significance level, thus the impacts of an increase in both unemployment rate measures considered are statistically significant and different for both male and female employees. If instead, the type of contract offered is considered, those who are offered any other contract type than an open-ended contract, these are more susceptible to variations in the contemporaneous unemployment rate than the latter, at least at a 5 percent significance level.

The structure of the remaining thesis is as follows. Section II presents a short overview on the most relevant literature published on the topic, which is key to this paper's specification strategy. Section III describes the datasets and characterizes the key variables used in the analysis. Section IV presents the methodological approach followed. Section V presents the main results and a robustness check and finally section VI concludes.

II. Conceptual Framework

The Great Recession of 2008 and its ravaging impacts on youth unemployment rose the need to reinforce academic research on the long-term impacts of economic downturns on recent graduates' earnings level. A rich body of literature, dedicated the last few years on studying the impacts of entering the labour market during a recession period. Research has been conducted for a number of countries worldwide, which have shown different patterns for higher and lower educated new entrants.

Empirical studies on prior recessions found that highly educated individuals whom enter the labour market during an economic downturn are more susceptible to incur substantial earning losses, than their luckier counterpart that entered the labour market during a boom. Life-long impacts from graduating or entering the labour market during a recession are dependent on how the economic downturn affects a multitude of determinants. Factors as the major of studies chosen, the quality and availability of initial job opportunities, firms' adjustments to wage levels, human capital accumulation and employer's perception of worker's productivity play a significant role on the dimension of such effects. From this perception, empirical research by Brunner and Kuhn (2014) has shown that poor entry conditions are also typically associated with lower quality in the worker's fist employer which may affect more than half of the observed effects on lifetime wages. In the same sense, Oyer (2006) examines how initial job placement have a determinant impact on the careers of PhD economic students. Results stated that economists that begin that career path during an economic expansion are up to 60 percent more likely to be placed in a top-50 institution which, in fact, enhances their careers future prospects thus referring the importance of job placement as a determinant factor to future career prospects. Moreover, Kahn (2010) evidenced that American individuals who graduate during an economic downturn are most likely to suffer from underemployment and job mismatching given the lack of opportunities in the labour market. As such, a recession causes the economic to retract and therefore it may force recent graduates to downgrade their expectations, accept lower quality job placements at lower wage levels or even become temporarily unemployed. Exploiting data for Norway, Liu, Salvanes and Sørensen (2012) predict that initial mismatching for recent graduates turn them more vulnerable to economic cyclical movements. In turn, those who are correctly matched in a given industry become largely imune to economic downturns and therefore, recessions. Thereby, it may be argued that the right initial job placement and high job mobility are key to

avoid the cyclical downgrading and disadvantage toward individuals who graduated during economic upturns.

Findings concerning the effects of a recession on the annual earnings level at the time of labour market entry may also diverge with respect to the rigidity of the labour market, as pointed out by Kawagushi and Murao (2014). For instance, the US and Canada have as a general rule a more flexible labour market when compared to European countries, for which there are rigidities as, for example, the imposition of a minimum wage for the vast majority of the countries observed.

For the US, Altonji et al. (2016) point out that a recession of significant magnitude can lead to a reduction up to 10 percent on the initial level of earnings mainly due to the cyclical sensitivity of demand for recent college graduates, effect which tend to perish over a period of approximately 7 years. Furthermore, restricting their analysis to cohorts entering the labour market during the great financial crisis of 2008-2012, the same effects are estimated to be two or three times larger than for cohorts graduating until 2003. This effect was mostly justified by the increase in sensitivity of the unemployment rate for college graduates to existing economic conditions. Along the same lines, Kahn (2010) estimates a decrease of 6 to 7 percent in American recent graduates' earnings level per each percentual point increase in the measure of unemployment rate, if entering the labour market between 1979 and 1988, that impact being persistent for a period up to two decades. In a similar way, Oreopoulus et al. (2012) examine the referred impacts on Canadian recent graduates and find a similar pattern of a decline of 9 percent that is dissipated after a decade if and only if there isn't an initial job mismatch. In such cases, the workers are expected to suffer a lifelong penalty on earnings. For the cases in which there is in fact initial mismatching, job mobility during the recovery period is key to strengthen the catch-up process. Genda et al. (2010) establish a comparison between Japanese and American men entering the labour market during a recession. Estimations shown that the impacts for the less educated group are far more intense than for the more educated group of men in both countries. For both Japanese and American more educated men there is an estimated negative impact of about 5 to 7 percent on annual earnings which tends to fade away over a period of twelve years, as experience increases, even though the Japanese labour market presents a considerable different mechanism of entry for Japanese graduates.

Alternatively, research conducted on European countries who mainly exhibit stronger market rigidities, the estimates presented differ from those from the US and Canada. Providing evidence for Flandres, Cocx and Ghirelli (2016) assess the implications, for white- and blue-collar workers, of facing a recession at labour market entry. Belgian graduates that enter in the

labour market during a recession are most likely to experience a reduction of about 6 percent in the annual number of hours worked which would be reflected in their correspondent annual earnings level. However, for the specific period comprised between 2008 and 2012 the results were estimated to 15 percent higher, due to a sharp increase in the unemployment rate levels. Empirical research conducted on the Spanish labour force estimate that a recession at labour market entry causes a college graduate to face a reduction of 6,4 percent on the annual earnings level. This impact is smoother since higher educated individuals are more likely to be offered more favourable contracts. Research by Brunner and Kuhn (2013), displayed a reduction of around 1,3 percent in the lifetime of wages, for the Austrian population. Very similar to what is concluded on the Belgium population, in Austria the impacts are also far more persistent for blue-collar workers since they are more likely to be only offered low paying job positions. Empirical research conducted on the Spanish labour force estimate that a recession at labour market entry causes a college graduate to face a reduction of For the German population, Wachter and Bender (2006) estimate that there is a substantially more negative wage loss of 15 percent for recent graduates. However, the catch-up process is fairly quicker given that these negative effects are expected to fade away over a period of five years. Studies on French population by Gaini, Leduc and Vicard (2012) find that a percentual point increase in youth unemployment at the time of labour market entry will decrease the earned income level of approximately 8 percent. Nevertheless, the catch-up process seems to be fairly quicker, around three years, than what is observed for the same population in different European countries.

On a final note, concerning Asian economies research conducted by E. Choi, J. Choi and Son (2019) stated that the great recession of 2008-2012, in sort, mimicked the effects, for American and European countries, the 1997-1998 Asian financial crisis' impacts in the South Korean economy. For south Korean new labour market entrants facing a recession at labour market entry causes a reduction of approximately 0,8 percent on the annual earnings level, although the impact is much more significant at the level of employment probability meaning that this fraction of the population was much more likely to become unemployed than those who entered the labour market in a different phase of the economic cycle. With respect to the catch-up period, it is very similar to what is observed for other countries around the world, since the losses caused by the recession were expected to dissipate over a period of ten years.

III. Data

The analysis in this paper draws on two main datasets. The main database used is *Quadros do Pessoal* (Personnel Records), which is a longitudinal matched employer-employee data set, that gathers detailed information on approximately 3 million workers and over 300.000 firms in each year. Data in *Quadros do Pessoal* is gathered by the Portuguese Ministry of Employment through an annual survey compulsory, by law, to every establishment with even a single wage-earner.

This longitudinal panel database contains information relative to not only the firm and the establishment but also each of its employees, that is every individual that is entitled to a wage in the Portuguese economy, with the exception of civil servants and independent workers. Data reported on the employee side includes information relative to gender, age, schooling level and detailed information on monthly earnings such as base earnings, regular payments, irregular benefits (e.g. premiums), overtime payments and number of hours worked. At the firm level, each firm is assigned a unique identification number and provides information on industry, region, ownership type and size.

Likewise, the database *Quadros de Pessoal* provides data from 1985 until 2017 on both firms and workers, allowing the users to track them over time. Thus, *Quadros do Pessoal* (Personnel Records) becomes ideally suited to undertake a study on the impact of labour market shocks on long-run income levels since it enables the construction of individual wage profiles for a relatively large number of entrants in the labour market over a rather long period of time. Note that at the employee's earnings level data is reported by the employer, thus information is less exposed to measurement errors. Likewise, by using panel data, it allows me to avoid the main limitation of cross-sectional data which implies a loss of precision in the measurement of some variables in the specification of the model used. It should be borne in mind that every result from this research will only be valid for workers in the private sector of the Portuguese economy provided that *Quadros do Pessoal* do not present any information regarding public sector employees nor independent workers.

Along with the need for data relative to the national annual unemployment rate over the period considered, the subsequent data was collected from a set of raw statistics published by *Instituto Nacional de Estatística de Portugal* (INE). Accordingly, with the aim of inferring the impacts of labour market short term shocks on annual earnings levels for labour market entrants, the main indicator used to assess conditions in the labour market is the national annual

unemployment rate both at the time of entry and in the current year, at regional level. The raw database aforementioned provides the necessary data at a NUT classification level.

A. Sample Selection and Description

In an effort to determine the scarring effects of entering the labour market in a recession for higher educated individuals, the population under analysis will differ from the entire Portuguese labour force. Largely for conceptual reasons, as previously stated, this research focusses solely on individuals who have at least completed at least one university degree, more precisely a bachelor, master or doctoral degree.

On the whole, I observe highly educated labour market entrants, specifically individuals who initiated their first regular employment activity between 2002 and 2017. The panel constructed comprises Portuguese men and women who completed their higher education degree, portrait a potential experience level between 1 and 12 years and reported a positive level of income in a year, over the time span considered. Be noted that even if a specific individual is not employed in the reference moth for which the data is collected, he will be accounted as eligible to figure in the sample as long as he has reported some positive income in any point in the year. Thus, only individuals who have reported an income of zero for a period of a year or more will be dropped from the sample. More precisely, all individuals that reported an income of zero or did not complete a high education degree were not eligible for this study.

Table I reports some of the most fundamental characteristics of the population under analysis over the 16-year period of analysis considered. Reported values are referent to the number of unique individuals, the average real earnings level and the correspondent log real earnings level, per each potential experience cohort considered in the analysis. Over the period discussed, the sample consists of 666.705 higher educated unique individuals who were full-time employed and reported a positive income for each year worked. On a yearly basis, the sample size fluctuates between approximately 150.000 in the early 2000s and 400.000 individuals in 2017. With respect to this sample, around 59% of the individuals in the labour force fraction eligible to figure is the sample are female and the vast majority of the participants has completed a bachelor degree. Moreover, the average annual real earnings for a higher educated worker in Portugal is approximately 13.574€ for individuals with a small number of years of experience, increasing to a roughly 18.513€ for the most experienced cohort considered in this analysis.

Table I

Summary Statistics

Portugal, High Education		
Unique Individuals (N)	666705	
Experience 1 – 3	94641	
Experience 4 – 6	171275	
Experience 7 – 9	199883	
Experience 10 – 12	200905	
	Log Real Earnings	Average Real Earnings
Experience 1 – 3	9,415 €	13 573,78 €
Experience 4 – 6	9,486 €	14 650,44 €
Experience 7 – 9	9,579 €	16 311,19 €
Experience 10 – 12	9,684 €	18 512,67 €

B. Key Variables

The choice of dependent variable for the most significant part of the analysis recalls on real annual earnings level, adjusted to 2002 prices. Considering that the Portuguese payment system differs in certain aspects to what is observed in other countries, the annual real wage shall not only be deflated by the inflation rate but also include supplementary payments as the 13^{th} month's salary and the holiday pay. Note that this specification implies that the Portuguese worker should receive the equivalent to 14 months' worth of regular salary per year. The dependent variable should therefore be measured as the sum of the total monthly earnings, including any extraordinary payments or premiums and overtime payments, over all employers for each individual, as presented in equation (1):

$$(1)\quad Annual\ Earnings = Base\ Remuneration * 14 + Regular\ Payments + Irregular\ Payments + Overtime\ Payments$$

As far as the main regressors are concerned, the most suitable for the empirical specification defined are the annual unemployment rate in the current year and at the time of entry in the labour market, at the NUT II level. These regressors consists of my measures for external labour market conditions for new labour market entrants.

It is worth taking into consideration the fact that the NUT classification (Nomenclature of Territorial Units for Statistics) is a hierarchical system implemented by both the European Union and the United Kingdom for the purpose of dividing the economic territory in a uniform way across countries. The NUT division comprises three categories which establish a crescent level of disaggregation, in accordance with previously established criteria by the competent authorities. The main goal of division system aforementioned is to simplify not only the collection, development and harmonization of statistics across European countries and also perform socio-economic analysis of these regions. As far as the Portuguese case is concerned, Portugal is divided in three NUT I regions, seven different NUT II regions and consequently twenty-five NUT III territories. As the main focus of this analysis will rely on the NUT II division of the Portuguese national territory these correspond to the North, Center, Lisbon Metropolitan Area, Alentejo, Algarve, Autonomous Region of the Azores and Autonomous Region of Madeira.

IV. Empirical Methodology

This paper intends to estimate the effects of a recession in the annual real earnings level for new higher educated labour market entrants. Following in part Genda, Kondo, and Ohta's (2010) methodological approach, I must not only identify the year in which new labour market entrants have completed their higher education degrees but also the NUT II region for which these new entrants in fact began their fulltime employment activity in that year.

Furthermore, with respect to cohort definition, to comply with the approach chosen I defined cohort as being a group of people who entered the labour market in the same year and NUT II region.

In spite of "Quadros de Pessoal" being a panel data set, it lacks some detailed information on employment history. Therefore, I computed a variable that stands for the year of graduation for each individual in the sample departing from each individual's age, educational background and the Portuguese educational system. As a general rule, and for the Portuguese context, students typically start searching or accepting employment offers in their last semester of enrolment in university. Thus, for my sample the entry-year in the labour market is computed as presented below:

(2) $Entry\ year = current\ year - Age\ (\ in\ the\ current\ year) + 6 + 12 + number\ of\ years\ to\ complete\ high\ education$

where an individual who entered primary school at age 6, without interruptions, attained the highest level of education. Further elaborated, the school leaving year which is assumed to be the entry-year in the labour market, will be given by the current year deducted by the current age of the individual, plus 6 which is the age for which education starts in Portugal, plus the number of years of mandatory education, plus the number of years to complete high education which can be 3, 5 or 9 according to the level attained. It worth referring that in 2006 the Portuguese higher education system suffered a major reform formally known as the *Bologna* Process, in which higher education degrees were adjusted to a two-tier education system. Accordingly, to those who completed their higher education degrees prior to 2006, equation (1) was appropriately adjusted.

Despite theory showing that unemployment rates at the time of graduation may influence the number of experience years, the fact that individuals may postpone their entry in the labour market due to unexpected increases in the unemployment rate are not going to be explored in this research. Thus, I will only consider that individuals follow the regular educational path from primary school until they complete a high education degree. With regard to the definition of potential experience it will be clearly defined by the difference between the current year and the school leaving year which in hand is determined as abovementioned. Concerning the existence of measurement errors in the computation of the school leaving year or the labour market entry year, since labour market experience as well as labour force participation years can be overstated it is worth noting that not all individuals choose to start a university degree at age 18. In the same manner, recent graduates may even opt for a one-year professional internship in between degrees, thus this may be a source of noise due to exceptions of my assumption.

In connection with the methodological approach followed it is of major relevance to emphasize that given not only the nature of the data and the assumptions for the analysis, the specification to estimate the effects on annual earnings of entering the labour market during a recession, for recent graduates, is written as follows:

(3) $logI_{iytr} = \beta U_{yr} + \alpha U_{tr} + \delta X_{it} + V_y + \eta_r + \theta_r + \varepsilon_{iyr}$

where $logI_{iytr}$ is the logarithm of annual earnings of individual i, that left school in year y, in region r and in the current year, t. Moreover, U_{yr} and U_{tr} are the unemployment rates verified at entry in region r and at present time. X_{it}represents a control variable for the number of years of potential experience, V_y is an entry year fixed effect control variable. In the same way, η_r stands for a regional fixed effect control variable. Lastly, ε_{iyr} which is the remaining error term. It must be borne in mind that the error term for the specification used in this model, ε_{iyr} includes a cohort-region effect which in all likelihood may consist of a source of autocorrelation.

Recognizing the fact that the main regressor of interest, the regional or NUT II unemployment rate at graduation date, is a serially correlated variable given the fact that is measured at a grouped level, Bertrand et al. (2004) demonstrate that in such circumstances the standard error can be severely downwards biased and that this bias can be very severe if the number of groups (clusters) is small. Thus, to take into consideration such random shocks, the standard errors of the regression shall be estimated by bootstrap with clusters by region, which for the particular case of this study will be the Portuguese NUT II territories. The use of such method to estimate the residuals of the model proposed is justified by the fact that the traditional clustered sandwich estimator may overestimate the errors of the model given the reduced number of regions in Portugal.

As the original authors, I will allow for coefficients associated with the annual unemployment rates to vary both at the year, as the goal for this analysis is to observe the persistence of this potential effect as potential experience increases, and at the regional level. Regarding regional division, I will consider seven administrative regions formally known as the NUT II division of territory which comprises five continental administrative regions and the two Autonomous Regions of Madeira and the Azores.

Ideally suited, equation (3) will be estimated separately by each potential experience year. Taking into account the dimension of each cohort, a more parsimonious approach will present estimates for a specific cohort according to the number of potential experience years. Thus, the analysis of the coefficients associated with the parameters of interest will be focused on four cohorts, more precisely 1 to 3, 4 to 6, 7 to 9 and 10 to 12 years of potential experience.

Furthermore, by definition, it can be claimed that the vast majority of individuals will experience an entry in the labour market only once. Thus, it is correct to assume that the

analysis undertaken is in fact referent to each individual's first and only entrance in the labour market and their outcomes, as potential experience increases.

V. Results

The principal focus of this analysis is to infer about the abovementioned effects during an economic downturn for the Portuguese context. This section presents the results obtained from the estimation of the baseline specification in equation (3) through a fixed effects estimation model, which intends to explain the formally known as the scarring effects of entering the labour market during a recession.

Primarily focusing on what defines a recession period, it was assumed that an increase in the national unemployment rate of more than 2 percentage points within the period of 12 months. Thus, analysing figure 1, it is possible to state that the period between 2008 and 2012 is characterised by a recession, due to a sharp increase in the total national unemployment rate of approximately 10 percentage points, over that time span. In the same manner, figure 2 displays the behaviour of such recession indicator at a more disaggregate level. It is possible to infer that the unemployment rate at a NUT II Regional mimicked the behaviour observed at the national level, with the north region being the most severely affected during the recession period.

Figure I

Evolution of the Portuguese Total Unemployment Rate between 2002 and 2017

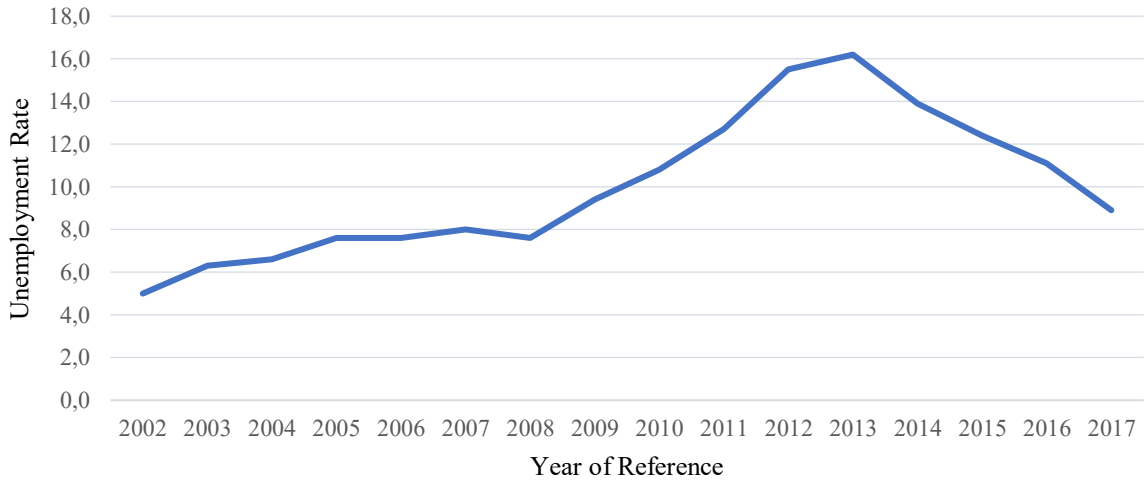
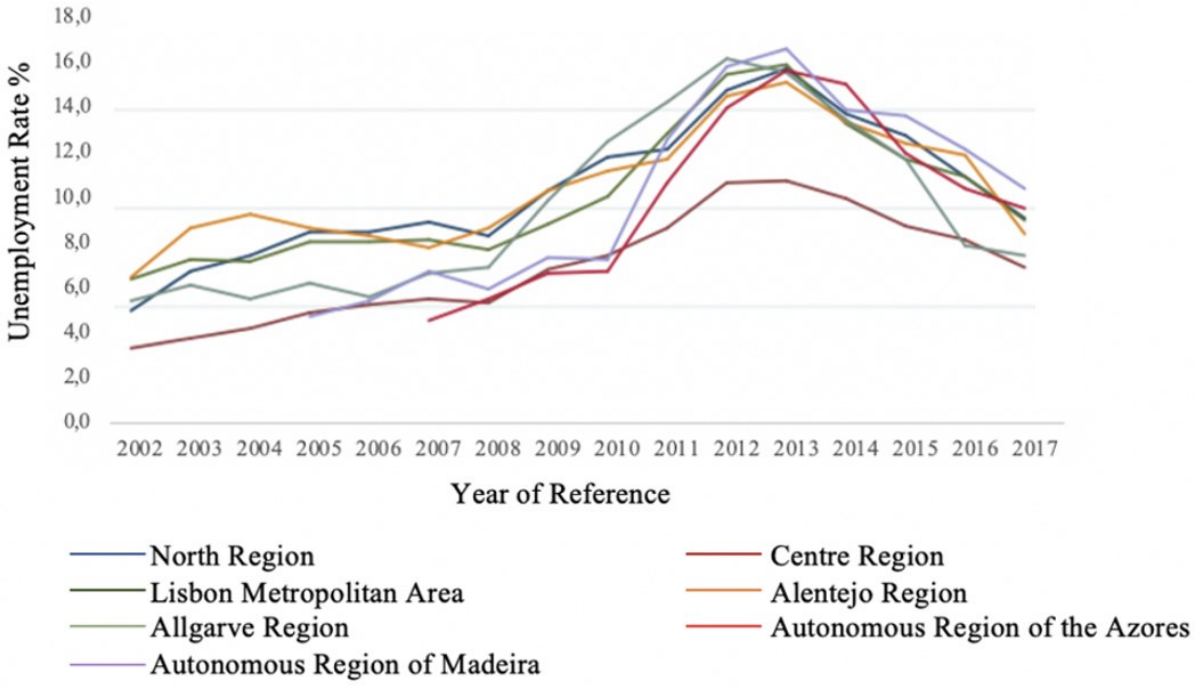


Figure II

Portuguese Unemployment Rate Evolution between 2002 and 2017 per NUT II Regional Level



Note: The cohort division of the population under analysis is defined by the region and the entry year in the labour market. The figure presents the evolution of the unemployment rates at a NUT II regional level, in accordance to the regional division that defines each cohort.

Emphasizing the discussion on the scarring effects of entering the labour market during a recession I find, for the Portuguese higher educated population, a fairly persistent negative impact of an increase in the two considered unemployment rates, at the time of entry in the labour market and the contemporaneous unemployment rate, on the earnings level of new labour market entrants.

The model proposed in equation (3) was estimated using a fixed effects model controlling for the number of potential experience years, education level, school leaving year and regional fixed effects. The estimations reported that high levels of unemployment rate observed at the time of entry in the labour market lead to earning losses of approximately 1,1 percent which in turn tend to fade to around 0,3 percent for more experienced cohorts, consistent to the findings of Oreopoulus, von Wachter and Heisz (2006) for Canadian higher educated individuals. Alternatively, observing the effects of the contemporaneous unemployment rate, it can be argued that there is a similar pattern, more precisely, a one percentage point increase in the contemporaneous unemployment rate leads to a decrease of

1,14 percent decrease in the annual earnings level which in turn fades to a 0,6 percentual decrease over 12 years.

The main result of interest for this research is not only to assess the impacts of unemployment rate at entry in the labour market on the annual earnings level of recent graduates but more specifically to assess the impacts of a recession on such variable. As aforementioned, a recession is characterized by an increase of more than 2 percentage points within twelve consecutive months. Thus, in the timeframe considered, the period between years 2008 and 2012 is clearly marked by a recession. In view of this, it is of primary interest to analyse such impacts for specific cohorts entering the labour market in the years previous to the recession, those "unlucky" cohorts that entered the labour market during the recession and finally those individuals who figured in the immediate years post-recession. This being the case, table III presents the estimation results for the abovementioned cohorts.

As regards to those who entered the labour market between 1990 and 2008, the period that previewed the financial crisis of 2008-2012, the impacts of an increase in the unemployment rate at the time of entry seem fairly low when compared with what was observed up to this point. The most inexperienced cohort is expected to observe a downgrade on its annual earnings of 0,3 percent which gradually fades in a period of 12 years. The so-called "unlucky" cohort, namely those who entered the labour market during the recession endure a much severer decrease in their earnings level. Recent graduates who enter the labour market during this period are expected to have a decrease of about approximately 9 percent in their annual earnings level which persists for the remaining years. Thus, in terms of earnings level the expected recovery period shall be much slower. In closing, for the cohort that entered the labour market during the years that immediately followed the recession of 2008-2012, the impacts are not as severe. However, for that same entry-year cohort, the most experienced cohorts are the most affected ones, given that this individuals in fact entered the labour market prior to 2012 which in turn implies that they are suffering the harsh effects from previous years.

Overall, the results estimated are not only as expected but also consistent with what is found in further literature related with the same topic for both European but also non-European countries. These estimates seem not only larger but also more precisely estimated, for individuals who graduated during the more prominent years of the crisis, in which unemployment rates at both a national and NUT II regional level spiked.

Table II

The Effect of the Unemployment Rate at Entry and the Contemporaneous Unemployment Rate on Log Annual Earnings

Portugal, High Education		
Unemployment Rate at entry in the Labour Market		% Effect
Experience 1 - 3	-0,0109***	-1,096
	(0,0014)	
Experience 4 - 6	-0,0080**	-0,751
	(0,0009)	
Experience 7 - 9	-0,0079***	-0,794
	(0,0018)	
Experience 10 - 12	-0,0038**	-0,382
	(0,0015)	
Contemporaneous Unemployment Rate		% Effect
Experience 1 - 3	-0,0114***	-1,139
	(0,0004)	
Experience 4 - 6	-0,0081***	-0,804
	(0,0002)	
Experience 7 - 9	-0,0064***	-0,639
	(0,0002)	
Experience 10 - 12	-0,0061***	-0,607
	(0,0002)	
Observations (N)	666705	
R^2	0,14	

Notes: [1] * p-value < 0,10, ** p-value < 0,05 and *** p-value < 0,01.
[2] The standard errors in parenthesis are calculated by bootstrapping with 50 replications and clustering by region, more precisely at a NUT II level. Other controls included are potential experience, education level, graduation year, regional an entry-year dummy variables.

Table III

The Effects of the Unemployment Rate at Entry on Log Annual Earnings allowing Different Effects between the pre-, during- and post-Recession Period

Portugal High Education			
Unemployment Rate at entry in the Labour Market			
Labour Market Entry Year	Year <2008	2008<= Year <=2012	Year >2012
Experience 1 - 3	-0,0301**	-0,0863*	-0,0087
	(0,0147)	(0,0999)	(0,0019)
Experience 4 - 6	-0,0097***	-0,0456*	-0,0656**
	(0,0018)	(0,0518)	(0,0458)
Experience 7 - 9	-0,0121***	-0,0717**	-0,0813**
	(0,0017)	(0,0159)	(0,0037)
Experience 10 - 12	-0,0037*	(-)	(-)
	(0,0016)	(-)	(-)
Contemporaneous Unemployment Rate			
Labour Market Entry Year	Year <2008	2008<= Year <=2012	Year >2012
Experience 1 - 3	-0,0036***	-0,0104***	-0,0118***
	(0,0013)	(0,0005)	(0,0006)
Experience 4 - 6	-0,0129***	-0,0056**	-0,0004*
	(0,0005)	(0,0009)	(0,0012)
Experience 7 - 9	-0,0057***	-0,0008*	-0,0066*
	(0,0002)	(0,0013)	(0,0037)
Experience 10 - 12	-0,0061*	(-)	(-)
	(0,0002)	(-)	(-)
Observations (N)	541530	101316	23859
R^2	0,11	0,13	0,09

Notes: [1] * p-value < 0,10, ** p-value < 0,05 and *** p-value < 0,01.

[2] The table presents the result estimations for the baseline regressions by the cohort of entry year in the labour market, assuming three cohorts for pre-, during- and post-recession period. The standard errors in parenthesis are calculated by bootstrapping with 50 replications and clustering by region, more precisely at a NUT II level. Other controls included are potential experience, education level, graduation year, regional an entry-year dummy variables.

Although not considered in my base specification model, it is necessary to infer about some specific characteristics of the individuals in the sample. Information provided by *quarros do Pessoal* relative to observed characteristics of each individual, as gender and the type of contract offered to employees, allows to infer about certain heterogeneity aspects in this sample.

On this note, a considerable body of research has shown significant gender gap in annual earnings. Thus, to infer about the magnitude of such gap, in table IV the above-mentioned effects are analysed by gender. The results displayed result from the introduction of a gender dummy variable in equation (3), which intends to separate the effects for male and female individuals in the sample. The estimations portrait a stronger effect for male individuals which are expected to suffer from a decrease in their annual earnings of approximately 1,2 percent gradually fading to 0,3 percent. On the other hand, for the female individuals observed in the sample the effect is slightly lower, their annual earnings are expected to decrease by about 1,1 percent for the first three experience years and a 0,5 percent impact for more experienced cohorts. It is worth noting that the impacts for the male group in the sample dissipate more rapidly than for the female group. Considering the effects of the contemporaneous unemployment rate on the annual earnings level, there is a stronger impact for the female individuals in the first experience cohort of around 1,2 percentual decrease in the level of annual earnings and for male individuals this impact is slightly lower of around 1 percent. In fact, gender differences are statistically significant at least at a 5 percent significance level, thus the impacts of an increase in both unemployment rate measures considered are statistically significant and different for both male and female employees.

Further, considering the contract typology offered to employees, a significant percentage of new labour market entrants tend to be offered an open-ended contract in comparison to other contractual options. Open-ended contracts consist of the most common form of employment contract between an employer and an employee, and has no fixed term. This contractual framework is typically preferred to other forms such, as fixed term contracts or at-will contracts. To explore the effects intended a dummy variable that stands for the most common type of contract offered to new entrants was introduced in equation (3). Table V explores such estimates, and it can be observed that for open-ended contracts the effects of a one percentage point increase in the unemployment rate at entry will be translated in an expected reduction of 1,4 percent decrease in the annual earnings level for a recent graduate. however, as expected this impact is decreasing over the time span considered given that for the most experienced cohort considered the decline expected is only of 0,3 percent, consistent with

the findings from our baseline regression. In contrast, for the multitude of other contract types offered to new entrants, the immediate effect is slightly lower, given that workers under such contracts are expected to have a decrease of 0,9 percent in their earnings level. However, this same group is more susceptible to increases in the contemporaneous unemployment rate, which for more inexperienced cohorts is expected to give rise to a decrease of roughly 1,2 percent in the annual earnings level. Once more, it can be stated that contractual differences are statistically significant at least at a 5 percent significance level. Thus, being offered an open-ended contract is statistically different than being offered any other typology used, at least at a 5 percent significance level, when considering the impacts of increases in the unemployment rate measures considered.

Table IV

The Effect of the Unemployment Rate at Entry and the Contemporaneous Unemployment Rate on Log Annual Earnings by Gender

Portugal, High Education			
Unemployment Rate at Entry in the Labour Market			P-value of the Difference
	Male	Female	
Experience 1 - 3	-0,0115***	-0,0110***	0,0308
	(0,0022)	(0,0018)	
Experience 4 - 6	-0,0090*	-0,0058*	0,0107
	(0,0017)	(0,0012)	
Experience 7 - 9	-0,0048**	-0,0104**	0,0151
	(0,0028)	(0,0022)	
Experience 10 - 12	-0,0030**	-0,0046*	0,0557
	(0,0022)	(0,0018)	
Contemporaneous Unemployment Rate			P-value of the Difference
	Male	Female	
Experience 1 - 3	-0,0104***	-0,0121***	0,0256
	(0,0007)	(0,0004)	
Experience 4 - 6	-0,0081**	-0,0078**	0,0521
	(0,0004)	(0,0003)	
Experience 7 - 9	-0,0078*	-0,0055**	0,0306
	(0,0003)	(0,0002)	
Experience 10 - 12	-0,0076*	-0,0051**	0,0339
	(0,0003)	(0,0002)	
Observations	271730	394975	
R^2	0,12	0,11	

Notes: [1] * p-value < 0,10, ** p-value < 0,05 and *** p-value < 0,01.

[2] The table presents the result estimations for the baseline regressions with a gender dummy variable, male=1 if the individual observed is male. The standard errors in parenthesis are calculated by bootstrapping with 50 replications and clustering by region, more precisely at a NUT II level. Other controls included are potential experience, education level, graduation year, regional an entry-year dummy variables.

Table V

The Effect of the Unemployment Rate at Entry and the Contemporaneous Unemployment Rate on Log Annual Earnings by Type of Contract

Portugal, High Education			
Unemployment Rate at entry in the Labour Market			P-value of the Difference
	Open-ended Contract	Other Contracts	
Experience 1 - 3	-0,0143***	-0,0092***	0,0683
	(0,0025)	(0,0021)	
Experience 4 - 6	-0,0053**	-0,0087**	0,006
	(0,0010)	(0,0021)	
Experience 7 - 9	-0,0097***	-0,0103*	0,0012
	(0,0019)	(0,0042)	
Experience 10 - 12	-0,0034**	-0,0013**	0,0611
	(0,0016)	(0,0049)	
Contemporaneous Unemployment Rate			P-value of the Difference
Experience 1 - 3	-0,0091***	-0,0122**	0,001
	(0,0006)	(0,0006)	
Experience 4 - 6	-0,0075**	-0,0083***	0,0536
	(0,9993)	(0,0004)	
Experience 7 - 9	-0,0056**	-0,0079**	0,012
	(0,0003)	(0,0004)	
Experience 10 - 12	-0,0053**	-0,0076**	0,002
	(0,0001)	(0,0005)	
Observations	271730	394975	
R^2	0,11	0,09	

Notes: [1] * p-value < 0,10, ** p-value < 0,05 and *** p-value < 0,01.

[2] The table presents the result estimations for the baseline regressions with a dummy variable for the type of contract most commonly offered to new entrants, contract_type=1 if the individual was offered an open contract. The standard errors in parenthesis are calculated by bootstrapping with 50 replications and clustering by region, more precisely at a NUT II level. Other controls included are potential experience, education level, graduation year, regional an entry-year dummy variables.

VI. Robustness Checks

This thesis explores an alternative measure of earnings as the dependent variable. the new measure of earnings only accounts for the base remuneration offered to each individual that figures in the sample used, over all employers. Thus, any regular payments as for example rents or subsidies, irregular payments, such as premiums, and overtime payments are not included. The new dependent variable for the specification presented is as follows:

(4) $Annual\ Base\ Earnings = Base\ Remuneration * 14$

Hence, the new form of the baseline specification presented in this thesis with the new measure of earnings as the dependent variable can be defines as:

(5) $logIbase_{iytr} = \beta U_{yr} + \alpha U_{tr} + \delta X_{it} + V_y + \eta_r + \theta_r + \varepsilon_{iyr}$

where $logIbase_{iytr}$ is the logarithm of annual base earnings of individual i, that left school in year y, in region r and in the current year, t. The remaining part of the model is exactly defined as abovementioned.

Using a fixed effects model, controlling to estimate equation (5), it can be stated that the expected impacts are displayed in table VI. The previous trend observed is further verified at the base annual earnings' level, even though the impacts seem to be more severe. Regarding the least experienced cohort considered, those who present a potential experience level, between 1 and 3 years, it can be concluded that an increase in the unemployment rate at the time of labour market entry leads to a decrease of 1,17 percent in annual base earnings when compared to a decrease of 1,1 percent when considered earnings from all sources reported by the correspondent firm about each of its employees, in the sample. In turn, it can be concluded that the volatile portion of an individual's earnings level is the least susceptible to increases in the unemployment rate level. This impact seems, however, to fade away to a percentage decrease similar to what is verified in my baseline specification, over a period of twelve years. If instead considering the effects of the contemporaneous unemployment rate, the same pattern is observed with further incidence over the individuals' base earnings level.

The results obtained are in fact robust to the exclusion of any other source of earnings, that is not base earnings, taking into account that there is a persistent negative effect on annual

earnings, of an increase in both the unemployment rate at the time of labour market entry and the contemporaneous unemployment rate.

Table VI

The Effect of the Unemployment Rate at Entry and the Contemporaneous Unemployment Rate on Log Annual Earnings and Log Annual Base Earnings

Unemployment Rate at entry in the Labour Market		
Dependent Variable	Total Earnings	Base Earnings
Experience 1 - 3	-0,0109***	-0,0117***
	(0,0014)	(0,0014)
Experience 4 - 6	-0,0080**	-0,0081**
	(0,0009)	(0,0011)
Experience 7 - 9	-0,0079***	-0,0055**
	(0,0018)	(0,0019)
Experience 10 - 12	-0,0038**	-0,0038*
	(0,0015)	(0,0015)
Contemporaneous Unemployment Rate		
Dependent Variable	Total Earnings	Base Earnings
Experience 1 - 3	-0,0114***	-0,0116***
	(0,0004)	(0,0004)
Experience 4 - 6	-0,0081***	-0,0088**
	(0,0002)	(0,0002)
Experience 7 - 9	-0,0064***	-0,0068***
	(0,0002)	0,0002
Experience 10 - 12	-0,0061***	-0,0064***
	(0,0002)	(0,0002)
Observations (N)	666705	666705
R^2	0,14	0,10

Notes: [1] * p-value < 0,10, ** p-value < 0,05 and *** p-value < 0,01.

[2] The table presents the result estimations for the baseline regressions with the dependent variable as log annual total earnings versus the dependent variable being the log of the annual base earnings. The standard errors in parenthesis are calculated by bootstrapping with 50 replications and clustering by region, more precisely at a NUT II level. Other controls included are potential experience, education level, graduation year, regional an entry-year dummy variables.

VII. Concluding Remarks

In this research, I shed light on the implications of entering the labour market during a recession on earnings of University graduates in Portugal. The analysis conducted comprises a period of analysis between 2002 and 2017, with particular attention concentrated on the cohorts who graduated during the recent great economic and financial crisis.

I find that effects of the recession on earning of university graduates in Portugal are negative persistent. Considering three main periods of entry in the labour market, the impacts of high unemployment rates are substantially higher than what is observed previously. In this sense, considering those who graduated or entered the labour market in the years prior to the great economic or financial crisis of 2008-2012, a one percentage point rise in the unemployment rate at entry reduces annual earnings by roughly 3 percent in the most inexperienced cohort. This effect is reduced to 0,3 percent if a period of 12 years is considered. The primarily group of interest, specifically individuals who entered started their first initial job occupation during the years of the main recession of the 21st century experience substantially higher decreases in their earnings level, given that they experienced a sharp increase in the unemployment rates that is not verified in any other point in time in the time span considered. During the great recession, empirical results estimated that a Portuguese new entrant had its annual earnings level reduced by 8 percent, which is at a close range to what was observed in evidence for other countries. Finally, for those who joined the labour market in the post-recession years the impacts for new entrants are lower than those for more experienced cohorts, which is explained by the fact that those cohorts entered the labour market precisely during the crisis period, given that the impacts are expected to still be susceptible for a number of years ahead.

The cost of a recession at the time of entry in the labour market may in fact increase wage inequalities. Despite not performing such analysis in this research, prior studies point out the effects to be much severer for the less educated groups in the labour force. It is therefore expected that for the Portuguese less educated fraction of the labour force that such estimates would be similar. This is the case given the fact that less-educated professionals are more likely to experience not only higher unemployment rate but also less job opportunities.

Overall, I interpreted my results over the hypothesis that all individuals pursued the educational path without major setbacks and did not manipulate the timing of labour market entry, this meaning that knowing that conditions were not favourable in terms of future career prospects, this entry was not postponed.

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