The Self-Employment Option: An Empirical Investigation in Rigid Labor Markets *

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Abstract

This paper analyzes the determinants of becoming self-employed in labor markets characterized by high unemployment and reduced worker turnover, often referred to as rigid labor markets. We use a large panel of workers' histories for the last three decades from Spanish Social Security records to characterize the dynamics of the transitions into self-employment, as well as the heterogeneity of the newly self-employed. The Spanish case is of particular interest given the high unemployment levels and its two-tier structure, which features many of the current challenges brought up by the gig economy in many other countries. We document the age, cohort, and time dynamics of transitions into self-employment by different statuses of origin. We show that, in contrast to current evidence, the decision to become self-employed is pro-cyclical, regardless of the original job status. The age dynamics, however, are very different if coming from unemployment or paid-employment. We then exploit the rich data and the specifics of job regulations in Spain to understand heterogeneity across sectors and labor market attachment histories. Regarding earnings, workers who spent a predominant share of their careers before age 40 in self-employment, when going back to paid-employment earn less than fixed-term workers. We also find evidence of negative selection into self-employment, regarding business duration, when entering from unemployment as opposed to a salaried job. We discuss how these facts call for a revision of self-employment promotion policies in place.

JEL Classification: J24, J64, E32

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1 Introduction

This paper analyzes the determinants of becoming self-employed in labor markets characterized by high unemployment and reduced worker turnover, often referred to as *rigid* or *sclerotic* labor markets. With an increasing pressure for flexibility steaming from higher unemployment, these labor markets have become also segmented in terms of job protection, creating a two-tier contract structure. In such markets, most workers are in highly protected positions but a non-negligible and increasing share[1] of the employed population have temporary unprotected contracts and face recurrent unemployment spells. While this type of labor markets are characteristic of Southern Europe, new challenges brought up by the Great Recession and the gig economy have increased the share of non-stable jobs and reduced worker turnover in countries such as the U.S. or the U.K. (Amaral (2011)).

To put our analysis in context, Southern European labor markets have faced two main challenges over the last decades: (1) high unemployment and (2) segmentation. During the 1980s these countries were characterized by high and persistent unemployment rates and stringent contracts with high termination costs for the employer. In an attempt to reduce unemployment and introduce flexibility in these labor markets, several labor market reforms took place in countries such as France, Italy, and Spain. These countries introduced the possibility of hiring workers under fixed-term contracts without firing costs; this became widely used, with the stock of these contracts rising above 35% in the mid-1990s for these countries. The co-existence of these two forms of contracts in the labor market —highly protected long-term employment relationships (permanent contracts) existing alongside workers with insecure, fixed-term contracts— is known as two-tier or dual labor markets. These features are still current, and hence these labor markets are currently facing these challenges. In such a context, self-employment has become an attractive option for workers. In Italy, Portugal and Spain self-employment accounts for more than 20% of employment over the last three decades, despite the higher risk borne by the worker compared to paid-employment. Yet, most of the current self-employment analyses are based on data from flexible and highly functional labor markets (Poschke, 2013; Humphries, 2018).

For our analysis, we use a large panel of workers' histories for the last three decades, including two big recessions, from the Spanish Social Security administration to study the characteristics of workers that enter self-employment. The Spanish labor market is an ideal case study for this question, with unemployment rates that spiked above 25% during the Great Recession, youth unemployment rates above 50%, and very segmented labor markets

[1] In 2015 it accounted for 14% of total employment in Italy, 25% in the case of Spain and 23% in Portugal, according to their respective National Institutes.

with 30% of workers being employed under unstable, fixed-term contracts. Despite the efforts to promote employment and favor long-lasting job relations, a complex political structure and the presence of nationwide unions has created a persistent insiders-outsiders situation that makes traditional policy instruments nearly unimplementable. In this context, policies that promote both entry and survival of self-employed workers have the potential of alleviating the dysfunctions of these rigid and segmented labor markets. These are benefits often ignored in the context of countries with low levels of employment protection legislation. While our analysis is broader, we pay special attention to the cyclical behavior of transitions in order to distinguish between types of workers and the type of industries they enter during recessions and booms. In particular, we study the transitions to self-employment from both unemployment and paid employment. We next disentangle whether the decision is mostly due to lack of alternatives in paid-employment or to the existence of more profitable opportunities as entrepreneurs.

The relationship between self-employment and unemployment has been studied before in the economic literature, although the evidence remains inconclusive. The literature has distinguished between two forces of selection into self-employment over the business cycle: *pull* and *push* forces (Carrasco (1999)). During economic expansions, the more favorable business conditions *pull* workers into self-employment. When recessions occur, the high and persistent unemployment *pushes* workers to switch to self-employment instead of searching for longer time periods. Notice that pull and push factors go in opposite directions over the Business Cycle. There is little consensus in the literature on which effect dominates and what policies can affect these forces. In the past, the lack of long time series data for a large number of workers' labor histories prevented from giving conclusive answers for this question from an empirical point of view.

We analyze the decision to become self-employed using Spanish Social Security data on workers' labor histories. The dataset, which is known as *Muestra Continua de Vidas Laborales* (MCVL) has three key characteristics: (i) the large sample size; (ii) longitudinal design; and (iii) the administrative nature of the data. This is a sample of 4% of Spanish taxpayers for years 2005-2015 (approximately 1.2 million individuals), which reduces the sample-size limitations of surveys. The dataset is longitudinal, which allows us to follow the working histories of all individuals over a long time period that involves two different recessions of different magnitudes and duration (1992-1993 and the Great Recession), and the highest growth decade in Spain's recent history. Moreover, the data are from Spanish Social Security Administration (SSSA) administrative records, which substantially reduces the measurement error arising from survey data. Most importantly, the richness of the dataset in terms of labor market outcomes and demographics allows us to control for observables and deal with

unobserved heterogeneity in the analysis in a way that previous studies did not.

Our findings aim to understand the cyclicality of entry into self-employment, characterizing the type of individuals that enter self-employment at different times, and survival in self-employment, by studying how long they stay out of unemployment. In particular we find:

(1) The probability of becoming self-employed is pro-cyclical: recessions and higher unemployment rates have a negative impact on the decision of entering self-employment for both unemployed and salaried workers. (2) The probability of entering self-employment from unemployment is lower for females, the low educated, young workers and previously fixed-term employees. The probability increases in earnings and tenure before the dismissal and if the worker is not receiving UI insurance. (3) The probability of entering self-employment from paid employment decreases on current wage and tenure, and increases if the worker is employed under a fixed-term contract, a part-time contract or if working in services related industries (i.e. food and accommodation, household services). (4) Survival rates while in self-employment are higher for workers that did not experience unemployment before starting their business that for those out of unemployment, and higher during expansions. These workers enjoy higher earnings and longer spells as self-employed, compared to those entering from unemployment. (5) Workers who spent a predominant share of their careers before age 40 in self-employment, when going back to paid-employment earn less than mostly fixed-term workers.

This paper is organized as follows: section 2 covers the related literature, section 3 describes the data used, in particular the definition of self-employment and variable description. Section 4 contains an analysis on the flows between paid-employment, self-employment and unemployment. Section 5 describes the multivariate analysis and probit estimation Section 6 contains a survival analysis in self-employment and compares heterogeneous age-earnings profiles based on self-employment experience at different stages in workers' careers. Finally, Section 7 concludes and contains the agenda for future research.

2 Related Literature

The rapid increase in the number of self-employed in the economies has centered the attention of recent empirical research. A number of papers study the causes and consequences of self-employed workers using longitudinal data. Evans and Leighton (1989) document the process of selection into self-employment on the US using National Longitudinal Survey of Young Men (NLS) data on young white men between 1966 and 1985. This paper is among the first

ones to document the characteristics of transitioning into self-employment over the life cycle using longitudinal data. However, given the characteristics of the data, the sample is reduced to a specific subset of the workforce who are interviewed bi-annually - reducing the frequency of observations in the data. Sraer *et al.* (2014) study the effect of a large-scale French reform that relaxed barriers of entry to self-employment. In particular, the government started providing a generous downside insurance for individuals starting a small business. The authors document that post-reform entry growth is larger by more than 12 percentage points in industries where small firms are prevalent at creation. Poschke (2013) provides empirical evidence on the choice of becoming self-employed. Using National Longitudinal Survey of Youth data (NLSY79), he documents that the relationship between entrepreneurship and ability is U-shaped: entrepreneurship is higher for people with high or low levels of education. More recently, Humphries (2018) using panel data from Sweden studies the labor market outcomes of self-employed workers over the life cycle. However, these papers abstract from incorporating the role of business cycles and cyclicality of unemployment into their analysis.

Several papers have attempted to study the relationship between self-employment and unemployment. Alba-Ramirez (1994) uses US data (CPS) and Spanish data from the Working and Living Conditions Survey (ECVT) in 1985. He finds that for both the US and Spain the probability of becoming self-employed increases with unemployment duration. The drawback of these databases include a small sample size, and its survey condition, which increases response bias and measurement error. Additionally, his study is carried during a particularly high but low-volatility unemployment episode for Spain, which prevents from observing differences in transitions over time. Carrasco (1999) studies the role of the business cycle also for the Spanish experience using survey data from the Spanish Continuous Family Expenditure Survey (Encuesta Continua de Presupuestos Familiares) from 1985 to 1991. This paper provides an extensive analysis on the probability of entering self-employment for individuals with different characteristics, and takes into account the economy aggregate state. Its main drawback is that the survey is limited to male household heads, which are only observed for at most for up to 8 quarters, which generates attrition in entry an exit between paid-employment, self-employment and unemployment. In contrast, in this paper we use a large longitudinal data set from the Spanish Social Security records to shed light on the determinants of becoming self-employed. The panel features the labor histories of 4% of Spanish workers for more than three decades. The panel dimension allows us to fully characterize the dynamics of the transitions into self-employment and study the characteristics of workers that enter self-employment during recessions and booms while controlling for observable characteristics and unobserved heterogeneity from their previous working history. The sample size also allows us to distinguish between the dynamics of males and females, and of different cohorts. We start describing the data in the next section.

3 Data

The Spanish Social Security Administration Data

We use data from the Spanish Social Security Administration (SSSA). The dataset is known as *Muestra Continua de Vidas Laborales* (MCVL). It consists of a 4% representative sample of Spanish individuals affiliated to the SSSA for a given year, be it as a worker, unemployed or retired. The sample size is about 1.2 million individuals per year, which reduces the sample-size limitations of surveys. The sample is selected in 2004 and has a longitudinal and historical structure: for every individual in the 2004 sample, we can observe her full working history from the first day of affiliation until 2015, starting from 1980[2]. Regarding the population and content of the data, the MCVL samples from individuals that were affiliated at least one day during the reference year. It excludes individuals with provided health insurance or non-contributory subsidies, as well as individuals without any connection to the SSSA. The dataset contains monthly wage data back to 1980 with an entry for each job spell the worker has experienced as a salaried or self-employed worker, as well as each non-employment spell that involves government benefits. For each working spell, the dataset also reports the start and end date of the contract, the type of contract and the cause of dismissal, among other relevant variables about the workers' labor history, firm and job characteristics[3]. For the case of the non-employment spells, we observe the associated unemployment benefits and pension amount.

Sample

We focus on prime age workers (25 to 55 years old) to avoid capturing atypical behavior at the beginning or end of the career. In the interest of data quality, our preferred time period of analysis is 1990 to 2015, since spell and income information is occasionally missing prior to 1990. Our baseline sample considers affiliated individuals in all industries. Other samples are considered in the robustness analysis that will be discussed later.

3.1 Definition of Main Variables

The source of the information in the MCVL is the actual contracts signed between firms and workers. The information in the dataset regarding job characteristics is therefore very

[2]Technically, the histories are available since the 60s, but most of the variables of interest start being reported in 1980. Because of data limitations regarding the 2004 wave, we use the 2005-2015 waves to construct the longitudinal panel.

[3]These include information regarding firm's location, size, and sector; particular worker characteristics on the contract (full or part-time, if the worker has a disability); and the worker's professional category, as described in the contract.

detailed and high quality. This allows us to perform an analysis with a large number of individuals while controlling for their characteristics over time, in particular their labor histories, which can be determinants for the decision of becoming self-employed. Next, we summarize the variables used in the analysis, including definition, construction and sources.

Self-employment

In order to identify the self-employment spells in the data, we use the variable *régimen de cotización* (contribution regime). This variable identifies the type of regime (salaried work or self-employment) that the spell is associated to according to the Social Security Administration[4]. For the main analysis, we exclude workers in identified special self-employment regimes, mostly in fishing and agricultural activities from the sample, since they may behave in a different way than the self-employed in the regular regime[5]. In the case the worker has more than one simultaneous jobs under different regimes, we classify workers under salaried work or self-employment as follows. If a worker has two or more active spells within a given month, and at least one belongs to self-employment, we define the worker's main job as the one under which the worker has the most seniority. [6] This approach reduces the error from attributing a certain job regime to workers with a long-lasting job or entrepreneurial activity, but that exhibit a seasonal or temporary source of income from a second activity. Whenever the period of analysis is at a lower frequency than monthly, the employment status for each period corresponds to the one held in the last month of the corresponding period. For example, for quarterly analyses, we consider a worker to be self-employed in the first quarter if she was self-employed in March; for yearly analyses, the status of relevance is that of December.

Demographics

We observe the birth date and sex of the individual. The dataset contains also information on the highest education level obtained by the worker as reported to the Census, and nationality of the worker. We only keep workers with Spanish nationality in our baseline sample. Finally, there is information regarding the province and municipality where the address of the worker is located at the time of the last data extraction, as well as some information on cohabitants (that we employ mainly to test the robustness of our results when controlling for more

[4]Most of the previous literature has relied on self-reported employment status, which creates measurement bias.

[5]Some of these workers in the agricultural sector where re-classified after 2008 as regular self-employed workers, so we will observe workers in this industry with active spells after 2008. We consider that excluding self-employed workers in primary activities will miss an important part of the workforce, since important industries for the Spanish economy, such as wine production, would be included here.

[6]We have also considered defining the main job status in the case contract overlap as the job which is the main source of earnings within a month. This does not affect the sample significantly, but generates job transitions that do not represent worker's most stable job over time.

factors).

Prior contract information

We use information on the workers' last spell to control for different types of heterogeneity. In particular, we use the following information regarding the last paid employment spell:

- *Average monthly earnings:* we take the average of the monthly earnings on the quarter prior to the transition. The MCVL provides nominal monthly earnings that we deflate them using the Spanish CPI with base year 2006 provided by the National Institute of Statistics (INE).

- *Tenure:* we compute tenure as the duration of the contract from the beginning to the end of the spell. We observe the exact date (day, month and year) when the contract started and ended, as provided from the Social Security administration, so tenure information is extremely accurate.

- *Contract type:* two types of contracts with different employment protection coexist in the Spanish labor market: fixed-term or temporary contracts, which offer little or no protection after dismissal and have a finite duration, and permanent contracts for extremely protected jobs with firing costs that could rise to three years' worth of a worker's wages. Since permanent contracts are correlated with job security, using information in MCVL about the contractual relationship between the worker to control for the role of job security in generating transitions between paid employment and self-employment.

- *Part-time contract:* the MCVL reports the percentage of hours of the relationship with respect to a full-time job (being 100 percent a full-time worker), which allows us to distinguish between full and part-time job. We include a dummy for part-time job in the case when a worker was employed with a contract with less than 95 percent full-time equivalent hours.

- *Industry:* associated with each spell, the MCVL contains information about the three-digit level industry classification of the firm, based on the Economic Activity National Classification (CNAE). We classify industries into 12 broad groups to control for the industry where the worker was employed prior to a transition.

Unemployment benefits

We identify unemployment benefits in the database as payments to the unemployed worker using the variable *"Tipo de relacion laboral"*. This category allows us to identify public unemployment insurance recipiency, both in duration and amount. [7]

[7] A drawback of this database is that unless the worker is a recipient of unemployment insurance, it is not possible to separately identify periods of unemployment with no benefits and non-employment. However, our

Demographics

In all of our specifications, we control for a quadratic polynomial in age, as well as the sex and the cohort of the worker. We build ten different cohorts by defining 5 year windows that start in 1940 until 1989. We also control for the years of education of the worker, as provided from the MCVL (with origin from the Census). Finally, we construct a dummy for workers employed in urban areas: the dummy takes value one if the municipality is bigger than 30,000 inhabitants, zero otherwise.

Aggregate variables: unemployment rate and recession dates

To understand the effect of the business cycle on the transitions to and from self-employment, we include the following two variables: national (and regional) unemployment rates and Euro area business cycle dates. We obtain the quarterly unemployment rates from National Institute of Statistics (INE). However, this variable itself may not be controlling enough for the business cycle (Spain has historically have high unemployment, even during the 2000-2006 expansion). For this reason, we classify each quarter in the data as a recession or an expansion period, using the definition of recession provided by the Centre for Economic Policy Research (CEPR). For the period studied, the CEPR committee identifies three recessions (1992Q1-1993Q3, 2008Q1-2009Q2, and 2011Q3-2013Q1), while the rest of the quarters are considered expansions[8].

4 Flows into Self-Employment: The Big Picture

This section describes the most important attributes of the self-employment decision. We first describe the main characteristics of the self-employed. We next seek to understand how the decision to become self-employed changes over the life cycle and how it has evolved over time and with every cohort that enters the labor market. For that purpose, we will calculate the age, year, and cohort profiles of the transitions from unemployment and paid-employment to self-employment, separately.

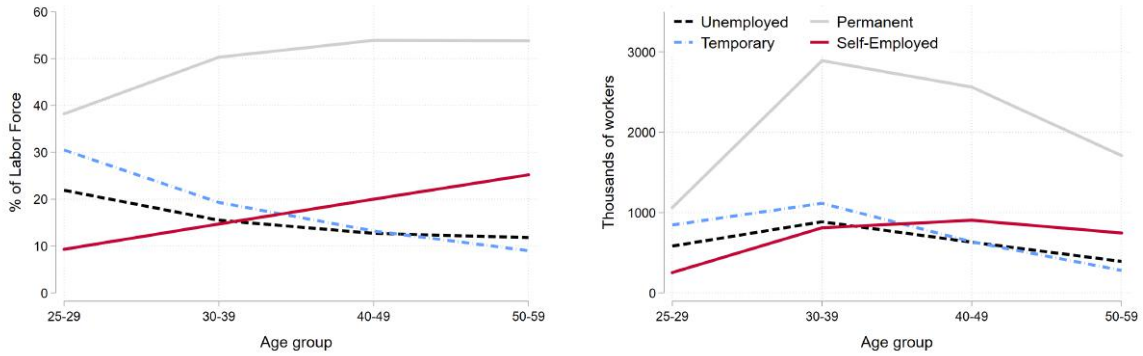
sample restrictions try to overcome this problem, by considering prime-age workers that have attachment to the Social Security and exhibit an employment spell before and after the dismissal.

[8]The Committee released its new findings in August 2017. Its main conclusion is that since the last trough in 2013Q1, the euro area has been recovering at a slow but steady pace. This post-recession recovery is commensurate with that of the US recovery, considering it began later, after the double-dip European recession that followed the global financial crisis.

Self-employment: descriptive statistics

In Spain more than 3 million workers are self-employed. The number of self-employed has remained fairly constant over the last three decades, and they represent an average of 20% of the labor force between 1990-2015 according to the National Statistics Institute (INE). The Spanish labor market has been widely studied due to its stringent duality: highly protected, *permanent* contracts co-exist with short-term, unprotected fixed-term or *temporary* employment. It has also exhibited highly volatile unemployment rates, that reached peaks above 25% during the Great Recession. This behavior is not exclusive to Spain: labor market duality and unemployment co-exist in Southern European countries such as Italy or Portugal. In this context, the cyclical relationship between self-employment, paid-employment and unemployment stands out as an important channel to alleviate the tensions in these labor markets.

Figure 1: Distribution of workers across employment states



At first glance, we decompose the Spanish labor force between four groups of workers: unemployed, permanent, temporary and self-employed. Figure 1 presents the rates and levels (in thousands) of these four pools of workers by age groups, as provided by the Spanish National Statistics Institute. Self-employed workers account for the same proportion and number as temporary and unemployed workers; however the literature has so far paid little attention to the self-employment option to alleviate duality and unemployment. Self-employment rates increase with age, as the prevalence of temporary employment and unemployment decreases. To better understand the characteristics of the self-employed, as well as the flows in and out of self-employment, we proceed to analyze workers' labor histories coming from Spanish Social Security records. We define the job status (employed, unemployed or self-employed) at the end of each quarter, and define transitions between different employment states between quarters. In this exercise we restrict the sample to prime-age workers (25 to 55 years old), that are either self-employed or salaried workers between 1990

and 2015. Tables 1 and 2 presents the summary statistics of the resulting sample of workers. Self-employed workers are mainly males (65 % vs 53 % of salaried workers), and half of them have not completed high-school education. These workers have been at their own business for almost 7 years on average, and are concentrated mainly in transportation, manufacturing and professional services.

Table 1: Descriptive Statistics (I): Self-employed vs Salaried 1990-2015

	Self-Employed			Salaried		
	Mean	Std.Dev.	Median	Mean	Std.Dev.	Median
Age	38.4	7.7	38.0	36.3	7.7	35.0
Monthly earnings	959.3	461.0	817.7	1572.2	795.6	1402.6
Tenure in years	6.7	5.6	5.3	4.1	4.4	2.6
Female (%)	34.9			47.0		

Source: MCVL-Seguridad Social, own calculations

Table 2: Descriptive Statistics (II): Self-employed vs Salaried 1990-2015

Education	Self-employed	Salaried
Less than high-school (%)	49.1	42.2
High-school graduates (%)	31.7	32.0
Some college (%)	6.6	9.9
College graduates (%)	12.6	16.0
Industry	**Self-employed**	**Salaried**
Manufacturing (%)	8.8	15.0
Construction (%)	13.3	8.2
Transportation and sales (%)	32.3	21.9
Food and accommodation (%)	8.9	5.3
Professionals and real state (%)	14.1	14.1

Source: MCVL-Seguridad Social, own calculations

Table 3 reports quarterly entry and exit into self-employment, and self-employment rates for different age groups with respect to the total number of self-employed within that age group for the period 1990-2015. Entry and exit is more common for young workers (26-30 years old) and plateaus around 2% between quarters for older workers for both types of transitions. From this table it seems plausible that the probability of entering and exiting is age dependent. We will study this hypothesis formally in the next sections, through the use of econometric techniques.

Table 3: Self-employment quarterly entry and exit rates by age

Age Group	Entry	Exit	Rate
26-30	6.5%	3.3%	9.3%
31-35	4.3%	2.5%	12.9%
36-40	3.3%	2.1%	15.6%
41-45	2.7%	1.9%	17.4%
46-50	2.3%	1.8%	18.3%
51-55	1.9%	1.6%	19.4%

Source: MCVL-Seguridad Social, own calculations

Self-employment: age, cohort and cyclical dynamics

Next we show how transitions to self-employment change over the life cycle and how they evolved over time and with every cohort that has entered the labor market. For that purpose, we will calculate the age, year, and cohort profiles of the transitions from unemployment and paid-employment to self-employment, separately. Given that the frequency of the transitions decreases the lower the time period analyze, in this section we look at transitions between employment states at the yearly level.

Age Dynamics

Figures 2 and 3 show age profiles. The circle-markers in the left panel of Figures 2 and 3 outline the age effects net of cohort and year effects. We calculate this profile following the methodology proposed in Deaton and Paxson (1994) to separate age from both year and cohort effects while avoiding the multicollinearity between the three variables. In a nutshell, it results from regressing the series of average transitions per year-age-cohort on age, cohort, and *restricted* year dummies. The restricted year dummies are detrended and normalized to add up to zero. Intuitively, it consists of attributing any growth or decline in transitions to age and cohort effects, and assume that the year effects capture cyclical fluctuations that average to zero over the long run. The reference group are 26-year old workers in 1985. The resulting dummies estimates are readjusted to start at the average transition rate of the reference group.

The age profile in Figure 2 shows that the probability of entering self-employment after an unemployment spell is hump-shaped in age. Prime-age workers are more likely to start a business than younger and older workers. In contrast, the age profile in Figure 3 shows a decreasing age trend of moving into self-employment after a working spell. Notice that these differences are consistent with the push-pull view of self-employment: The most likely age to transition from unemployment is in the early forties, when long-term unemployment

is more frequently a problem. From paid-employment, it is the young that transition more into self-employment, we will discuss below that this is more likely the case in expansions, hinting at pull effects from good economic prospects. In Section 5 we use worker, firm, and job characteristics to further dissect the forces behind these findings.

Time Dynamics

Next, we turn our attention to the solid line in the left panels of Figures 2 and 3. This series corresponds to the time series. It is obtained by regressing the series of interest on age and year raw dummies, pooling year and cohort effects. Therefore, as opposed to the aforementioned adjustment, the year dummies reflect a combination of trend and cyclical components.

Two facts are worth discussing of these time effects. First, not surprisingly, there is a clear increasing time trend of becoming self-employed both from unemployment or salaried employment. This trend is more pronounced for the case where the new self-employed was unemployed before. Secondly, we can see a marked cyclical component, again stronger in the unemployed to self-employed case. Notice, thought, that it is hard to further interpret the two facts, as cohort and year effects are confounded. To give an example, we do not know whether the large increase observed in the last five years of the sample is a result of the increasing tendency for each new cohort to become self-employed or if it is associated with the recovery after the Great Recession. In the next subsection, we will discuss the cohort-trend and cyclical components separately.

Cyclical Dynamics

Finally, we turn to the right panel of Figures 2 and 3. The two lines in these panels are the cohort and year dummies resulting from the regression described in the age effects discussion above and borrowed from Deaton and Paxson (1994). That is, the black-dashed line corresponds to the pure cohort effects, without the influence of business cycles, while the red-solid line can be identified with the cyclical component of the series. It is easy to see now that, up to the Great Recession, there was indeed an increasing trend to become self-employed from both statuses – salaried and unemployed –. After 2010, however, the large increased that we saw on the left panel is entirely attributable to the post-recession effect in the case of transitions from unemployment. For the case where the worker used to be salaried, we see that there is an increasing tendency of younger working cohorts to become self-employed.

Turning to the cyclical part, the red-solid line highlights the strong correlation with GDP growth, especially in the unemployed to self-employed case. Very surprisingly. This correlation is positive, in contrast to other studies performed with US data (Alba-Ramirez,

1994). We find this result puzzling and will be at the core of our multivariate analysis in Section 5, as well as a motivating fact for a future quantitative analysis.

Figure 2: Transitions from Unemployment to Self-Employment

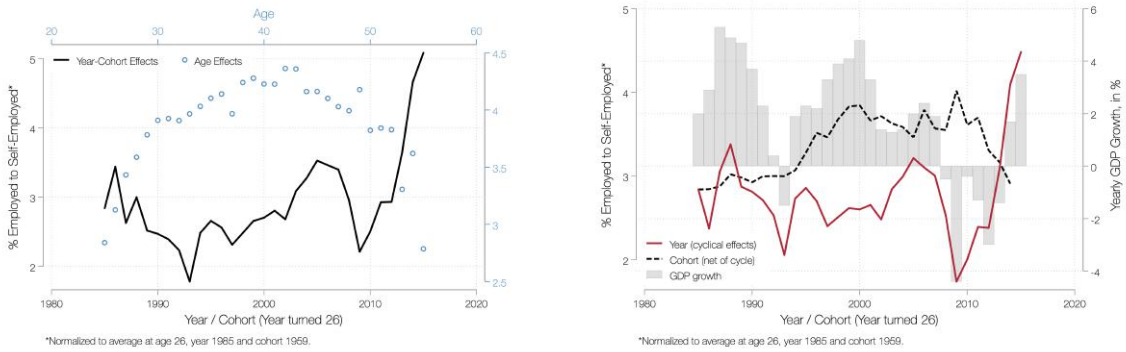
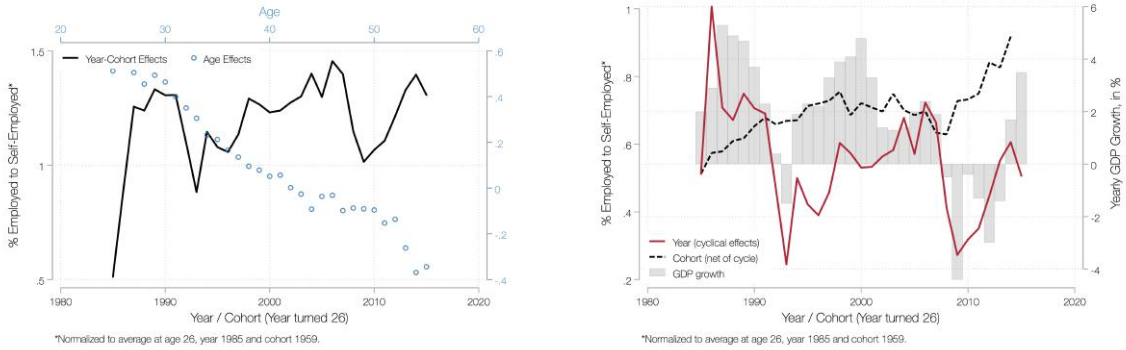


Figure 3: Transitions from Paid-Employment to Self-Employment



5 Flows into Self-Employment: Heterogeneity

To study the determinants of becoming self-employed we use a probit analysis. For this part, we collapse the panel into a quarterly dataset and record transitions between paid employment, self-employment and unemployment between 1990 and 2015. As explained above, we compare the employment status of the worker at the end of a given quarter q and the next one $q-1$ to identify transitions between the three states[9]. An underlying assumption of the probit regression analysis is that a worker that transitions from paid employment to self-employment does so if the expected income under self-employment is higher than the

[9]Even though a quarterly analysis will miss any transitions that occur within the quarter, we find it is more suitable to increase the order of magnitude of the transitions and analyze the role of business cycles than a monthly analysis.

expected wage under paid employment. Similarly, it is also assumed that a worker leaves unemployment to become self-employed if the expected value of doing so is higher than the expected value of keep searching for a wage salaried job.

Let d_i^* denote the expected income difference between self-employment and a salaried job for individual i. Then we can write d_i^* as:

$$d_i^* = \beta X_i + \varepsilon_i$$

where X_i is a vector of observable individual characteristics.

The term d_i^* is not observed, but the outcome of the decision process is observed and it is summarized by a binary variable that takes value 1 if the worker becomes self-employed and 0 if he does not. Assuming that the error term ε_i is normally distributed, then:

$$P\left(d_i^* > 0 \mid X_i\right) = F\left(\beta X_i\right)$$

where F is the cumulative distribution function of the standard normal.

We estimate separately the quarterly transitions to self-employment from unemployment and paid-work using a binomial probit approach[10] We define job controls such as tenure or type of contract for at the end of the last period, which are the relevant states to consider in the transition. In the case of unemployed workers, we use the characteristics of the last spell before being unemployed.

Probability of becoming self-employed from unemployment

We present in Table 10 in Appendix A the full probit estimates for the determinants of becoming a self-employed worker from unemployment. We analyze the results in detail below[11]. Relative to the demographic characteristics of workers, we observe that females and workers that have not completed high-school education have a lower probability of tran-

[10]The dependent variable takes value 1 if the worker becomes self-employed in q, 0 for any other outcome. An unemployed worker at the end of quarter $q-1$ has three possible outcomes: the worker continues to be unemployed in q, the worker is a wage employee in q, or the worker is self-employed in q. Similarly, we define the transitions from paid-employment to self-employment by considering these three possible transitions: paid-employment, self-employment or unemployment. Since the focus of this paper is understanding the decision of becoming self-employed, we believe that the binomial model is sufficient to uncover the characteristics of these workers.

[11]The constant in all the specifications in the Appendix refers to males with previous employment in the primary industry, with less than 6 years of schooling and born between 1940 and 1944.

sitioning from unemployment to self-employment. Not only the flows are lower, also the stock of self-employed females is smaller compared to paid-employment, as noted earlier in Table 1. This poses an interesting puzzle, since self-employment could in principle add job flexibility, helping especially women to have a stronger attachment. However, we do not observe that in the data. On the other hand, younger cohorts are more likely to enter into self employment compared to older cohorts of workers. One reason could be that since the higher self-employment rates are found in workers between 45-50, these workers have already transitioned, whereas younger cohorts exhibit lower rates in the total stock. Being a recipient of unemployment insurance decreases the probability of the transition. This is in line with the findings of Carrasco (1999) and Alba-Ramirez (1994). Relative to the characteristics of the previous employment spell, workers who were employed under temporary contracts are less likely to enter self-employment compared to permanent workers. Workers who had longer tenures, higher earnings or a part-time contract are more likely to transition to self-employment. Having previous work experience in construction, transportation, IT and domestic services is a positive determinant to enter self-employment. Finally, let's analyze the role of the business cycle in the transition probability. Higher national unemployment rates have a negative impact on the probability, as well as being under a CEPR recession quarter[12].

Probability of becoming self-employed from paid work

Next we analyze the transitions from paid-work to self-employment. Complete estimation results for this specification are presented in Table 15. In line to our previous findings in transitions from unemployment, females and the low educated have a lower probability of transitioning from salaried work to self-employment. Relative to the characteristics of the current employment spell, workers who were employed under temporary contracts and part-time jobs are more likely to enter self-employment compared to permanent full-time workers. This result seems to indicate that workers in less stable jobs, and facing unemployment spells more frequently are more likely to avoid the labor market turmoil and start their own business. Aligned with this result, we find that the higher the seniority and wage of the worker, the lower the probability that he will quit his job to enter self-employment. Workers who work in urban areas are also less likely to quit their job to start their own business. Higher unemployment rates and recessions have a significant negative effect on the probability.

To give meaning to these findings, next we present some comparison of the change in

[12]In an alternative specification with time effects we observe that 1992-1994 and the years of the GFC have the most negative coefficients. These results are reported in Appendix A.

transition probabilities for workers with different covariates in Table 4. For transitions from unemployment, the in this exercise we define the baseline worker is a male with a college degree, born between 1970-1974 who is 35 years old, earned at his last job 1200 euros a month and is unemployed without benefits, and who was employed under a full-time permanent contract for three years as a professional before the dismissal. In the scenario of transitions from paid-employment, we consider a representative male, with a college degree, born between 1970-1974 who is 35 years old, earns 1200 euros a month, and who has been employed under a full-time permanent contract for three years in an urban area. In both experiments, the economy has an average unemployment rate of 15% (and high of 20%). Changes in the unemployment rate have a sizable impact on the probability of entering self-employment[13]. Moreover, entry for low-educated individuals and females is very small relative to college educated workers[14].

Table 4: Predicted probabilities of entering self-employment

	From U	P.P. difference	From E	P.P. difference
Baseline	2.97%	–	0.38%	–
Recession	2.56%	−0.41	0.35%	−0.03
Female	1.54%	−1.44	0.18%	−0.21
Temporary	2.40%	−0.57	0.57%	+0.19
No school	1.54%	−1.43	0.17%	−0.22
High-school	2.68%	−0.29	0.25%	−0.14
Age 25-30	2.32%	−0.66	0.39%	+0.01
High UR	2.82%	−0.15	0.37%	−0.01
UI benefits	2.71%	−0.26	–	–

In Appendix A, we conduct additional robustness checks for these findings. We estimate the model separately for different time periods[15]. In particular, Table 12 in Appendix A presents these results separately for 1990-2000, 2001-2015 and 2010-2015. The main difference between time periods is that the probability of entering self-employment from unemployment for females, despite being lower than for males, has increased in the last decade.

[13]While in this specification we use the national unemployment rate, we have also tried an alternative specification with regional unemployment rates, with virtually no difference in our results.

[14]While the numbers seem small in magnitude, it is necessary to remind the reader that the stock of the unemployed averages 3 million workers, while the employed account for 16 million workers.

[15]Some covariates appear with missing values as we go back in time, so we estimate the same model from 2001 onwards, when all the variables should be reported by firms to the Social Security. By doing this, we double-check that the missing covariates are not correlated with some intrinsic characteristics that predict the transition to self-employment. Additionally, we have estimated the model separately for different cohorts, these results are available upon request since they do not add much to the results already presented in this version of the paper.

The effects of recessions and higher unemployment rates are significantly negative for the two main sub-periods: 1990-2000 and 2001-2015. However, if we only consider the 2010-2015 period, while recession quarters still have a negative effect on the transition, higher unemployment rates triggered workers into self-employment, even during recessions. This is an interesting result, because this sub-period covers the double-dip of the financial crisis and the aftermath of the Great Recession, when the unemployment rate where at historical maximum, and job creation was very small. Finally,we study the relationship between previous industries and recessions by including an interaction term in the probit model. The results of this specification are presented in Tables 13 and 14 in the Appendix. While recessions affect negatively the entry for all sectors, we find that workers whose last job was in the food and accommodation services, professional activities and education industries are barely affected during recessions. Workers previously employed in manufacturing and energy industries reduce their entry more significantly during recessions.

6 Is self-employment useful to escape unemployment?

In this section we study the characteristics of self-employed workers and how these affect the survival of the business. In particular, we will study the transition from self-employment to unemployment and how it relates to the characteristics of the worker. We specifically show how the survival of a business is lower if a worker enters self-employment from unemployment.

We start by describing the characteristics of workers who become self-employed during the 1990-2015 period. We divide workers into two groups: those who entered self-employment from unemployment, and those who did not (either from paid-employment or directly to self-employment). From now on, we will refer on to these two groups as origin of entry. Table 5 contains summary statistics regarding the characteristics of the self-employed based on origin of entry. Note that those who enter from unemployment tend to be a higher proportion of females, and provide more professional, food and accommodation services relative to those who do not.

Table 5: Characteristics of self-employment workers by origin of entry

	From U	Not from U
Female	35.9%	33.5%
Less than high school	49.5%	48.7%
College	12.4%	12.8%
Age	38.7	38.1
Manufacturing	7.7%	10.0%
Construction	13.5%	13.2%
Food and Accommodation	9.5%	8.2%
Professionals	15.1%	12.9%
Household services	8.9%	8.4%

We next look at the tenure distribution of self-employed workers[16]. Table 6 contains descriptive statistics on spell characteristics for self-employed workers, ranking spells by duration. Businesses of workers who join self-employment from unemployment last on average 6 years compared to more than 7 years for those who do not enter from unemployment. The median age of a business for a worker who entered from unemployment is two years younger than for the rest of the workers (4.5 versus 6.2 years, respectively).

Self-employed workers who did not experience an unemployment spell also enjoy higher monthly earnings. In particular, the average earnings for those with entry from unemployment was 923 euros a month. On the other hand, this figure was 1003 euros for those who did from paid-employment or joined the labor force as self-employed, 8.7% higher. Moreover, the distribution of earnings for entering from employment is skewed to the right compared to entering from unemployment: while the median earnings are very similar (829 and 804 respectively), the 90% percentile is 1578 euros a month for those who do not enter from unemployment and 1175 for those who do, or 34.4% higher.

The effect of the business cycle on which industry to enter is presented in Table 7 for the 1990-2015 period. The proportion of workers who enter manufacturing and construction falls during recessions, while those going into food and accommodation services increases. These industries become outside options for both unemployed and paid-wage workers during downturns, when opportunities to find a job are scarce and the stability of a job decreases. Also barriers to entry in these industries are smaller compared to manufacturing, since the

[16]In reporting the distribution of workers across tenures we restrict the years analyzed to 2005-2015. Since by design, self-employment spells start in 1990, we drop the first fifteen years to allow distribution to converge towards the time-invariant one.

Table 6: Duration of a self-employment spell by origin of entry: 2005-2015

	Duration in years	
Spell Percentile	From U	Not from U
10%	0.5	0.9
25%	1.6	2.6
50%	4.5	6.2
75%	9.5	11.3
90%	14.4	15.9
Mean	6.2	7.4

specific human capital required is not high and there are few and inexpensive licenses needed to operate.

Table 7: Self-employment industry over the business cycle

	Expansion		*Recession*	
	From U	Not from U	From U	Not from U
Manufacturing	5.9%	6.8%	5.1%	5.9%
Construction	14.3%	18.0%	13.2%	12.7%
Food and Accommodation	11.5%	10.3%	13.3%	12.7%
Professional Services	16.3%	14.7%	16.3%	16.3%
Household services	8.7%	7.9%	9.1%	9.1%

We next analyze formally the effect of different characteristics of self-employed workers to disentangle whether observables are able to predict the higher average earnings of those who join self-employment without experiencing unemployment. We perform an econometric survival analysis to study the drivers of these differences across workers that allows us to control for different characteristics. Because of the panel structure of the data, we need to use a discrete hazard function approach (see Narendranathan and Stewart (1993) and Güell and Petrongolo (2007) for details). The continuous process of exiting self-employment to unemployment is given by the hazard:

$$\theta_i\left(t \mid x_i\right) = \lambda\left(t\right) \exp\left(x_i'\beta\right)$$

where $\lambda\left(t\right)$ is the baseline hazard, x_i is the vector of explanatory variables and β is a vector of unknown coefficients.

The discrete hazard is given by:

$$h_i(t \mid x_i) = 1 - \exp\left\{-\int_t^{t+1} \theta_i(u \mid x_i)\, du\right\} = 1 - \exp\left\{-\exp(x_i'\beta)\,\gamma(t)\right\}$$

where $\gamma(t)$ denotes the baseline hazard

$$\gamma(t) = \int_t^{t+1} \lambda(u)\, du$$

.

Hence, we can define the (log) likelihood contribution for the -i^{th} individual with spell of length d_i as:

$$L_i = c_i \ln h_i(d_i \mid x_i) + \sum_{t=1}^{d_i-1} \ln(1 - h_i(t \mid x_i)) =$$

$$c_i \ln\left\{1 - \exp\left[-\exp(x_i'\beta)\,\gamma(d_i)\right]\right\} - \sum_{t=1}^{d_i-1} \exp(x_i'\beta)\,\gamma(t)$$

where c_i is an indicator function that takes value 1 if we do not observed the individual exiting to unemployment (censored) and 0 otherwise. We do not impose any functional form on the baseline hazard, but instead we estimate the model semi-parametrically. The vector x_i contains covariates on individual and job-specific characteristics that we treat as time invariant. Finally, self-employment can terminate either because of a transition into unemployment or because other alternative states. We need to consider a competing risk model, that distinguishes between different reasons of exit. We follow Narendranathan and Stewart (1993) and treat transitions different from exits to unemployment (i.e. to self-employment or paid-employment) as censored at the time of exit. This allows us to estimate the competing risk model that treats exits into alternative states differently from exits into unemployment as a single-risk model[17]. In the reminder of this section, whenever we refer to survival or exit for self-employed workers, we refer to unemployment as the exiting state.

6.1 Empirical results

We estimate the econometric model outlined earlier for the transitions out of self-employment to unemployment. The results are presented in Table 9. Both higher unemployment rates at

[17] Narendranathan and Stewart (1993) show that if distinct destinations depend upon disjoint subsets of parameters, the parameters of a given cause-specific hazard can be estimated by treating durations for other reasons as censored at the time of exit.

Table 8: Survival in self-employment by duration in years

Duration in years	Survival rate
1	87%
2	79%
5	67%
10	57%
15	52%
20	47%

the province level (we link the unemployment rate to the province where the firm is located, which is longitudinally available, to also control for regional variation), as well as the effect of the business cycle affect increase the hazard of a business failure and exit to unemployment. Transitions to unemployment were less likely during the 2002-2007 expansions, and more frequent during the Great Financial Crisis. Education and gender have the expected effects on termination rates, with females and the least educated exiting more often.

It is interesting to note that hazard rates out of self-employment are significantly different depending on the reason of entry (from unemployment or paid employment). In particular, workers who enter self-employment with a previous unemployment spell are more likely to terminate their spell sooner and return to unemployment, as we described earlier by comparing average spell duration.

The semi-parametric estimation is informative about the most important characteristics in the survival of self-employment workers from unemployment. We now turn to non-parametric estimators of the survivorship rates by grouping workers into categories based on their observable characteristics. We use Kaplan-Meier's procedure to analyze the probability of staying in self-employment for another year if an individual has been in self-employment of T years. To be consistent with our previous results, we define failure as exiting self-employment to unemployment[18], and we study spells that start between 1990-2015 period for prime age workers.

[18]Since we are interested in survival from unemployment, we treat exits to paid-employment as censored. We have alternatively defined failure as both exiting to unemployment or paid employment, and results are basically the same due to the reduced number of SE-E transitions.

Figure 4: Survival rates in Self-employment

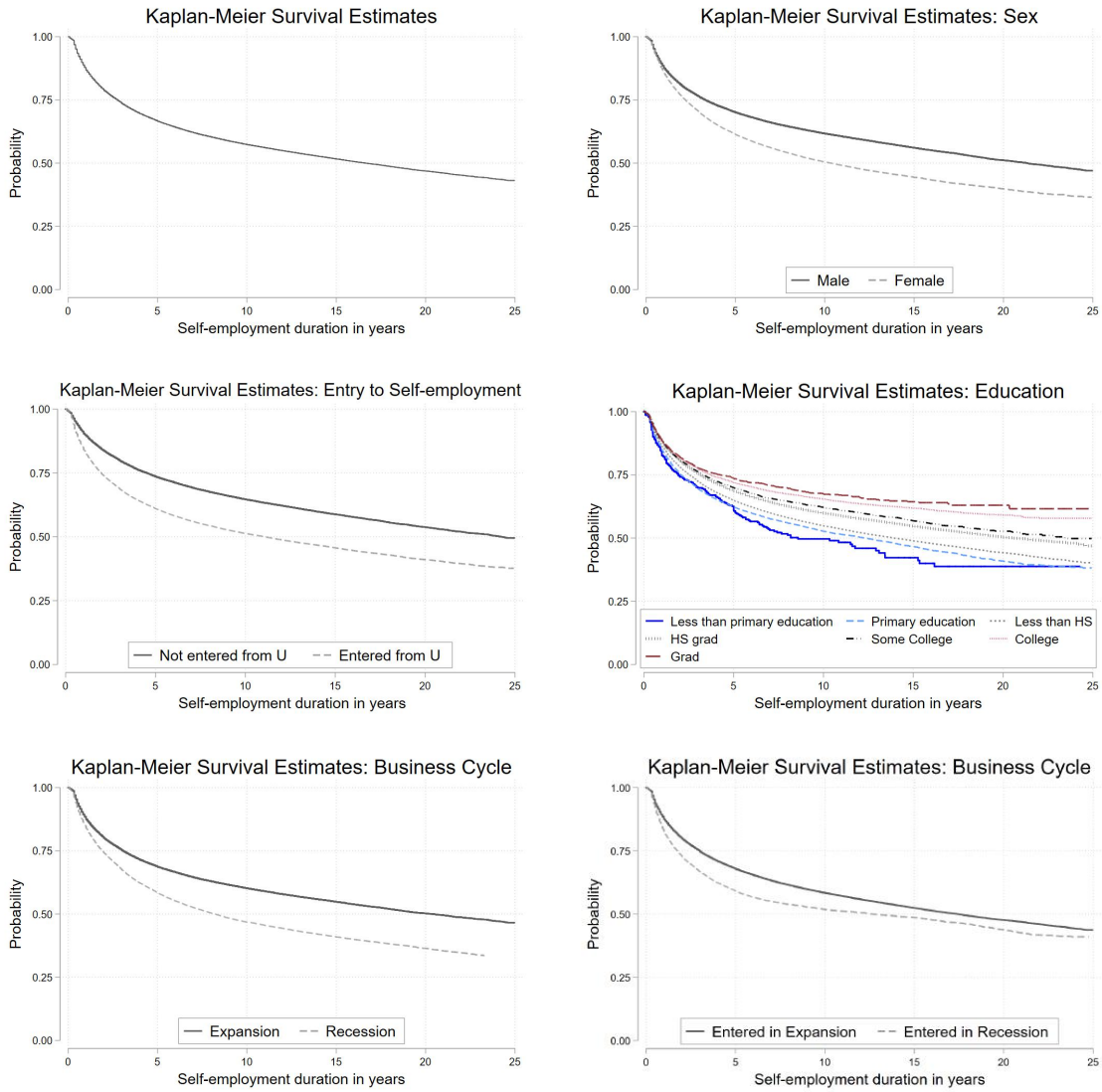


Table 8 presents the survival probabilities for the whole sample. It is worth highlighting that 30% of the self-employed become unemployed within 4 years of starting their business, and after 10 years only 57% of the entrants are left in the market. The proportion of workers that survives in self-employment within the first 10 years becomes lower during recession years (46.9% vs 60.3% in expansion years), for females (50.5% vs 61.8% for males) and for workers that entered self-employment from unemployment (51.4% vs 64.7% if not unemployed before). Survival if entry during a recession is lower during the initial years of the business, but it converges after 10 years to the rate for those that entered during expansions. Survival is also higher the higher the educational attainment of the worker. Figure 4 presents the estimated survivorship rates for these groups.

Table 9: ML estimates of the transition from self-employment to unemployment: 1990-2015

Female	0.269***	(23.68)
Unemployed before	0.323***	(28.99)
Age 25-34	0.00847	(0.63)
Age 35-44	0.0361***	(2.82)
Age 45+	-0.0275	(-0.49)
Province UR	0.0170***	(17.47)
SMSA	0.223***	(19.37)
Recession quarter	-0.00340	(-0.16)
Years of schooling = 6	0.230**	(2.16)
Years of schooling = 8	0.143	(1.36)
Years of schooling = 12	-0.000998	(-0.01)
Years of schooling = 15	-0.0958	(-0.89)
Years of schooling = 16	-0.259**	(-2.42)
Years of schooling = 18	-0.207*	(-1.80)
Manufacturing	0.676***	(10.11)
Energy	0.386**	(2.21)
Construction	1.065***	(16.34)
Transportation	0.656***	(10.17)
Food and Accommodation	1.063***	(16.30)
IT & Finance	0.724***	(10.35)
Real State & professionals	0.718***	(10.94)
Public Administration	1.993***	(29.47)
Education	0.794***	(11.15)
Health	0.268***	(3.65)
Arts & household services	0.589***	(8.84)
1991	-0.217	(-1.61)
1992	-0.276**	(-2.12)
1993	-0.484***	(-3.81)
1994	-1.003***	(-7.88)
1995	-1.018***	(-8.16)
1996	-1.051***	(-8.51)
1997	-1.045***	(-8.52)
1998	-1.139***	(-9.30)
1999	-1.269***	(-10.29)
2000	-1.355***	(-10.95)
2001	-1.140***	(-9.37)
2002	-1.188***	(-9.79)
2003	-0.789***	(-6.69)
2004	-0.242**	(-2.10)
2005	-0.223*	(-1.94)
2006	-0.209*	(-1.82)
2007	-0.185	(-1.61)
2008	0.271**	(2.34)
2009	0.242**	(2.11)
2010	0.264**	(2.32)
2011	0.334***	(2.92)
2012	0.427***	(3.69)
2013	0.270**	(2.36)
2014	0.165	(3.70)
2015	-0.0651	(-0.57)
N	3,426,457	

t statistics in parentheses

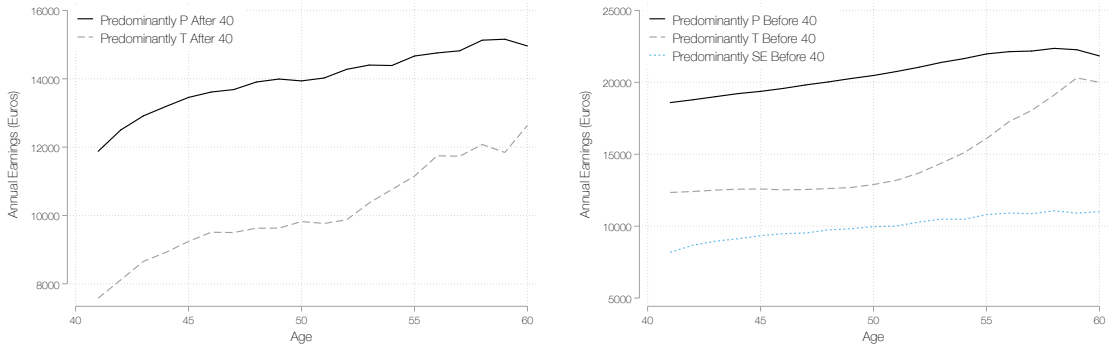
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2 The impact of self-employment on lifetime earnings: a dual labor market study

We further investigate the option of self-employment as an escape to unemployment and unstable employment. We exploit the duality of the Spanish labor market to analyze whether experience in self-employment is preferably for long-run growth to fixed-term employment. Using information on contract duration, we compute at each age total days under each of the following employment status: Employed-Permanent, employed-fixed term, self-employed and unemployed.

Then we categorize workers based on which pool of the above mentioned they have spent the most time at young ages (before 40 years old), and look at their labor market outcomes, in particular earnings and job status from 40 years old and forward, and compare the heterogeneity in returns. Since the reported earnings for the self-employed are not reliable (even if coming from Social Security Records, they are self-reported), we will prefer to rely most of upcoming the analysis to earnings while in salaried work, but will distinguish by acquired experience in self-employment prior to that spell. We first look at age-earnings profiles for workers who spent the most of their working time before turning 40 years old in self-employment, but returned to paid-employment afterwards. We illustrate the duality of the labor market in the left panel in Figure 5. Workers that after 40 years old are mostly in permanent employment, earn substantially more compared to fixed-term workers, even though both groups spent their careers initially at self-employment. Interestingly, self-employment experience does not seem to be compensated when comparing to workers predominantly in paid-employment prior to 40 years old, as observed in the right panel of Figure 5. Conditional on having mostly a permanent contract, workers predominantly permanent before age 40, earn 20,000 euros on average, while those predominantly self-employed before 40 years old earn an annual average of 14,000 euros at age 50. Moreover, those mainly self-employed before age 40, unconditional on the contract, earn less than those workers with young experience in fixed-term employment. This evidence suggests that self-employment, for the average worker, is not a successful option to escape labor market duality and unemployment when their prevalence is at its highest, i.e., between 20 and 40 years old.

Figure 5: Age-earnings profiles based on young employment attachment



These results present a challenge from a policy-making point of view. Governments should design different policies to increase the human capital and skills of the self-employed, by taking into account the characteristics of the workers. In particular, the Spanish Government incentivizes becoming a self-employed for young workers and females if unemployed by allowing workers to receive a lump-sum unemployment benefit to start up their business. Further analysis is necessary to disentangle whether unobserved differences between workers is driving these differences and to study optimal training policies for self-employed workers, targeted to increase the profitability and survival of these group of workers.

7 Conclusions

This paper analyzed the determinants of becoming self-employed in labor markets characterized by high unemployment and turnover. We use a large longitudinal data set from the Spanish Social Security records to shed light on the determinants of becoming self-employed.

Our findings aim to understand the cyclicality of entry into self-employment, characterizing the type of individuals that enter self-employment at different times, and survival in self-employment, by studying how long they stay out of unemployment. In particular we find: 1) The probability of becoming self-employed is pro-cyclical: recessions and higher unemployment rates have a negative impact on the decision of entering self-employment for both unemployed and salaried workers. 2)The probability of entering self-employment from unemployment is lower for females, the low educated, young workers and previously fixed-term employees. The probability increases in earnings and tenure before the dismissal and if the worker is not receiving UI insurance. 3) The probability of entering self-employment from paid employment decreases on current wage and tenure, and increases if the worker is employed under a fixed-term contract, a part-time contract or if working in services re-

lated industries (i.e. food and accommodation, household services). 4) Survival rates out of unemployment in self-employment are higher during expansions and for workers that did not experience an unemployment spell before starting their business. These workers enjoy higher earnings and longer spells as self-employed, compared to those entering from unemployment.5) Workers who spent a predominant share of their careers before age 40 in self-employment, when going back to paid-employment earn less than mostly fixed-term workers.

Our research agenda will focus in constructing an structural model of occupational choice that will be disciplined by the estimates presented in the current version of the paper. Our analysis aims to study two novel features of labor markets: high unemployment benefits and segmented labor markets. This analysis will use the Spanish labor data presented in the paper, but can also be used to study the role of the gig economy in other countries. The ultimate goal of this project is to study policy reforms using government instruments that target the training and survival of self-employed, specifically in groups that traditionally face high unemployment rates (i.e. females, young workers) and unstable employment. By performing welfare comparisons between different policies we will assess the costs and benefits of government intervention through active policies in the rigid labor markets.

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A Appendix: Additional Tables

Table 10: Probability of entering self-employment from unemployment

Constant	-3.601***	(-72.46)
Female	-0.276***	(-91.41)
National UR	-0.00453***	(-17.62)
Age	0.0540***	(28.00)
Age^2	-0.000636***	(-24.71)
Years of schooling = 6	0.0474*	(1.79)
Years of schooling = 8	0.155***	(5.88)
Years of schooling = 12	0.231***	(8.75)
Years of schooling = 15	0.226***	(8.43)
Years of schooling = 16	0.275***	(10.35)
Years of schooling = 18	0.203***	(7.23)
UI recipient	-0.0397***	(-12.70)
Recession quarter	-0.0647***	(-17.63)
Prior Spell		
Earnings	0.000104***	(40.35)
Temporary worker	-0.0924***	(-26.12)
Tenure	0.00100***	(7.77)
Part-time job	0.0336***	(9.02)
Last Industry		
Manufacturing	-0.0437**	(-2.28)
Energy	-0.186***	(6.33)
Construction	0.0192	(1.00)
Transportation	0.0347*	(1.83)
Food and Accommodation	-0.00380	(-0.20)
IT & Finance	0.0227	(1.12)
Real State & professionals	-0.0292	(-1.53)
Public Administration	-0.140***	(7.23)
Education	-0.0540***	(-2.68)
Health	-0.129***	(-6.40)
Arts & domestic service	0.0884***	(4.51)
Cohort effects		
1945-1949	0.119***	(5.08)
1950-1954	0.123***	(5.41)
1955-1959	0.149***	(6.91)
1960-1964	0.187***	(8.87)
1965-1969	0.217***	(10.21)
1970-1974	0.291***	(13.53)
1975-1979	0.350***	(16.09)
1980-1984	0.390***	(17.63)
1985-1989	0.458***	(20.03)
N	6618160	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$

Table 11: Probability of entering self-employment from unemployment (year fixed effects)

Constant	-3.079***	(-64.55)
Female	-0.274***	(-90.59)
Age	0.0417***	(23.11)
Age^2	-0.000612***	(-25.61)
Years of schooling = 6	0.0475*	(1.79)
Years of schooling = 8	0.152***	(5.76)
Years of schooling = 12	0.227***	(8.61)
Years of schooling = 15	0.223***	(8.30)
Years of schooling = 16	0.272***	(10.20)
Years of schooling = 18	0.199***	(7.07)
Prior Spell		
Earnings	0.000108***	(41.77)
Temporary worker	-0.0975***	(-26.90)
Tenure	0.000908***	(7.00)
Part-time job	0.0331***	(8.88)
Last Industry		
Manufacturing	-0.0282	(-1.47)
Energy	-0.172***	(-5.85)
Construction	0.0381**	(1.99)
Transportation	0.0493***	(2.59)
Food and Accommodation	0.00907	(0.47)
IT & Finance	0.0354*	(1.75)
Real State & professionals	-0.0127	(-0.66)
Public Administration	-0.127***	(-6.55)
Education	-0.0405**	(-2.01)
Health	-0.117***	(-5.77)
Arts & domestic service	0.102***	(5.20)
Year effects		
1991	0.00218	(0.11)
1992	-0.0807***	(-4.34)
1993	-0.190***	(-10.40)
1994	-0.0811***	(-4.68)
1995	-0.0458***	(-2.68)
1996	-0.0742***	(-4.35)
1997	-0.0726***	(-4.28)
1998	-0.0524***	(-3.10)
1999	-0.0229	(-1.36)
2000	-0.0175	(-1.04)
2001	0.00368	(0.22)
2002	0.0114	(0.68)
2003	0.0733***	(4.40)
2004	0.111***	(6.72)
2005	0.130***	(7.87)
2006	0.147***	(8.86)
2007	0.140***	(8.39)
2008	0.0787***	(4.70)
2009	-0.0514***	(-3.08)
2010	-0.0383**	(-2.32)
2011	0.0159	(0.97)
2012	0.0349**	(2.14)
2013	0.0992***	(6.13)
2014	0.190***	(11.76)
2015	0.223***	(13.57)
N	6618160	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Probability of entering self-employment from unemployment (Different periods)

	1990-2000		2001-2015		2010-2015	
Constant	-2.819***	(-24.59)	-3.865***	(-53.69)	-4.995***	(-39.37)
Female	-0.354***	(-61.05)	-0.246***	(-69.39)	-0.195***	(-38.38)
National UR	-0.00924***	(-10.55)	-0.00714***	(-16.01)	0.0128***	(10.89)
Age	0.0493***	(8.68)	0.0579***	(21.63)	0.0940***	(15.18)
Age^2	-0.000752***	(-9.16)	-0.000622***	(-17.98)	-0.000996***	(-12.51)
Years of schooling = 6	0.0206	(0.47)	0.0643*	(1.93)	0.0423	(0.89)
Years of schooling = 8	0.121***	(2.78)	0.177***	(5.35)	0.144***	(3.04)
Years of schooling = 12	0.178***	(4.06)	0.259***	(7.82)	0.240***	(5.07)
Years of schooling = 15	0.157***	(3.51)	0.256***	(7.64)	0.270***	(5.63)
Years of schooling = 16	0.135***	(3.03)	0.326***	(9.77)	0.354***	(7.42)
Years of schooling = 18	0.0431	(0.87)	0.259***	(7.43)	0.307***	(6.21)
UI recipient	-0.0733***	(-11.90)	-0.0360***	(-9.80)	-0.0178***	(-3.40)
Recession quarter	-0.0836***	(-8.89)	-0.0714***	(-17.56)	-0.0933***	(-16.34)
Prior Spell						
Earnings	0.0000931***	(19.13)	0.000109***	(35.48)	0.0000949***	(21.13)
Temporary worker	-0.205***	(-7.89)	-0.0872***	(-23.12)	-0.110***	(-19.36)
Tenure	0.000372	(1.59)	0.00127***	(8.04)	0.000840***	(3.97)
Part-time job	0.0399***	(4.94)	0.0322***	(7.63)	0.0419***	(7.08)
Cohort effects						
1945-1949	0.0785***	(3.02)				
1950-1954	0.00388	(0.12)	0.101***	(2.71)		
1955-1959	-0.0493	(-1.34)	0.169***	(4.81)		
1960-1964	-0.0940**	(-2.38)	0.235***	(6.70)	0.0692***	(3.15)
1965-1969	-0.104**	(-2.54)	0.281***	(7.78)	0.116***	(4.34)
1970-1974	-0.108**	(-2.52)	0.392***	(10.52)	0.227***	(7.17)
1975-1979	-0.147***	(-2.73)	0.467***	(12.18)	0.329***	(9.33)
1980-1984			0.528***	(13.32)	0.487***	(12.83)
1985-1989			0.620***	(14.97)	0.596***	(14.61)
Last Industry						
Manufacturing	-0.0424	(-1.02)	-0.0501**	(-2.32)	-0.0551**	(-2.06)
Energy	-0.225***	(-3.54)	-0.174***	(-5.28)	-0.162***	(-3.83)
Construction	-0.0103	(-0.25)	0.0265	(1.23)	0.00732	(0.28)
Transportation	0.0442	(1.06)	0.0275	(1.29)	0.0209	(0.80)
Food and Accommodation	0.00181	(0.04)	-0.00930	(-0.43)	-0.00830	(-0.31)
IT & Finance	-0.124***	(-2.77)	0.0562**	(2.48)	0.0605**	(2.15)
Real State & professionals	-0.0580	(-1.38)	-0.0224	(-1.04)	-0.0191	(-0.73)
Public Administration	-0.144***	(-3.43)	-0.142***	(-6.46)	-0.167***	(-6.09)
Education	-0.0856*	(-1.95)	-0.0442*	(-1.95)	-0.0336	(-1.19)
Health	-0.181***	(-4.11)	-0.110***	(-4.82)	-0.116***	(-4.09)
Arts & domestic service	0.0323	(0.76)	0.104***	(4.73)	0.118***	(4.32)
N	2032704		4585456		2204698	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Probability of entering self-employment from unemployment: recession*industry interactions

Constant	-3.574***	(-71.11)
Female	-0.276***	(-91.38)
National UR	-0.00456***	(-17.73)
Age	0.0541***	(28.03)
Age^2	-0.000637***	(-24.74)
Years of schooling = 6	0.0473*	(1.78)
Years of schooling = 8	0.155***	(5.88)
Years of schooling = 12	0.231***	(8.75)
Years of schooling = 15	0.226***	(8.42)
Years of schooling = 16	0.275***	(10.34)
Years of schooling = 18	0.203***	(7.22)
UI recipient	-0.0396***	(-12.68)
Recession quarter	-0.248***	(-4.47)
Prior Spell		
Earnings	0.000104***	(40.46)
Temporary worker	-0.0923***	(-26.08)
Tenure	0.00101***	(7.81)
Part-time job	0.0338***	(9.07)
Cohort effects		
1945-1949	0.120***	(5.10)
1950-1954	0.123***	(5.42)
1955-1959	0.149***	(6.91)
1960-1964	0.187***	(8.88)
1965-1969	0.217***	(10.21)
1970-1974	0.291***	13.53)
1975-1979	0.350***	(16.09)
1980-1984	0.390***	(17.62)
1985-1989	0.458***	(20.03)
N	6618160	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Probability of entering self-employment from unemployment: recession*industry interactions (cont)

Last Industry		
Manufacturing	-0.0736***	(-3.57)
Energy	-0.190***	(-5.95)
Construction	0.00726	(0.35)
Transportation	0.00655	(0.32)
Food and Accommodation	-0.0349*	(-1.68)
IT & Finance	-0.0129	(-0.59)
Real State & professionals	-0.0601***	(-2.92)
Public Administration	-0.171***	(-8.20)
Education	-0.0905***	(-4.16)
Health	-0.162***	(-7.42)
Arts & domestic service	0.0585***	(2.77)
Last Industry * recession		
Manufacturing	0.195***	(3.45)
Energy	0.0628	(0.77)
Construction	0.112**	(1.98)
Transportation	0.186***	(3.31)
Food and Accommodation	0.202***	(3.56)
IT & Finance	0.222***	(3.80)
Real State & professionals	0.200***	(3.55)
Public Administration	0.202***	(3.36)
Education	0.230***	(3.95)
Health	0.209***	(3.56)
Arts & domestic service	0.195***	(3.41)
N	6618160	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Probability of entering self-employment from employment (Cohort + recession)

Constant	-2.716***	(-44.26)
Female	-0.251***	(-65.75)
National UR	-0.00151***	(-4.96)
SMSA	-0.272***	(-77.26)
Age	0.0269***	(11.03)
Age^2	-0.000444***	(-13.36)
Years of schooling = 6	0.0345	(1.00)
Years of schooling = 8	0.0862**	(2.52)
Years of schooling = 12	0.123***	(3.60)
Years of schooling = 15	0.162***	(4.66)
Years of schooling = 16	0.268***	(7.75)
Years of schooling = 18	0.349***	(9.74)
Recession quarter	-0.0309***	(-6.90)
Prior Spell		
Earnings	-0.000247***	(-75.92)
Temporary worker	0.139***	(35.79)
Tenure	-0.00520***	(-35.97)
Part-time job	0.0287***	(6.30)
Last Industry		
Manufacturing	-0.0607***	(2.67)
Energy	-0.214***	(6.20)
Construction	0.169***	(7.47)
Transportation	0.108***	(4.80)
Food and Accommodation	0.165***	(7.18)
IT & Finance	0.0582**	(2.44)
Real State & professionals	0.0365	(1.61)
Public Administration	-0.158***	(6.68)
Education	-0.00251	(-0.10)
Health	-0.0831***	(-3.51)
Arts & domestic service	0.173***	(7.43)
Cohort effects		
1945-1949	0.00267	(0.10)
1950-1954	-0.0275	(-1.03)
1955-1959	-0.0906***	(-3.56)
1960-1964	-0.112***	(-4.51)
1965-1969	-0.106***	(-4.26)
1970-1974	-0.107***	(-4.24)
1975-1979	-0.123***	(-4.84)
1980-1984	-0.148***	(-5.74)
1985-1989	-0.154***	(-5.76)
N	23001845	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: Probability of entering self-employment from employment (year fixed effects)

Constant	-2.935***	(-41.12)
Female	-0.249***	(-65.33)
SMSA	-0.272***	(-77.22)
Age	0.0273***	(12.12)
Age^2	-0.000416***	(-13.68)
Years of schooling = 6	0.0353	(1.02)
Years of schooling = 8	0.0858**	(2.51)
Years of schooling = 12	0.123***	(3.58)
Years of schooling = 15	0.162***	(4.66)
Years of schooling = 16	0.268***	(7.74)
Years of schooling = 18	0.347***	(9.69)
Prior Spell		
Earnings	-0.000244***	(-74.99)
Temporary worker	0.145***	(36.69)
Tenure	-0.00513***	(-35.48)
Part-time job	0.0299***	(6.56)
Last Industry		
Manufacturing	-0.0582**	(-2.56)
Energy	-0.212***	(-6.15)
Construction	0.170***	(7.52)
Transportation	0.111***	(4.91)
Food and Accommodation	0.167***	(7.26)
IT & Finance	0.0609**	(2.55)
Real State & professionals	0.0386*	(1.69)
Public Administration	-0.157***	(-6.62)
Education	-0.00139	(-0.06)
Health	-0.0837***	(-3.54)
Arts & domestic service	0.175***	(7.52)
Year effects		
1991	0.0115	(0.55)
1992	0.0333	(1.59)
1993	-0.000568	(-0.02)
1994	0.0999***	(3.64)
1995	0.0519**	(2.05)
1996	0.0214	(0.90)
1997	0.0298	(1.39)
1998	0.0842***	(4.51)
1999	0.0676***	(3.83)
2000	0.0314*	(1.70)
2001	0.00764	(0.34)
2002	0.0286	(1.37)
2003	0.0139	(0.67)
2004	0.0571***	(2.66)
2005	0.0149	(0.61)
2006	0.0626**	(2.43)
2007	0.0684***	(2.61)
2008	-0.00749	(-0.35)
2009	-0.0681***	(-3.78)
2010	-0.0515***	(-2.61)
2011	-0.0515**	(-2.37)
2012	-0.0287	(-1.04)
2013	-0.0147	(-0.49)
2014	0.0169	(0.63)
2015	-0.0213	(-0.94)
N	23001845	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$