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Financing Entrepreneurship in Portugal

This study aims to provide an answer to the following question: how do financial constraints affect different types of entrepreneurs? To identify the effect of financial constraints on entrepreneurship, this study uses a Portuguese public programme named Single Amount («Montante Único»). This programme allows any individual on unemployment insurance to collect the entire amount of their benefits as a lump sum in order to start a business. The access to financing provided to individuals through this programme is a suitable mechanism to understand how the alleviation of financial constraints contributes towards the development of high-quality entrepreneurship. The results of this study are relevant from a policy-making perspective, as they provide evidence on how to promote entrepreneurship that drives job creation and economic growth.

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Contents

Abstract

We study how financial constraints affect different types of entrepreneurs, identifying the effects by exploiting age-based discontinuities in the amount of funding available through a public programme for unemployed workers, and using administrative data that link workers and firms. We find that access to funding increases the rate of entrepreneurship, and the effect is stronger for entrepreneurs who incorporate their business, especially those in the top decile of the wage distribution before unemployment, and in the information, communication and manufacturing sectors. In terms of ex-post outcomes, we find that the effect is more pronounced for businesses in the upper half of the size, growth and profitability distributions.

Chapter 1
Introduction

Financial constraints are among the most common obstacles to new business creation cited by potential entrepreneurs.[1] Yet evidence on how financial constraints affect entrepreneurship is mixed. It has long been known that personal wealth and entrepreneurship are positively correlated (Evans and Jovanovic, Evans and Leighton, 1989), but this correlation could be driven by differences in ability or preferences, such as lower risk aversion, rather than financial constraints (Hurst and Lusardi, 2004). Changes in the value of housing collateral (Adelino, Schoar and Severino, 2015) are also associated with increases in entrepreneurship, but this relationship could be driven by changes in local demand (Kerr, Kerr and Nanda, 2019).

In addition to this identification challenge, a growing body of research emphasizes the differences between entrepreneurs who possess the skills and desire to grow their businesses, and those who do not (LaPorta and Shleifer, 2008; Schoar, 2010; Hurst and Pugsley, 2011; Levine and Rubinstein, 2016). While the latter account for the majority of businesses created, it is the former who are frequently associated with a key role in job creation (Murphy, Shleifer and Vishny, 1991; Aghion and Howitt, 1992). Previous empirical evidence on how financial constraints affect different types of entrepreneurs is, however, limited.[2]

This paper examines the effect of financial constraints on entrepreneurship using a Portuguese public programme named Single Amount («Montante Único»). This programme allows any individual on unemployment insurance (UI) to collect the entire amount of their benefits as a lump sum in order to start a business. Programme participants cannot earn labour income from any source other than their own business for a period of three years, or are otherwise obligated to repay the full amount received.

Our empirical setting has three key advantages. First, we are able to exploit sharp age-based discontinuities in the duration of unemployment benefits to generate exogenous variation in the amount potential entrepreneurs receive as a lump sum. This ensures that shocks to the potential amount are uncorrelated with ability, wealth and other unobserved determinants of entrepreneurship. Second, our results cannot be explained by local demand shocks, as we exclusively rely on cross-individual variation. Third, we link data on 2.1 million eligible workers, covering the universe of unemployed workers in Portugal within the 2005-2016 period, to the financial statements of businesses created through the programme. Our sample includes workers spanning a broad range of skills, sectors and entrepreneurial outcomes, and is therefore well suited to study the impact of financial constraints on different types of entrepreneurs.

The amount that potential entrepreneurs can access through the programme equals an average of €11,000 in our sample, and increases discontinuously at ages 30, 40 and 45. We exploit the exogenous

increases around these age cutoffs using a regression discontinuity design. The average increase around the three age cutoffs equals €2,400, €3,200, and €4,500, respectively, and can exceed €12,000, depending on wages and experience. One concern with using wealth shocks to identify the effect of financial constraints on entrepreneurship is that changes in wealth may also shift preferences for entrepreneurship, for example by lowering risk aversion or increasing the preference for «being one's own boss» (Hurst and Lusardi, 2004). But while the increases in funding we exploit can affect a potential entrepreneur's ability to start a business - the median initial equity and assets for incorporated businesses in Portugal equal €5,000 and €20,000, respectively - these are far too small for changes in preferences to account for our findings.[3]

We find that the fraction of unemployed workers who start a business by collecting lump sum payments through the Single Amount programme increases discontinuously at each of the three age cutoffs. Instrumenting the potential amount entrepreneurs are entitled to receive with these cutoffs, we find that an extra one thousand euros of funding increases the rate of entrepreneurship by 0.12 percentage points. The unconditional probability of becoming an entrepreneur through the programme is 1.1%. Thus, our estimate corresponds to an 11% increase in the probability of becoming an entrepreneur.

We then examine how different types of entrepreneurs respond to the programme using proxies of ex-ante entrepreneurial quality. We first focus on the legal form of the business, following Levine and Rubinstein (2016), who show that incorporation is a good proxy for higher potential entrepreneurship. As in other countries, incorporated businesses in Portugal enjoy limited liability but pay higher taxes and

face heavier regulation,[4] and are therefore more likely to be chosen by entrepreneurs undertaking higher potential projects. Data from Portugal corroborate this: although they represent only 32 percent of all businesses in Portugal, incorporated businesses account for 76 percent of employment and 96 percent of sales.[5] We also find that the effect on incorporated businesses is four times stronger than the effect on unincorporated businesses (0.29 vs 0.07 percentage points). Turning to differences across sectors among incorporated businesses, we find that the effect is strongest in information and communication technology, followed by manufacturing.

Next, we study the effect for entrepreneurs with different levels of wages before unemployment. Higher wages are likely to be positively correlated with individual characteristics that are valuable for entrepreneurs, such as education, ability or ambition for growth. In addition, individuals with a better outside option in the labour market may be more selective about the entrepreneurial opportunities they pursue. We find that the effect increases steeply at the top of the wage distribution, but only for entrepreneurs who incorporate their business. The effect on incorporated entrepreneurship in the top decile of the wage distribution, in particular, is over six times larger than our baseline estimate. In contrast, among unincorporated entrepreneurs the effect is roughly constant throughout the wage distribution.

Next, we turn to ex-post measures of entrepreneurial performance, which we observe for incorporated businesses only. One concern with our setting is that participants might adhere to the programme to maximize UI benefits, rather than overcome financial constraints, and that the incentive to do so might increase discontinuously around the

age thresholds. If this were the case, we would expect to see the effect of funding on the creation of surviving businesses drop off at age four, once participants are no longer under the obligation of returning the funds obtained in order to pursue other opportunities. We evaluate this concern by estimating the programme's effect on the creation of businesses which survive beyond this three-year window. We find no evidence of increased exit beyond age three. In fact, we find that access to funding through the programme steadily increases survival rates from entry to age six.

We then examine the programme's effect in terms of ex-post performance, focusing on outcomes at age four, once the obligation to return programme funds expires. This allows us to observe that the programme has a stronger effect on the creation of incorporated businesses in the upper half of the size, growth and profitability distributions. In particular, we estimate a positive and statistically significant effect on the upper tail of sales, sales growth and sales distributions per worker, and somewhat weaker results for total assets. Overall, our results consistently indicate that financial constraints disproportionately affect growth-oriented entrepreneurs.

Our paper contributes to the literature on financial constraints and entrepreneurship (see Kerr and Nanda (2011) for a review). Past evidence regarding the effect of liquidity constraints on entrepreneurship using individual shocks to wealth, such as inheritances, is mixed (Holtz- Eakin, Joulfaian and Rosen, (1994); Blanchflower and Oswald, (1998); Hurst and Lusardi, (2004)). Black and Strahan (2002) study the effect of credit supply on firm creation. Fracassi, Garmaise, Kogan and Natividad (2012) show that access to credit increases survival for existing businesses, and the effect is stronger for more educated and less experienced entrepreneurs. Adelino, Schoar and Severino (2015); Corradin and Popov (2015) show that entrepreneurship responds to changes in house prices. Schmalz, Sraer and Thesmar (2017) isolate the effect of house prices on liquidity from local demand and wealth effects, by comparing full home owners (treatment group) with renters and partial owners (control group), who cannot access housing collateral in their setting, in the same region in France.

We contribute to this literature in several ways. First, our identification strategy ensures that our treated and control groups do not differ in terms of ability, risk aversion and other unobserved determinants of entrepreneurship. This may not hold when comparing inheritance recipients with non-recipients or when comparing full home owners with renters or partial owners, who may have different levels of initial wealth. Second, our research design identifies the effect of liquidity solely using cross-individual variation, rather than using an aggregate shock, such as changes in house prices. Thus, our results cannot be driven by local demand shocks or other general equilibrium effects, such as in the case of changes in house prices (Kerr, Kerr and Nanda (2019)). Third, the real estate collateral channel requires entrepreneurs to be full home owners and borrow from a financial intermediary, who has discretion concerning the decision to lend and the associated loan terms. In our setting, individuals obtain additional liquidity from a public programme. Finally, and most importantly, our large sample and our ability to outline both ex-ante characteristics and ex-post outcomes, allows us to present evidence on how financial constraints affect different types of entrepreneurs.

Our paper also contributes to the literature on unemployment insurance and labour outcomes. Several papers exploit age-based

discontinuities for identification but focus on employment outcomes rather than entrepreneurship (Card, Chetty and Weber, 2007; Centeno and Novo, 2009; Schmieder, von Wachter and Bender, 2016; Nekoei and Weber, 2017). Meager, Bates and Cowling (2003), and Caliendo and Künn (2011), examine the effect of start-up subsidies for unemployed individuals on business creation in the U.K. and Germany, respectively.[6] In this paper, we identify the causal effect of access to funding on the quantity and quality of entrepreneurship. Hombert, Schoar, Thesmar and Sraer (2019), exploit a French reform in which the unemployed who choose to start a business are allowed to retain the rights to their unemployment benefits if their business fails within three years (but do not receive a lump sum), lowering the risk of entrepreneurship. We examine the effect of financial constraints on entrepreneurship rather than downside insurance.

Chapter 2
Institutional background

The unemployment benefit system in Portugal includes unemployment insurance (UI) and unemployment assistance (UA). The latter applies to all individuals who either exhaust their UI benefits (Subsequent UA) or do not meet the eligibility requirements to receive UI benefits (Initial UA). Both UI and Initial UA beneficiaries are entitled to participate in the Single Amount programme («Montante Único»). In this section, we describe the rules for unemployment benefit in Portugal during our sample period, from 2005 to 2016. During this period, in April 2012, there was a reform of the UI and UA rules. The first subsection explains the rules for UI and Initial UA, while the second subsection explains the Single Amount programme's rules.

2.1. Unemployment insurance and initial unemployment assistance

To be eligible for both UI and Initial UA, individuals are required to accumulate monthly Social Security contributions for a determined period, prior to the date of the involuntary dismissal. For UI, the minimum number of monthly contributions during the two years preceding the date of dismissal, was 15 months until March 2012 (before the reform), and 12 months since April 2012 (after the reform).[7] Individuals who do not fulfil this requirement but have worked for at least six months the year prior to becoming unemployed, are entitled to Initial UA. In addition, Initial UA requires

individuals to be means-tested such that the household does not earn more than the minimum wage on a per capita basis.

If eligible, unemployed individuals receive a monthly tax-exempt payment. Initial UA beneficiaries are entitled to their net wages during the first six of the eight months preceding the starting date of the unemployment spell, up to a maximum of €335 if they live alone, or €419 if they live with other members in the same household. The amount of UI benefit depends on the wage reported during the first 12 of the 14 months preceding the dismissal date. Before July 2010, the replacement rate was 65% of gross wages, whereas since July 2010 it has been 75% of net wages (which is equivalent to between 59% and 67% of gross wages). During the sample period, each individual was guaranteed at least €419, unless this amount was below their net wages (which could happen, for example, if they worked part-time and earned the minimum wage). At the upper end, the monthly amount was capped at €1,258 before April 2012, and at €1,048 since April 2012.

The monthly amount is attributed for a pre-determined period of time, depending on individuals' age at the date of their involuntary dismissal and on Social Security contributions made during their career. The following table summarizes the duration (in months) of the Initial UA and UI before the April 2012 reform.

Potential duration (in months)

Age (years)	Contributions since last spell	Before April 2012	
		Potential duration	Extra potential duration*
<30	< 24	9	up to 4
	≥ 24	12	
[30,40[	<48	12	up to 4
	≥ 48	18	
[40,45[	<60	18	up to 4
	≥ 60	24	
≥45	<72	24	up to 4
	≥ 72	30	

* Extra potential duration is 1 month (2 months for «up to 8») for each 5 years of consecutive contributions made during the 20 years preceding the date of involuntary dismissal.

The 2012 reform reduced the potential duration across the board but did not change the age thresholds, and increased the last threshold from 45 to 50 years of age. The large majority of individuals in our sample were unaffected by the reform sample as they became unemployed before March 2012. Thus, we focus our analysis on the pre-reform age thresholds.

2.2. Single Amount programme

The Single Amount programme was introduced in 1989 and allows unemployed individuals to receive the entire amount of their UI benefits as a lump sum in order to start a business. Individuals can request the entire amount on their first month of UI or later, in which case they only receive the monthly payments that are left of the remaining potential duration. Under the UI rules for monthly amounts and potential duration described above, the lump sum payment under the Single Amount programme could reach a maximum of €47,791.

The legal form of the new business can be unincorporated or incorporated. Individuals can choose to start a business by themselves or partner with others. The only requirement is that individuals do not obtain labour income from any source other than their business, for a period of three years. If this requirement is violated, they are obligated to pay back the full amount received under the programme. This implies that, if the business fails, individuals must pay back the amount received in order to be able to accept a job within three years after their participation in the programme. Both project approval, which should be decided within 90 working days after the project's submission, and project monitoring, are carried out by local Social Security offices.

Chapter 3
Data

3.1. Sample description

Our study uses administrative data collected by the Portuguese Social Security. The data cover the universe of workers on unemployment insurance between January 2005 and December 2017. The data include all payments related to unemployment benefits. The unit of observation is individual-payment, where each payment contains information on the amount, potential duration, starting date, ending date, and on transitions between UI and the Single Amount programme. The data also contain all the information regarding the periods of registered employment, unemployment and disability pensions – the unit of observation is individual-event. Regarding employment, for each observation, we have information on wage, type of employment, starting date, ending date, firm identifier and industry. Among individuals who transition into the Single Amount programme, nearly 90% do so within one year of the beginning of their UI or Initial UA benefits. We therefore restrict our sample to individuals who began receiving benefits until December 2016, in order to minimize right censoring.

We then match our individual data to administrative data on firms' financial statements from «Informação Empresarial Simplificada» (IES), covering the period from 2009 to 2016. IES comprises the universe of incorporated firms, with the exception of the financial sector, and includes detailed balanced sheet and income statement data. This allows us to measure outcomes for incorporated firms which started under the Single Amount programme.[8]

3.2. Variables definitions

We define entrepreneurs as the individuals who participate in the Single Amount programme, either as unincorporated self-employed workers or as founders of new incorporated firms.[9] We measure the potential amount of funding these entrepreneurs are entitled to as their monthly benefit payment, multiplied by the number of months of their benefits' potential duration. Age is measured at the time of the unemployment benefit's starting date. Pre-unemployment wages are the monthly wages reported to Social Security during the last employment prior to involuntary dismissal.

From IES, we obtain outcomes for incorporated businesses such as sales, total assets, number of employees and paid-in capital (i.e. equity). Labour productivity is defined as sales divided by number of employees.

3.3. Descriptive statistics

Table *1* reports summary statistics for the population of employed individuals, unemployed individuals, and unemployed individuals who become entrepreneurs under the Single Amount programme. For employed individuals, we present statistics from their last job observed in the data. For unemployed individuals, we report statistics from their last job before unemployment. The unemployed population is younger and have lower monthly wages than the employed population, but the differences are relatively small (37 vs 39 years old, and €720 vs €871, on average, respectively).

We find that 1.1% of unemployed individuals in our sample were selected into the Single Amount programme. Programme participants are older on average, as very few young workers participate and are also disproportionately more highly skilled, as indicated by their higher pre-unemployment wages (€1,170 on average). This suggests the programme successfully attracts high potential entrepreneurs. They are also more likely to be male, in line with previous studies which find that males are more likely to start new businesses (Rosa, Carter and Hamilton, 1996; Verheul and Thurik, 2001; Fairlie and Robb, 2009).

Table *2* reports summary statistics for incorporated firms created through the programme and within the full population of new firms, at entry and ages 2 and 4. Firms created through the programme are somewhat smaller on average, but span a broad range of outcomes, including firms in the upper tail of the distribution.

Table *3* reports that 30% of new incorporated firms created through the programme operate in the wholesale and retail trade sector,

versus 17% of firms created outside the programme. Entrepreneurs within the programme are also significantly more likely to create firms in the professional, scientific and technical activities sector (13%), in manufacturing (8%) and in accommodation and food services (12%), than entrepreneurs outside the programme (9%, 4% and 7%, respectively). In contrast, administration and support services seem to attract less entrepreneurs within the programme (8%) than outside the programme (28%). The education and the health and social work sectors are also less attractive for entrepreneurs within the programme (2% vs 7% and 3% vs 6%, respectively).

Chapter 4
Empirical strategy

We exploit age-based discontinuities in the potential duration of unemployment benefits to generate exogenous variation in the amount that potential entrepreneurs can receive as a lump sum, using a regression discontinuity design (RDD). This ensures that the variation in funding we exploit is uncorrelated with ability, wealth and other unobserved determinants of entrepreneurship. The amount increases discontinuously at age 30, age 40, and age 45. In our baseline specification, we instrument the potential amount (*Potential Amount*) unemployed workers are entitled to receive under the Single Amount programme, using the three age cutoffs. The first stage regression is given by:

Equation (1):

$$Potential\ Amount_i = \sum_{j \in J} \phi_j \times 1(Age_i \geq j) + \sum_{j \in J} f_j(Age_i - j) \times 1(Age_i \geq j) + \epsilon_i$$

for J = {0, 30, 40, 45}. Age_i is the age (in years) of individual i; *Potencial Amount*$_i$ is the total amount of unemployment benefit (in thousands of euros) received over the full duration, which depends on age and employment history of individual i; and 1 is the indicator function. f_j are smooth functions of age (quadratic polynomials in our baseline) around each cutoff.

The second stage regression is given by:

Equation (2):

$$Y_i = \beta_0 + \beta_1 \times \widehat{Potential\ Amount}_i + \sum_{j \in J} f_j(Age_i - j) \times 1(Age_i \geq j) + \omega_i$$

where Y_i is a dummy variable that takes a value of one if an individual i becomes an entrepreneur under the Single Amount programme, and zero otherwise.

To validate our design, we investigate age and pre-unemployment wage distributions around the age cutoffs. If individuals respond strategically to the UI duration rules, we might expect to see bunching within ages just above the age cutoffs. Figure 1 shows the age distribution (absolute frequency) at the date of the involuntary dismissal, and figure 2 shows the average pre-unemployment (i.e., last job before unemployment) wage by age, both aggregated at the quarter level. In both cases, we can observe that the distribution evolves smoothly around the age cutoffs, except perhaps within one or two quarters of the thresholds, where there seems to be some bunching. This suggests that while there might be some strategic manipulation of the timing of dismissal, it is highly localised around the thresholds. We address this concern below by showing that our estimates are nearly unchanged when we exclude these potentially problematic observations on either side of each threshold, in a donut regression discontinuity design (Barreca, Guldi, Lindo and Waddell, 2011; Hoxby and Bulman, 2016).

Chapter 5
Results

This section examines the effect of the funding obtained under the Single Amount programme on the probability of becoming an entrepreneur. We first instrument the *Potential Amount* with the age cutoffs. The first stage corresponds to a regression of the potential amount of funding on age cutoff dummy variables in Equation (1). All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each age cutoff. We present estimates of model specifications with and without observable covariates (region, nationality and gender dummies). Table 4 reports the estimates. Column (1) presents the coefficient estimates of a model specification without covariates. The increase in the potential amount is €2,404, €3,177 and €4,470 at the age cutoffs of 30, 40 and 45, respectively. We obtain similar estimates in column (2) when the model specification includes covariates. Figure 3 presents graphical evidence on changes in the potential amount at the age cutoffs, using the specification without covariates in column (1). The figure shows there is a clear upward jump in the average potential amount at the three age cutoffs, and that the quadratic polynomials offer a nearly perfect fit to the data.

The reduced-form regressions correspond to a linear probability model of *Y* on the age cutoff dummy variables. Figure 4 presents graphical evidence. The figure shows a significant increase in the probability of becoming an entrepreneur at the three age cutoffs, and demonstrates that the quadratic polynomials once again fit the data closely.

Table 4 reports the reduced-form regression model's estimates. Column (3) presents the coefficient estimates of a model specification without covariates. The increase is 0.27 percentage points at age 30, 0.34 percentage points at age 40, and 0.62 percentage points at age 45, all statistically significant at the 1% level. We obtain similar estimates in column (4) when the model specification includes covariates.

The second-stage regressions correspond to a linear probability model of *Y* on the predicted *Potential Amount* obtained in the first-stage regression. Table 4 reports estimation results from the model in Equation (2). Column (5) in table 4 presents the coefficient estimates of a model specification without covariates. The increase in probability is 0.12 percentage points for each additional one thousand euros of potential amount. We obtain similar estimates in column (6) when the model specification includes covariates.

Table 5 presents estimates from donut RDD specifications, where we exclude observations within a certain distance of each threshold, to address concerns with possible manipulation of dismissal dates around the thresholds. As shown above, any potential manipulation seems to occur at most within two quarters of each threshold. When we exclude one month, one quarter or two quarters of data, our estimates remain nearly unchanged from our baseline estimates, both in the reduced form and IV regressions. Our IV estimate when we exclude two quarters, in particular, equals 0.11 percentage points, which compares with our baseline estimate of 0.12 percentage points.

5.1. Legal form

We next examine how different types of entrepreneurs respond to the programme. We start by studying the effect of financial constraints on entrepreneurship, conditional on the legal form of the business. Levine and Rubinstein (2016), show that incorporation is a good proxy for growth-oriented entrepreneurship. Thus, incorporated businesses are more likely to be chosen by entrepreneurs undertaking projects with higher growth potential and more risk.

Figure 5 presents graphical evidence on the probability of becoming an *unincorporated* entrepreneur by age (reduced form model). Figure 6 does the same for the probability of becoming an *incorporated* entrepreneur by age. Both figures show a significant increase at each age threshold. Table *6* presents the estimates of the reduced-form regressions separately for the probability of becoming an unincorporated entrepreneur – column (1) – and an incorporated entrepreneur – column (2). We divide the coefficients by the proportion of unincorporated and incorporated businesses in the overall population of firms started during our sample period (roughly 4/5 and 1/5, respectively), in order to make the coefficients comparable with each other and with our baseline coefficient. The increase in probability is statistically significant at the 1% level in all cases, except at age 40 for incorporated businesses, which is only significant at the 10% level. Columns (3) and (4) present the estimates of the second-stage regression separately for unincorporated and incorporated entrepreneurs, respectively. The coefficients are statistically and economically significant. The increase in the probability of becoming an unincorporated entrepreneur is 0.07

percentage points for each one thousand euros added to the potential amount. The effect is four times larger in the case of incorporated entrepreneurs, with an increase in probability of 0.29 percentage points. These results indicate that financial constraints primarily impair higher potential entrepreneurship.

5.2. Wage

In this subsection, we study the effect of the Single Amount programme on entrepreneurship for different levels of individual wages before unemployment. Higher pre-unemployment wages could proxy for entrepreneurial potential, as they may capture individual characteristics that are valuable for entrepreneurs, such as education, ability or ambition to grow. In addition, individuals with a better outside option in the labour market may be more selective about the entrepreneurial opportunities they pursue.

We proceed as follows. First, we assign each unemployed worker in our sample a wage percentile p_i, based on that worker's last observed wage before unemployment and the wage distribution among the worker population within that same year. We then estimate a separate regression for each percentile P of the wage distribution, based on Equation (2), where observations are weighted by $\min(0.1 - |(p-p_i)/11|)$. That is, in each regression we only assign positive weight to observations within 10 wage percentiles of p, and this weight declines linearly with distance to p. This procedure yields a non-parametric estimate of the programme's effect as a function of pre-unemployment wages, smoothed with triangular weights.

We employ this procedure separately for incorporated and unincorporated entrepreneurship, and again divide the coefficients by the proportion of incorporated and unincorporated businesses in the overall population of firms started during our sample period. Figure 7 plots the resulting coefficients and confidence intervals for all P. The figure shows that the increase in the probability of becoming an entrepreneur is particularly strong at the top of the wage distribution for incorporated entrepreneurs. In the upper percentiles of the distribution, this increase is about 0.8 percentage points for each extra one thousand euros, over six times larger than our baseline estimate of 0.12 percentage points. In contrast, among unincorporated entrepreneurs, the effect is weaker and stable throughout the wage distribution. These results once again suggest that the Single Amount programme promotes the creation of firms by high-potential entrepreneurs.

5.3. Industry

Table 7 presents the estimates of the second-stage regression separately for each industry. We divide the coefficients by the proportion of businesses in each industry in the overall population of firms started during our sample period. The coefficients are statistically significant in manufacturing, wholesale and retail trade, accommodation and food service activities, information and communication, and health and social work. Among these sectors, the effect is strongest in information and communication (1.78 percentage points), followed by manufacturing (0.67 percentage points), wholesale and retail trade (0.57 percentage points), accommodation and food services (0.43 percentage points) and, finally, health and social work (0.29 percentage points).

5.4. Post-entry performance

In this subsection, we turn to ex-post outcomes, which we observe for incorporated firms only. We do not estimate the effect on average outcomes conditional on entry, which would be ambiguous (Evans and Jovanovic, 1989). If financially constrained workers select into entrepreneurship or dependent employment as a function of their relative ability in the two occupations and their ability to invest, then access to additional funding has two opposite effects. First, it induces the entry of marginal entrepreneurs who would have otherwise selected into employment, which may lower average entrepreneurial performance. Second, it increases the investment capacity of infra-marginal entrepreneurs, who would have entered in any case, improving average entrepreneurial performance.

Rather than conditioning on entry, we examine the effect of the Single Amount programme on the probability of becoming an entrepreneur *and* attaining a given level of post-entry performance. This way, we are able to characterise the effect of the programme on different types of entrepreneurs with respect to ex-post performance. In each case, we divide the coefficients by the proportion of businesses in the overall population which started during our sample period and attained that level of performance.

We start with survival. One concern with our empirical setting is that programme participants might select into entrepreneurship to maximize UI benefits, rather than overcome financial constraints, and that the incentive to do so might increase discontinuously around the age thresholds. If that were the case, we would expect to see the effect of funding obtained through the programme on the creation

of surviving businesses drop off at age four, once participants are no longer obligated to return the funds obtained in order to pursue other opportunities. To evaluate this possibility, we separately estimate the effect of funding on the probability of becoming an entrepreneur and surviving from age one to age six after entry. Since our data on incorporated firms covers the 2009-2016 period, and our match is restricted to firms founded until 2013, we restrict our sample in each case to unemployment spells beginning between (2009 - firm age) and min(2013, 2016 - firm age).

Table 8 presents the results. We find no evidence of a drop off in the effect of funding on the creation of surviving businesses beyond age three. In fact, the coefficient rises with age, from 0.32 percent at age one to 0.42 at age six. This indicates that access to funding increases survival for the average business, and rules out the concern that the effect we estimate is driven by participants simply using the programme to maximize UI benefits.

We next consider the outcome distribution among survivors, starting with sales. We focus on outcomes at age 4, again so that entrepreneurs are no longer obligated to return the amount received if they choose to exit. This implies that we restrict our sample to unemployment spells beginning up to 2012, since we observe firm outcomes up to 2016.

We proceed as follows. First, we let S denote the set of workers in our sample who participate in the programme, incorporate and whose business survives until age 4, and let p_i denote the sales percentile of the firm created by worker $i \in S$ in the overall population of firms from the same cohort and at the same age. We then estimate a separate regression for each percentile P, based on Equation (2), where the dependent variable equals

$$Y_{p,i} = \begin{cases} \min(0, 1 - |(p - p_i)/11|), & i \in S \\ 0, & i \notin S \end{cases}$$

Yp only takes on positive values for surviving firms with sales within 10 percentiles of p, and its value declines linearly with distance to p. For workers who do not participate in the programme, do not incorporate or exit before age four, Yp takes a value of zero. This is similar to the procedure we employed for pre-unemployment wages, except that we use triangular weighting to redefine the dependent variable rather than sample weighting, since we do not observe potential entrepreneurial outcomes for $i \notin S$.

Figure 8 plots the resulting coefficients and confidence intervals for each percentile in the sales distribution. Although our estimates in this section are less precise, the figure clearly indicates that the programme's effect is stronger in the upper half of the sales distribution and, more particularly, is statistically significant in the upper tail. This finding is of particular interest given the weight of upper tail firms on aggregate employment and output. In Portugal, for example, the top quintile of incorporated firms account for over 75 percent of total employment and 90 percent of total sales.

Figure 9 employs the same procedure but for sales growth distribution, where growth is measured from entry to age four. Figure 10 does the same for labour productivity, defined as sales per worker. In both cases the patterns are very similar as for the level of sales. Figure 11 does the same for total assets, and the results are strongest between the 60th and 70th percentiles, while somewhat weaker at the top of the distribution. In short, we find that the effect of the Single Amount programme is more pronounced in the upper half of the post-entry performance distribution measured among incorporated businesses.

Chapter 6
Conclusion

The effect of financial constraints on entrepreneurship has been a controversial topic in the literature due to several data limitations and empirical challenges. We show that financial constraints are an important barrier to both the quantity and quality of entrepreneurship, by using administrative data on a public programme which allows unemployed workers in Portugal to collect the full amount of their unemployment benefit as a lump sum in order to start a business. We identify the effects by exploiting age-based discontinuities in the duration and amount of unemployment benefits. We find that an extra one thousand euros of funding increases the probability of becoming an entrepreneur by 0.12 percentage points on average, which corresponds to an 11% increase.

Most importantly, we find significant heterogeneity in the effect of financial constraints across different types of entrepreneurs and businesses. The effect on the probability of becoming an incorporated entrepreneur is almost four times stronger than the effect on unincorporated entrepreneurship. The effect rises steeply at the top of the pre-unemployment wage distribution for incorporated entrepreneurship and remains flat across the wage distribution for unincorporated entrepreneurship. In terms of sectors, we find that the effect is larger in information and communications, followed by manufacturing. Finally, turning to post-entry performance, we find that access to funding increases survival, and that the effect is stronger in the upper half of the size, growth and profitability distributions

among incorporated businesses. Overall, our findings consistently indicate that financial constraints primarily hamper the type of higher potential entrepreneurship that drives job creation and economic growth.

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Table 1 Summary statistics – Workers

	(1) Employed	(2) Unemployed	(3) Programme
Wage (€)			
mean	813	716	1,168
p10	388	405	470
p50	600	550	764
p90	1,444	1,200	2,220
p99	3,666	2,930	6,074
Age (years)			
mean	38.94	37.18	40.28
p10	25	24.16	29.91
p50	38	35.77	40.31
p90	53	52.95	50.91
p99	59	59.87	57.56
Male	0.54	0.48	0.62
Lisbon	0.13	0.19	0.18
Portuguese	0.95	0.96	0.99
Potential amount (€)			
mean		10,822	17,504
p10		3,888	6,745
p50		8,993	14,860
p90		19,591	33,955
p99		39,832	46,444
N	16,919,433	2,134,261	23,530

This table presents means and percentiles at the individual level for three samples: (1) employed, defined as all workers reporting employment earnings to Social Security during our sample period (2005-2016); (2) unemployed, defined as all workers who became unemployed during our sample period; and (3) Single Amount programme, defined as all workers who became unemployed during our sample period and became entrepreneurs through the Single Amount programme. Wage corresponds to the last wage of the last job for the employed sample, and the last wage of the last job before unemployment for the unemployed and Single Amount programme samples. Age is measured at the beginning of the last job for the employed sample, and at the time of unemployment for the unemployed and Single Amount programme samples.

Table 2 Summary statistics – Incorporated firms

	Entry		Age 2		Age 4	
	All	Programme	All	Programme	All	Programme
Sales (€)						
mean	69,740	42,423	239,707	156,508	322,008	185,790
p10	0	0	0	4,367	0	198
p50	14,599	11,102	53,894	52,730	67,648	61,732
p90	141,241	89,450	386,194	300,122	524,908	391,667
p99	906,828	417,188	2,605,858	1,548,039	3,703,534	2,070,109
EBIT (€)						
mean	-2,048	-7,364	1,368	-1,357	8,704	2,902
p10	-16,701	-22,391	-22,453	-23,026	-22,881	-21,649
p50	-958	-4,630	389	-531	1,308	471
p90	9,775	2,732	26,453	17,256	36,031	21,819
p99	75,994	24,993	188,437	91,624	283,011	133,010
Total assets (€)						
mean	151,466	51,217	373,450	99,466	565,234	127,445
p10	3,015	4,208	5,530	4,266	9,617	2,250
p50	22,767	27,113	56,969	42,133	85,482	48,406
p90	173,588	109,717	426,388	191,873	660,634	253,266
p99	1,379,294	350,925	3,639,941	981,403	5,759,477	1,366,351
Labour productivity (€)						
mean	32,622	20,304	73,387	46,957	80,439	52,630
p10	0	0	0	4,811	0	4,643
p50	9,208	8,143	25,562	25,007	29,487	29,156
p90	66,549	45,870	127,300	100,251	142,874	109,328
p99	358,820	200,683	658,669	359,170	789,000	441,082

	Entry		Age 2		Age 4	
	All	Programme	All	Programme	All	Programme
Paid-in capital (€)						
mean	23,196	11,869	37,881	18,784	55,840	24,703
p10	250	1,000	1,000	2,500	4,980	5,000
p50	5,000	5,000	5,000	5,000	5,000	5,000
p90	20,000	26,452	50,000	40,591	50,000	56,750
p99	160,000	101,321	296,468	160,000	500,000	200,000
Survival	1	1	0.82	0.91	0.64	0.78
N	105,899	4,722	136,280	5,482	143,744	4,603

This table presents means and percentiles at the firm level for the sample of all firms defined as the overall population of incorporated firms, and the sample of Single Amount programme firms, defined as all incorporated firms started by unemployed workers who became entrepreneurs through the Single Amount programme. Sales correspond to total sales in euros. EBIT corresponds to earnings before interest and taxes in euros. Total assets correspond to total assets in euros. Labour productivity corresponds to sales divided by number of employees. Paid-in capital corresponds to equity invested by the firms' owners in euros.

Table 3 Relative frequency of new incorporated firms by industry

	Programme	Overall
Agriculture, forestry and fishing	1.21	8.25
Mining and quarrying	0.02	0.05
Manufacturing	8.07	3.72
Electricity, gas steam and air-conditioning supply	0.02	0.2
Water supply, sewerage, waste management and remediation	0.26	0.08
Construction	6.22	6.27
Wholesale and retail trade, repair of motor vehicles and motorcycles	30.08	16.05
Transportation and storage	3.56	1.03
Accommodation and food service activities	11.81	7.91
Information and communication	3.76	1.54
Real estate activities	1.97	2.2
Professional, scientific and technical activities	13.26	7.92
Administration and support service activities	8.01	26.16
Education	1.92	5.71
Human health and social work activities	2.71	5.86
Arts, entertainment and recreation	2.18	2.83
Other services	3.76	4.23

This table presents the relative frequency (in percentage) of incorporated firms started between 2009 and 2016 for the sample of firms created through the Single Amount programme, and for the overall population of firms. Industries are aggregated at the one-letter level. Due to small sample size, we have excluded «financial and insurance activities», «public administration and defence, compulsory social security», «activities of households as employers of domestic personnel», «undifferentiated goods- and services-producing activities of private households for own use», and «activities of extraterritorial organisations and bodies».

Table 4 Probability of starting a business and unemployment benefits - Baseline results

	First stage		Reduced form		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
Age 30	2.404*** (0.0163)	2.433*** (0.0167)	0.00268*** (0.000446)	0.00262*** (0.000455)		
Age 40	3.177*** (0.0395)	3.172*** (0.0387)	0.00342*** (0.000860)	0.00362*** (0.000879)		
Age 45	4.470*** (0.0488)	4.451*** (0.0475)	0.00615*** (0.000930)	0.00599*** (0.000945)		
Potential amount					0.00122*** (0.000112)	0.00121*** (0.000114)
Covariates	No	Yes	No	Yes	No	Yes
N	2,134,261	2,065,857	2,134,261	2,065,857	2,134,261	2,065,857

This table reports estimates that follow our baseline specification. Columns (1) and (2) report the estimated regressions of the potential amount received through the Single Amount programme (in thousands of euros) on > age 30, > age 40 and > age 45 dummy variables. Columns (3) and (4) report the estimates of a regression of the probability of becoming an entrepreneur on > age 30, > age 40 and > age 45 dummy variables. Columns (5) and (6) report estimates of a regression of the probability of becoming an entrepreneur with the potential amount received through the Single Amount programme, instrumented with > age 30, > age 40 and > age 45 dummy variables. All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each cutoff. Columns (2), (4) and (6) include region, nationality, and gender dummies as covariates. The sample consists of all workers who became unemployed between 2005 and 2016. Robust standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 5 Probability of starting a business and unemployment benefits – Donut RDD results

	Reduced form			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
	1 month	1 quarter	2 quarters	1 month	1 quarter	2 quarters
Age 30	0.00262*** (0.000465)	0.00280*** (0.000510)	0.00239*** (0.000585)			
Age 40	0.00352*** (0.000933)	0.00352*** (0.00111)	0.00293*** (0.00145)			
Age 45	0.00558*** (0.00100)	0.00540*** (0.00117)	0.00558*** (0.00149)			
Potential amount				0.00118*** (0.000119)	0.00118*** (0.000129)	0.00110*** (0.000148)
N	2,103,709	2,041,131	1,949,157	2,103,709	2,041,131	1,949,157

This table reports estimates from a donut RDD specification, where we exclude observations within a given distance from each threshold. The distances range from one month to two quarters, as indicated in column labels. Columns (1) through (3) report the estimates of a regression of the probability of becoming an entrepreneur on > age 30, > age 40 and > age 45 dummy variables. Columns (4) through (6) report the estimates of a regression of the probability of becoming an entrepreneur with the potential amount received through the Single Amount programme, instrumented with > age 30, > age 40 and > age 45 dummy variables. All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each cutoff. The sample consists of all workers who became unemployed between 2005 and 2016. Robust standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 6 Probability of starting a business and unemployment benefits – Sample of incorporated and unincorporated businesses

	Reduced form		IV	
	(1)	(2)	(3)	(4)
	Unincorporated	Incorporated	Unincorporated	Incorporated
Age 30	0.00178** (0.000358)	0.00590*** (0.00162)		
Age 40	0.00239*** (0.000705)	0.00671* (0.00307)		
Age 45	0.00327*** (0.000790)	0.0167*** (0.00318)		
Potential amount			0.000742*** (0.0000937)	0.00292*** (0.000395)
N	2,132,969	2,132,969	2,132,969	2,132,969

This table reports estimates for a regression of the probability of becoming an incorporated or unincorporated entrepreneur with the potential amount (thousands of euros) received through the Single Amount programme, instrumented with > age 30, > age 40 and > age 45 dummy variables. Coefficients are divided by the proportion of unincorporated and incorporated businesses in the overall population of firms (roughly 1/5 and 4/5), in order to make them comparable with each other and with our baseline coefficient for all businesses. The sample consists of all workers who became unemployed between 2005 and 2016. All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each cutoff, and include region, nationality, and gender dummies as covariates. Robust standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 7 Probability of starting a business and unemployment benefits by industry

	Coefficient	Standard errors
Agriculture, forestry and fishing	0.000812	(0.000576)
Mining and quarrying	0.029456	(0.021574)
Manufacturing	0.006709**	(0.003099)
Electricity, gas steam and air-conditioning supply	-0.001499	(0.001060)
Water supply, sewerage, waste management and remediation	0.002753	(0.018758)
Construction	0.000947	(0.001525)
Wholesale and retail trade, repair of motor vehicles and motorcycles	0.005636***	(0.001374)
Transportation and storage	0.009417	(0.007539)
Accommodation and food service activities	0.004341	(0.001705)
Information and communication	0.017511***	(0.004973)
Publishing activities	0.002710**	(0.001102)
Motion picture and video production, distribution and projection	-0.000700	(0.001127)
Radio and television activities	0.001561	(0.001692)
Telecommunications	0.002234	(0.001794)
Computer consultancy and programming and related activities	0.002142**	(0.000961)
Data processing, hosting, web portals and related activities	0.002301	(0.002276)
Real estate activities	0.002505	(0.002474)
Professional, scientific and technical activities	0.003018*	(0.001809)
Administration and support service activities	0.000465	(0.000421)
Education	0.000232	(0.000983)
Human health and social work activities	0.002882***	(0.001020)
Arts, entertainment and recreation	0.001010	(0.002020)
Other services	0.002940	(0.001788)

This table reports estimates for a regression of the probability of becoming an entrepreneur with the potential amount (thousands of euros) received through the Single Amount programme, instrumented with > age 30, > age 40 and > age 45 dummy variables. The regressions are estimated separately for each industry. Coefficients are divided by the proportion of businesses in the industry within the overall population of firms, in order to make them comparable with each other and with our baseline coefficient for all businesses. The sample consists of all workers who became unemployed between 2005 and 2016. However, industries where the number of entrepreneurs who benefited from the programme represents less than 1% of the overall industry distribution, have been excluded from this table. All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each cutoff, and include region, nationality, and gender dummies as covariates. Robust standard errors are shown. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 8 Probability of starting a business and unemployment benefits - Survival

|	(1) Age 1	(2) Age 2	(3) Age 3	(4) Age 4	(5) Age 5	(6) Age 6
Potential amount	0.00323*** (0.000560)	0.00358*** (0.000594)	0.00395*** (0.000614)	0.00393*** (0.000648)	0.00367*** (0.000774)	0.00415*** (0.000893)
N	1,075,131	1,189,569	1,323,088	1,326,426	1,064,512	878,476

This table reports estimates for a regression of the probability of becoming an incorporated entrepreneur and surviving up to a given age with the potential amount (thousands of euros) received through the Single Amount programme, instrumented with > age 30, > age 40 and > age 45 dummy variables. Coefficients are divided by the proportion of incorporated businesses in the overall population of firms (roughly 1/3), and again by the proportion of survivors at each age in the overall population, in order to make them comparable with each other and our coefficient for incorporated businesses at entry. The sample consists of all workers who became unemployed between 2005 and 2016. All regressions control for a quadratic polynomial, which allows for different coefficients on either side of each cutoff, and include region, nationality, and gender dummies as covariates. Robust standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Figure 1 Age distribution at time of unemployment
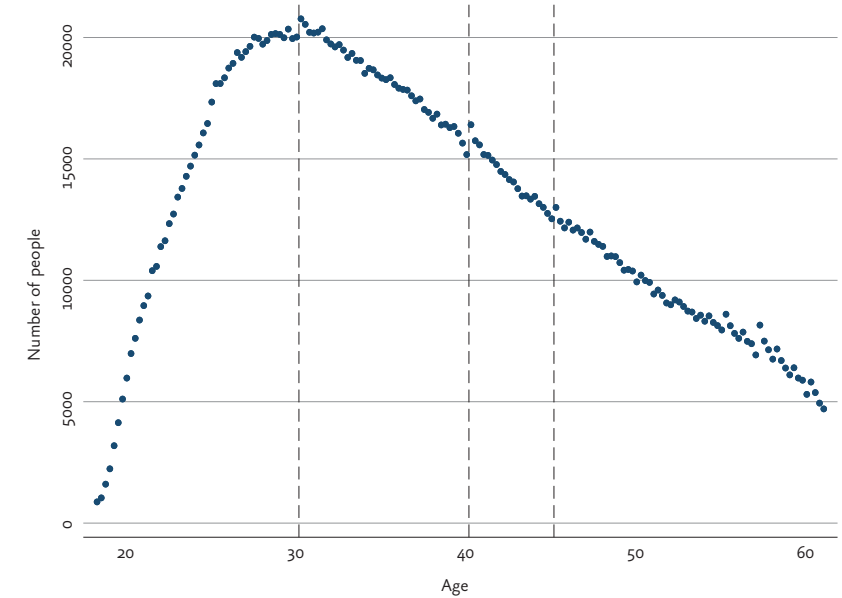
This figure plots the frequency of age among unemployed workers (at the date of their involuntary dismissal). The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to quarterly intervals. The sample consists of all workers who became unemployed between 2005 and 2016.

**Figure 2** Average pre-unemployment wage by age
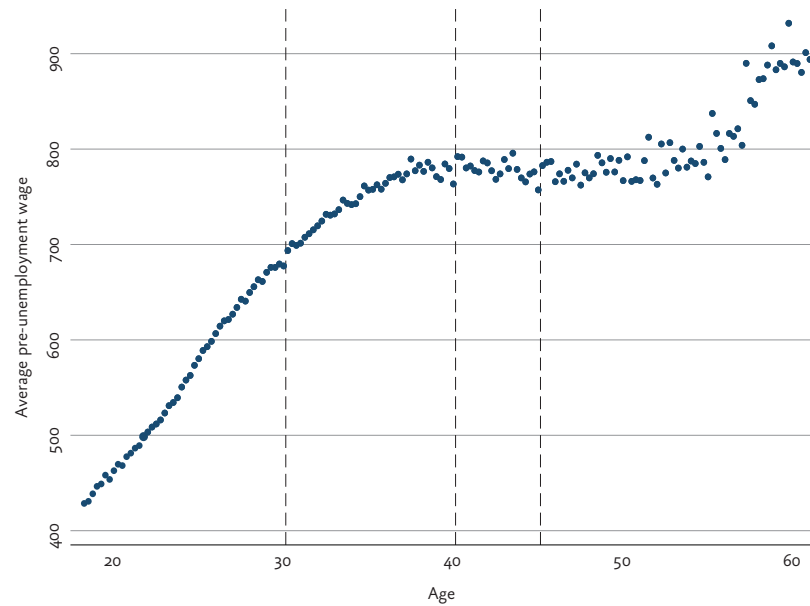
This figure plots the average pre-unemployment (i.e., last job before unemployment) wage (euros per month) by age. The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to quarterly intervals. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 3 Average potential amount by age
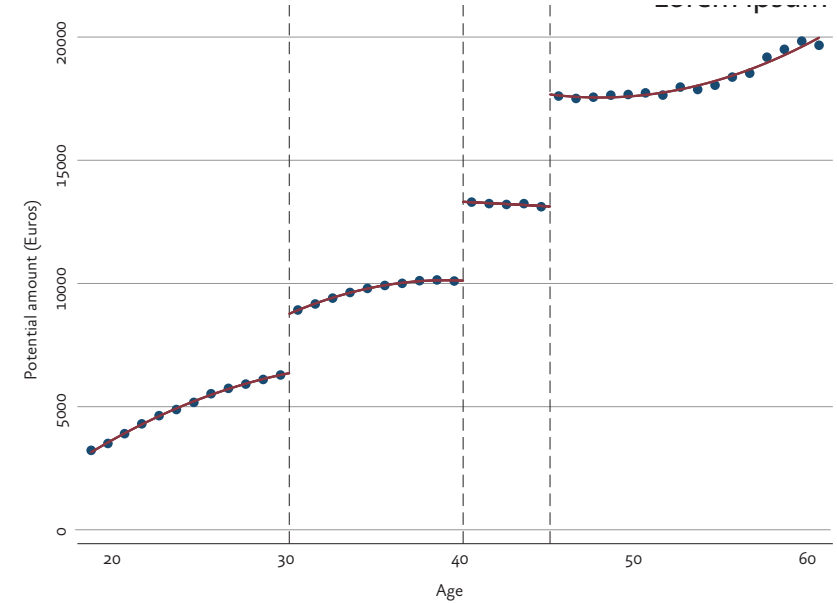
This figure plots the average amount (euros) that potential entrepreneurs can access through the Single Amount programme by age. The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to one-year intervals. The sample consists of all workers who became unemployed between 2005 and 2016.
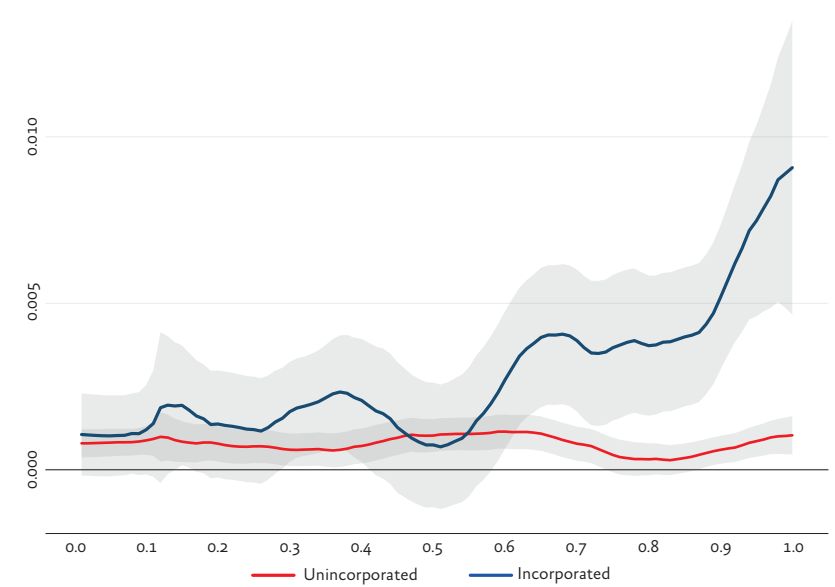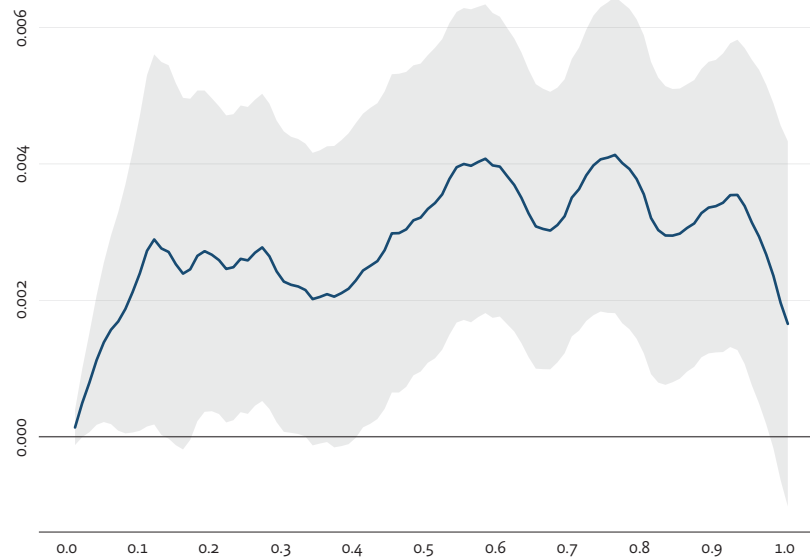
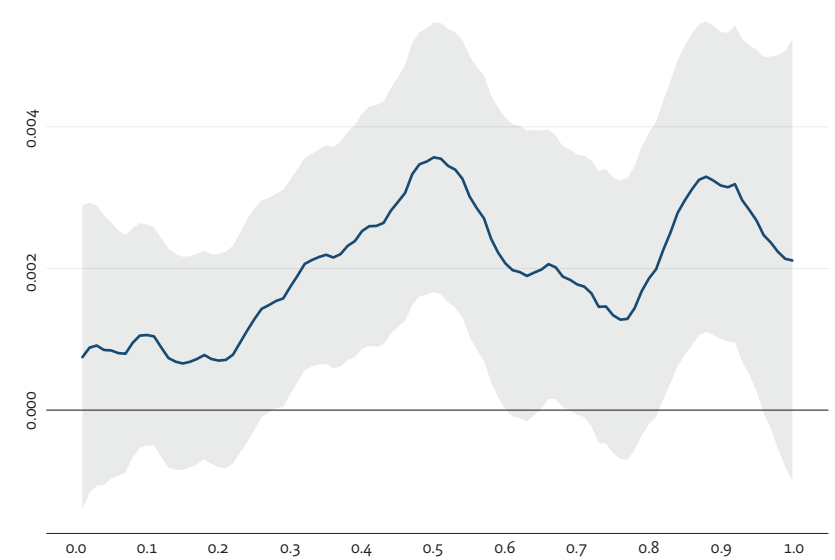**Figure 4** Probability of becoming an entrepreneur by age
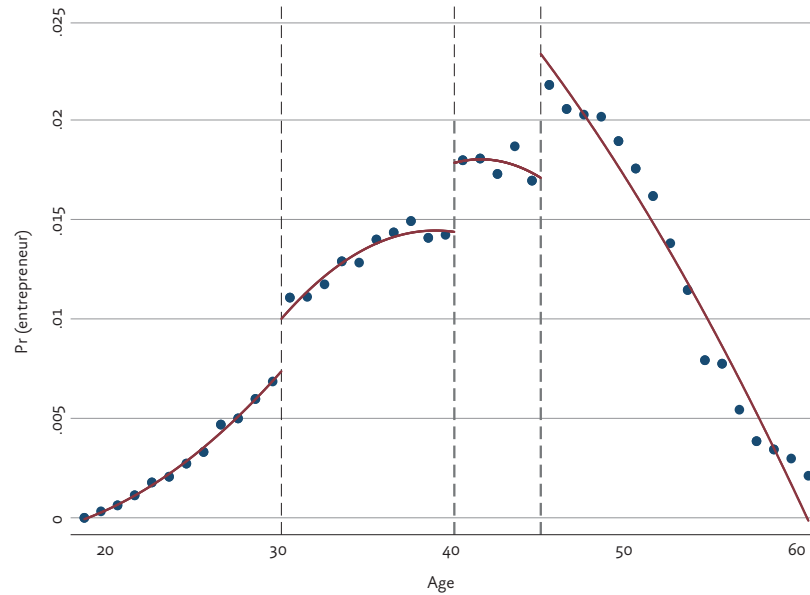
This figure plots the probability of becoming an entrepreneur through the Single Amount programme by age, as estimated in column (3) of table 4. The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to one-year intervals. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 5 Probability of becoming an unincorporated entrepreneur by age
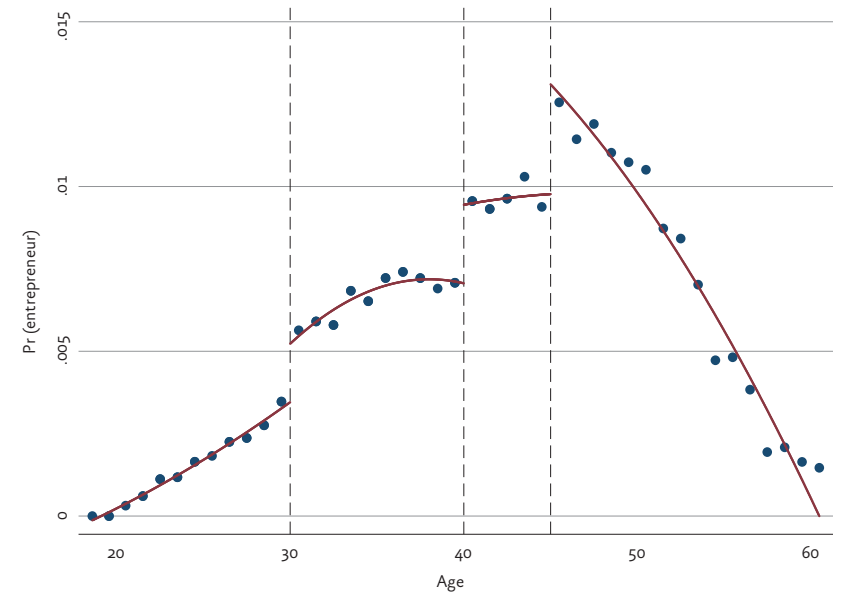
This figure plots the probability of becoming an unincorporated entrepreneur through the Single Amount programme by age, as estimated in column (3) of table 4. The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to one-year intervals. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 6 Probability of becoming an incorporated entrepreneur by age
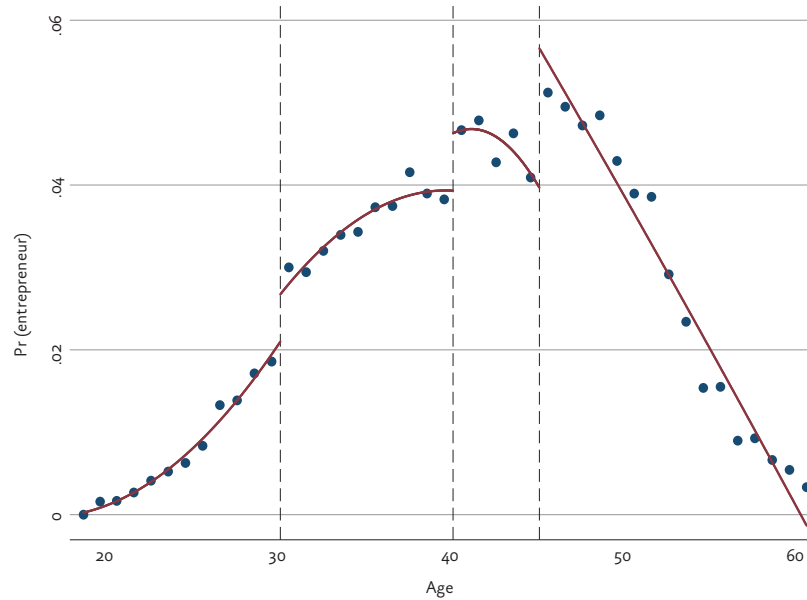
This figure plots the probability of becoming an unincorporated entrepreneur through the Single Amount programme by age, as estimated in column (3) of table 4. The dashed lines represent the three age cutoffs at which the duration of unemployment benefits increases discontinuously. Age bins correspond to one-year intervals. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 7 Probability of becoming an entrepreneur by wage percentile

This figure plots the probability of becoming an entrepreneur through the Single Amount programme as a function of the potential amount received (in thousands of euros), as estimated in column (5) of table 4 separately by pre-unemployment wage deciles. Coefficients are divided by the proportion of unincorporated and incorporated businesses in the overall population of firms (roughly 2/3 and 1/3), in order to make them comparable with each other and with our baseline coefficient for all businesses. 95% confidence intervals are represented by dashed lines. The two lines represent second degree fractional polynomials estimated on the coefficients for each legal form. Wage deciles are computed from the overall worker population. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 8 Probability of becoming an incorporated entrepreneur by sales percentile

Figure 9 Probability of becoming an incorporated entrepreneur by sales growth percentile
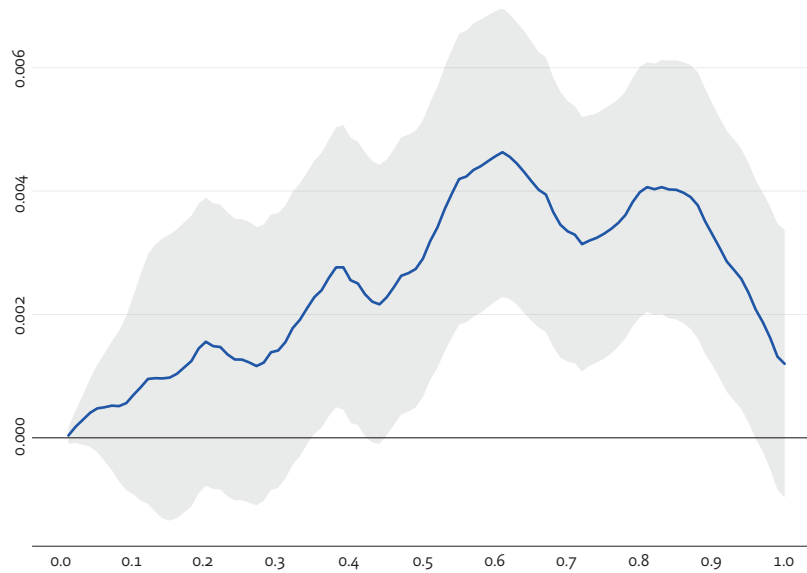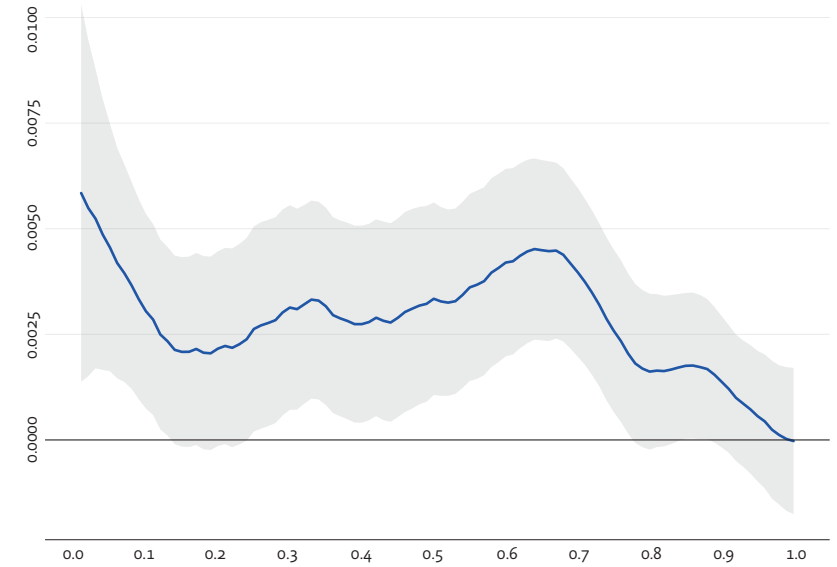

This figure plots the probability of becoming an incorporated entrepreneur through the Single Amount programme as a function of the potential amount received (in thousands of euros), as estimated in column (5) of table 4. Each coefficient represents the probability of creating a firm in a given percentile of the sales growth distribution between age 0 and age 4, as explained in the main text. 95% confidence intervals are represented by dashed lines. Sales growth percentiles are computed from the overall population of incorporated firms in the same cohort and at the same age. The sample consists of all workers who became unemployed between 2005 and 2016.

This figure plots the probability of becoming an incorporated entrepreneur through the Single Amount programme as a function of the potential amount received (in thousands of euros), as estimated in column (5) of table 4. Each coefficient represents the probability of creating a firm in a given percentile of the labour productivity distribution at age 4, as explained in the main text. Labour productivity is measured by sales per worker. 95% confidence intervals are represented by dashed lines. Labour productivity percentiles are computed from the overall population of incorporated firms in the same cohort and at the same age. The sample consists of all workers who became unemployed between 2005 and 2016.

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Figure 10 Probability of becoming an incorporated entrepreneur by labour productivity quintile

This figure plots the probability of becoming an incorporated entrepreneur through the Single Amount programme as a function of the potential amount received (in thousands of euros), as estimated in column (5) of table 4. Each coefficient represents the probability of creating a firm in a given percentile of the total assets distribution at age 4, as explained in the main text. 95% confidence intervals are represented by dashed lines. Total assets percentiles are computed from the overall population of incorporated firms in the same cohort and at the same age. The sample consists of all workers who became unemployed between 2005 and 2016.

Figure 11 Probability of becoming an incorporated entrepreneur by total assets quintile

This figure plots the probability of becoming an incorporated entrepreneur through the Single Amount programme as a function of the potential amount received (in thousands of euros), as estimated in column (5) of table 4. Each coefficient represents the probability of creating a firm in a given percentile of the total assets distribution at age 4, as explained in the main text. 95% confidence intervals are represented by dashed lines. Total assets percentiles are computed from the overall population of incorporated firms in the same cohort and at the same age. The sample consists of all workers who became unemployed between 2005 and 2016.

Notes

< **1** For example, the Flash Eurobarometer public opinion survey (DG COMM, 2015) reports the lack of capital and financial resources as the main barrier to entrepreneurship.

< **2** Fracassi, Garmaise, Kogan and Natividad (2012), show that the effect of obtaining a loan on the survival rate of existing small businesses increases with education and decreases with managerial experience. Hombert, Schoar, Thesmar and Sraer (2019) study how the provision of insurance to entrepreneurs affects the average quality of entrants.

< **3** Hurst and Lusardi (2004) estimate that entrepreneurship rises by 0.005 percentage points per $1k of wealth on average, which accounts for only 4% of our baseline result (0.005/0.12). Moreover, any effect on preferences would be attenuated by the fact that entrepreneurs are personally liable for returning the full amount received if they return to paid employment within three years, for example in case their business fails.

< **4** Incorporated businesses have no value added tax (VAT) exemptions, cannot be taxed as personal income and must submit annual financial statements certified by a chartered accountant.

< **5** Our calculations use data from the Sistema de Contas Integradas das Empresas (SCIE) for 2016.

< **6** The Prince's Trust support, in the U.K., is only available to individuals between 18 and 30 years of age and provides one of the largest subsidies (up to €47,791) to some individuals. In Germany, the start-up subsidy is restricted to a maximum of €25,000 per year. The Single Amount programme in Portugal is available to all individuals and the amount is restricted by the maximum amount of unemployment benefit each individual is entitled to. See Wilson and Adams (1994), Román, Congregado and Millán (2013), and Caliendo (2016) for a comparison with similar programmes in other countries.

< **7** There was a short period between January and June 2010 (before the reform), during which the minimum number of contributions was 12 months.

< **8** We use the firm's tax ID number to match the databases, and the match is restricted to firms founded until 2013. Given these timing restrictions, our analysis of ex-post outcomes is limited to a sub-sample of our data, as explained below.

< **9** Participants are also allowed to join an existing firm by acquiring an ownership stake; we do not define those cases as entrepreneurs.

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