Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

# Educational pathways and the composition of entrepreneurial entry: evidence from the COVID-19 shock in Spain

**Pilar Palacios-Guillén**
Independent Authority for Fiscal Responsibility (AIREF)
**Juan Carlos Salazar-Elena**
juancarlos.salazar@uam.es
Universidad Autónoma de Madrid

**Research Article**

**Keywords:** Necessity entrepreneurship, solo self-employment, vocational education and training, human capital specificity, COVID-19, difference-in-differences

**Posted Date:** November 25th, 2026

**DOI:** https://doi.org/10.21203/rs.3.rs-11728267/v1

**License:** This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

**Additional Declarations:** No competing interests reported.

# Educational pathways and the composition of entrepreneurial entry: evidence from the COVID-19 shock in Spain

The distinction between necessity- and opportunity-driven entrepreneurship has organised research in this field for decades, yet it is typically established by asking entrepreneurs why they started. We propose an observable alternative. Where the firm is understood as the organisational form that an act of knowledge integration takes, the presence of employees is not a measure of scale but a signature of the kind of act that entry was. The criterion is asymmetric: employment establishes integration, while its absence does not establish integration's absence. We apply it to the COVID-19 shock in Spain, using Labour Force Survey microdata for 2017–2023 and comparing employed vocational and higher education graduates, on the argument that occupation-specific human capital makes the direct monetisation of a competence more readily available than the assembly of an organisation around it. Following the shock, the share of employment in solo self-employment rose among vocational graduates relative to the comparison group, while no corresponding movement occurred on the employer margin, where the estimates rule out an increase of comparable magnitude. Quarterly estimates show no differential before the shock and full reversion within eighteen months of its onset. What increased was self-employment, on a margin that created no organisations and left no durable positions behind.

**Plain English Summary**

When jobs disappear, some workers start working for themselves. Is this entrepreneurship or a stopgap? We propose a simple observable test: whether the new business hires anyone. Using Spanish Labour Force Survey data for 2017–2023, we compare workers with vocational qualifications and higher education graduates before and after the COVID-19 shock. After the pandemic began, the share of vocational graduates working on their own, without employees, rose by about one percentage point relative to higher education graduates. There was no comparable rise in the share running businesses with employees, and the increase disappeared within eighteen months. The surge in self-employment was therefore a temporary adjustment rather than a wave of new firms. Policies that promote self-employment in downturns should not be assessed as job-creation policies, and vocational programmes may need to build the broader competences that running an organisation requires.

**Keywords:** Necessity entrepreneurship; solo self-employment; vocational education and training; human capital specificity; COVID-19; difference-in-differences

**JEL Classification:** L26; J24; I26; J21; E32

## 1. Introduction

Few distinctions have organised the study of entrepreneurship as durably as that between entry driven by necessity and entry driven by opportunity. It underpins cross-country comparisons, informs the design and evaluation of policy instruments, and frames the interpretation of business creation during downturns. It is also, in most applications, established by asking entrepreneurs why they started, so that a category intended to capture what an entrepreneur was doing is validated against a retrospective account of what she believed she was doing. A substantial literature has responded to this difficulty, either by questioning the dichotomy (Block & Wagner, 2010; Williams & Williams, 2014; Fairlie & Fossen, 2020; Dencker et al., 2021) or by seeking observable correlates of entrepreneurial content (Schoar, 2010; Hurst & Pugsley, 2011; Levine & Rubinstein, 2017). Between them, these literatures establish that motive is an unreliable basis for classification and that observable margins can discriminate. What neither supplies is an account of why any particular margin should discriminate: margins are validated after the fact, against outcomes correlated with them, and adopted as proxies.

This paper proposes a criterion and derives it rather than validating it. The criterion is the employer margin: whether the entrant employs anyone. Its justification rests on the knowledge-based view of the firm (Penrose, 1959; Kogut & Zander, 1992; Grant, 1996) and on the insight that productive knowledge exists as dispersed and partly tacit fragments held by different people (Hayek, 1945; Polanyi, 1966). If value arises from combining fragments that are cognitively distant from one another, the firm is not only a device for economising on transaction costs (Coase, 1937; Williamson, 1985) but the organisational form that a successful act of combination takes: an entrepreneur employs because the combination she is assembling requires knowledge she does not hold. Hiring is then not merely correlated with knowledge integration; it is what integration looks like from the outside. The criterion is asymmetric: the presence of employees is a sufficient sign that integration has occurred, but their absence is not a sufficient sign that it has not, since some combinations are assembled through contracting and the decision not to hire may reflect the price of employment.

We apply the criterion to the COVID-19 shock in Spain, which was exogenous to individual circumstances and moved aggregate quantities within a single quarter, and we exploit variation in the kind of human capital that entrants bring. Vocational education and training (VET) is organised around an occupation; higher education is organised around a discipline. Building on the human capital tradition (Becker, 1964) and on Lazear's (2005) finding that founders hold balanced rather than deep skill portfolios, we argue that occupational specificity equips its holder to monetise a competence directly, but not to assemble an organisation around it. Vocational graduates facing a contraction in wage employment should therefore enter self-employment without crossing the employer margin, and should not remain there once the alternative recovers. We test these predictions on Spanish Labour Force Survey microdata for 2017–2023, combining matching as preprocessing with a difference-in-differences design and a quarterly event study.

The estimates show three things. The share of employment in solo self-employment rose among vocational graduates relative to higher education graduates by between 0.8 and 1.2 percentage points, against a pre-shock rate of 9.1 per cent in the comparison group, and the estimate is positive and significant in all six specifications reported. On the employer margin no corresponding movement occurred: the upper limit of the confidence interval excludes any relative increase exceeding one fiftieth of the baseline rate, well inside the equivalence margin of one tenth specified in advance. And the differential did not persist: it is absent in the seven

quarters preceding the shock, peaks in the first quarter of 2021 and returns to zero by the end of that year. Together, these findings describe a movement into own-account work that created no organisations and left no durable trace. The magnitude is modest, and it is not what carries the argument: the estimates function as a diagnostic of the margin on which the response occurred and of whether it persisted.

The paper makes three contributions. The first is the criterion itself, together with the theory that grounds it and the asymmetry that delimits it; because it requires only the employment status recorded by any harmonised labour force survey, it is available wherever the necessity–opportunity question is asked. The second concerns vocational education, which accounts for a substantial share of the European workforce yet appears in the entrepreneurship literature mainly as an attenuated form of higher education: we argue that its specificity shapes not the propensity to enter self-employment but the form that entry takes. The third is empirical: what increased in Spain after the pandemic was not entrepreneurship but self-employment, concentrated among those whose competences are most closely bound to an occupation, and fully reversed within eighteen months.

Section 2 develops the framework and the hypotheses, Section 3 describes the data and the design, Section 4 reports the results and Section 5 discusses them.

## 2. Literature Review

### 2.1 Necessity and opportunity entrepreneurship: a measurement problem

The relationship between labour market conditions and business creation is among the oldest questions in the field. Oxenfeldt (1943) argued that adverse conditions push individuals towards self-employment when wage employment becomes scarce, a relationship confirmed in many settings, including Spain (Verheul et al., 2006). The literature organises it around two mechanisms: a refuge or push effect, whereby unemployment drives necessity entry, typically into small-scale activity in traditional sectors and a persistent feature of Southern European economies (Baptista & Thurik, 2007; Faria et al., 2009); and a Schumpeterian or pull effect, whereby opportunity-driven entry drives innovation and growth (Marič et al., 2010; Conti & Roche, 2020). Audretsch et al. (2008) argue that the two coexist.

The distinction has proved durable, but its implementation is fragile. Whether an entry episode counts as necessity- or opportunity-driven is usually established either by asking the entrepreneur, as in the Global Entrepreneurship Monitor tradition, or by inferring it from macroeconomic conditions. Self-reported motive is elicited after the fact and is subject to rationalisation; inference from aggregate conditions is close to circular, since entry during a downturn is coded as necessity-driven by construction.

A critical literature questions the dichotomy itself. Williams and Williams (2014) document the porosity of the boundary, Block and Wagner (2010) find overlapping performance distributions, Dencker et al. (2021) reconceptualise necessity as a condition constraining resources at founding, and Fairlie and Fossen (2020) treat necessity and opportunity as coexisting components, measured through the entrant's prior labour market state. A parallel literature seeks observable correlates of entrepreneurial content: Schoar (2010) distinguishes subsistence from transformational entrepreneurship, Hurst and Pugsley (2011) show that most small businesses intend neither to grow nor to innovate, and Levine and Rubinstein (2017) separate incorporated from unincorporated self-employment, showing that the incorporated perform non-routine cognitive work and earn substantially more, while the unincorporated typically run one-person businesses.

Taken together, these literatures reject motive as a basis of classification and show that observable margins discriminate, but they treat those margins as proxies validated against correlated outcomes, and Fairlie and Fossen's measure describes the situation preceding entry rather than the act itself. What is missing is a criterion located in the entry episode and grounded in a theory of what the entrepreneur is doing when she enters. Section 2.3 derives one.

### 2.2 Entrepreneurship and aggregate shocks

The COVID-19 pandemic has generated a substantial literature on entrepreneurial responses to aggregate shocks (Doern, 2021; Dvouletý et al., 2021; Sharma et al., 2022), building on a long tradition that sees entrepreneurship as a mechanism of economic adaptation (Constant & Zimmermann, 2006; Nicolás Martínez & Rubio Bañón, 2020). The evidence remains inconclusive on the central question. Some studies emphasise the resilience of knowledge-intensive activity and the acceleration of digital transformation, consistent with opportunity-driven entry (Belitski et al., 2022; Dvouletý, 2024); others report increases in self-employment that appear to function as labour market adjustment (Brown & Rocha, 2020; Liñán & Jaén, 2022). Part of the reason is methodological: most evidence measures the aggregate level of entry and interprets it in light of context, so studies observing the same increase can reach

opposite conclusions. Little work distinguishes between forms of entry within the same shock, which is where the discriminating information lies.

The pandemic's effects were also sectorally uneven. All activities were disrupted (Sunge et al., 2024), but the most severe impacts concentrated in retail, hospitality, tourism and the cultural and creative industries, while essential and digital activities proved more resilient (Bartik et al., 2020; Donthu & Gustafsson, 2020; De Vet et al., 2021). This supports a competing account of any educational differential in entrepreneurial response: that it reflects the sectoral composition of employment rather than a property of the individuals concerned. Sections 4.4 and 5.2 contrast the two accounts.

Individual characteristics also shape entry. Human capital theory posits a positive relationship between education, adaptability and entrepreneurial performance (Bates, 1990; Robinson & Sexton, 1994; Portuguez Castro & Gómez Zermeño, 2021; Remeikienė et al., 2023), but treats education as a quantity, measured in years or levels. Education is also a pathway, and pathways differ in the kind of competence they build. Vocational education and training is the clearest instance: organised around an occupation, it accounts for a substantial share of upper secondary enrolment and of the European workforce, yet appears in the entrepreneurship literature mainly as an attenuated form of higher education. Dawson et al. (2009) and Calderon et al. (2015) associate vocational qualifications with self-employment under adverse conditions, Micozzi (2013) links higher education to entry in technology-intensive activity, and related evidence for Spain shows that vocational graduates are more likely to be self-employed across the working life (Authors, 2026). These contributions establish associations without identifying what produces them. Whether distinct pathways shape distinct forms of entrepreneurial activity, and why, remains largely unexamined.

### 2.3 Human capital specificity and the capacity to integrate knowledge

Rather than asking why individuals enter, we ask what form their entry takes, and we argue that the form depends on a property of human capital that can be measured before the fact: its degree of occupational specificity.

*Specificity and the educational pathway*

Since Becker (1964), human capital has been distinguished by its transferability. Between general and firm-specific human capital lies capital specific to an occupation or an industry, which transfers across employers but not across lines of work (Neal, 1995; Kambourov & Manovskii, 2009). It is this dimension that distinguishes educational pathways. Vocational education and training is organised around an occupation: its curriculum, its certification and its workplace component are defined by the tasks of a trade. Higher education is organised around a discipline, and its output is a portfolio of analytical and organisational competences whose application is not fixed ex ante. The distinction underpins the familiar trade-off between early labour market integration and later adaptability in wage employment (Hanushek et al., 2017). We ask instead how it shapes the form of entrepreneurial entry when wage employment becomes less available.

Block and Wagner (2010) provide suggestive evidence: in German panel data, general education raises the earnings of opportunity entrepreneurs but not those of necessity entrepreneurs, whereas vocationally oriented education is positively related to the earnings of necessity entrepreneurs only. Their classification rests on self-reported motive, which is what this paper seeks to avoid, but the association is what an account based on the composition of competences would predict.

*From skills to organisations*

The first link is Lazear's (2004, 2005) jack-of-all-trades theory: founders are not those with the deepest competence in a single domain but those with the most balanced portfolios, because running an organisation requires performing or evaluating functions that no single specialism covers. Applied to educational pathways, this predicts an asymmetry of portfolio composition rather than of capability. A worker with occupation-specific human capital can convert it into income on own account, because the competence is itself the marketable output; converting it into an organisation requires coordinating competences the training was not organised to develop. The claim concerns relative propensities in the aggregate, not what any individual can do, and many vocational graduates do build organisations.

This also specifies what Lazear's account leaves open. Breadth matters because assembling a productive combination requires judging the value of knowledge one does not hold. Occupation-specific human capital is eminently integrable, since it is precisely the knowledge an organisation needs to bring in, but it does not by itself supply the capacity to be the integrator.

*Why the organisation is the discriminating margin*

The second link explains why the asymmetry is not merely one of scale. In the knowledge-based tradition (Hayek, 1945; Penrose, 1959; Polanyi, 1966; Kogut & Zander, 1992; Grant, 1996), productive knowledge exists as dispersed, partly tacit fragments of limited value in isolation, and value arises from combining fragments that are cognitively distant from one another. On this view the firm is not only a device for economising on transaction costs (Coase, 1937; Williamson, 1985) but the organisational form that a successful act of integration takes. Transaction costs explain where the boundary of the firm is drawn; knowledge integration explains why there is a firm whose boundary to draw. Employment relations are, in the first instance, integration relations.

This is a theoretical proposition rather than an established empirical regularity, but it generates predictions that can fail: if entry following a shock crossed the employer margin, or if the positions created persisted once the outside option recovered, the account would be in difficulty. The empirical exercise is therefore, in part, an indirect test of the proposition on which it rests.

Two consequences follow. First, the employer margin is an observable boundary between two economically distinct acts. Entry that integrates distant knowledge produces an organisation; entry that monetises a single competence does not, because there is nothing to integrate. The presence of employees is therefore not a measure of size but a signature of the kind of act that entry was, and it requires no elicitation of motive. Second, the two acts differ in what they leave behind. A successful integration confers a position that others cannot immediately replicate and that generates rents until imitation erodes it (Lippman & Rumelt, 1982; Rumelt, 1984). Entry that integrates nothing confers no such position: it substitutes for wage employment, remunerated at the margin and protected by nothing.

The criterion is asymmetric. Hiring is a sufficient sign that integration has occurred, since the employment relation is the form the integration takes. Its absence is not a sufficient sign that integration is absent: some combinations are assembled through contracting and, where employment is costly, the decision not to hire may reflect its price. The predictions below are framed accordingly.

*An anticipated objection*

It might be objected that a tradesperson who sets up on own account may be exercising genuine alertness in the sense of Kirzner (1973), identifying an unserved local demand and acting on it. Nothing in the argument denies this. The claim concerns observable signatures rather than motives: alertness that integrates the knowledge required to serve an opportunity should leave a position that persists after the conditions of its creation have passed and, where the combination proves valuable, subsequent movement across the employer margin. An episode exhibiting neither trace is difficult to reconcile with opportunity-driven entry. The identifying power of the design lies in the conjunction of the predictions, not in any one of them.

### 2.4 The Spanish setting

Spain is informative because the forces at work pull in opposite directions. The post-pandemic period saw an explicit effort to promote digitalisation, innovative entrepreneurship and the modernisation of vocational training (Government of Spain, 2022a, 2022b), consistent with opportunity-driven dynamics. Yet the economy retained structurally high unemployment, a segmented labour market and a heavy dependence on activities requiring intensive social interaction, which were severely disrupted (Pinilla et al., 2021; Salom-Carrasco et al., 2025), features more consistent with defensive self-employment.

Three features of the policy response bear on the interpretation of any movement in self-employment. The furlough scheme (expedientes de regulación temporal de empleo) suspended employment relationships without terminating them; an extraordinary cessation-of-activity benefit and a reduced flat-rate contribution for new registrations changed the incentives to register as self-employed; and platform-mediated delivery work expanded during the lockdowns before its reclassification under Royal Decree-Law 9/2021 (Government of Spain, 2021). Each could raise registered solo self-employment without entrepreneurial entry in any meaningful sense, and Section 5.2 returns to them.

### 2.5 Hypotheses

Consider an aggregate shock that abruptly reduces the availability of wage employment. Workers on both pathways face a worse outside option, but the framework predicts that the form of their response will differ with the specificity of their human capital.

> **H1a.** Following the shock, workers holding occupation-specific credentials exhibit a relative increase in entry into solo self-employment.
>
> **H1b.** The same workers exhibit no corresponding increase in entry into employer entrepreneurship.

Neither proposition is decisive alone: a rise in solo self-employment admits several interpretations, and an absence of employer entry is uninformative if nothing else moved. It is their conjunction that identifies the act as monetisation of existing competence rather than integration of dispersed knowledge. H1b is therefore tested as a statement of equivalence rather than as a failure to reject a null hypothesis (Section 3.7).

A third prediction concerns persistence rather than magnitude.

> **H2.** The differential emerges with the shock and attenuates as labour market conditions recover, rather than persisting as a durable shift.

Entry that creates no protected position generates no rents and has no mechanism sustaining it once the outside option improves; its duration is governed by the recovery of wage employment. Entry that integrated distant knowledge would persist and, where successful, would itself cross the employer margin.

Two clarifications complete the set. Because occupational specificity is carried by the worker rather than by the industry, the framework does not predict that the differential will be confined to the sectors most disrupted, whereas the sectoral account does; Section 4.4 tests the contrast. Heterogeneity by sex is examined as a robustness check rather than as a hypothesis, since the framework offers no mechanism linking sex to specificity.

## 3. Methodology

### 3.1 Data and sample

We use microdata from the Spanish Labour Force Survey (Encuesta de Población Activa, EPA), conducted quarterly by the National Statistics Institute and harmonised with the European Labour Force Survey, for all quarters between 2017Q1 and 2023Q4 (4,110,161 individual records; National Institute of Statistics, 2024). We retain employed individuals aged 16 to 65 whose highest completed qualification is either vocational education and training or higher education, which yields 892,807 observations.

The main analysis uses a fourteen-quarter window from 2018Q3 to 2021Q4, comprising the seven quarters before and the seven after the onset of the pandemic (460,761 observations). The window is long enough to reveal any pre-shock differential trend and short enough to limit contamination by unrelated developments; Online Resource 1 reports estimates for the full 2017–2023 period.

Educational attainment is measured by the variable NFORMA, based on the 2014 Spanish Classification of Education. The treated group (SP) holds upper secondary vocational qualifications, including post-secondary non-tertiary programmes; the comparison group (SU) holds tertiary qualifications. Age is recorded in five-year bands and enters the estimation as a set of indicator variables.

We do not use the EPA grossing-up factors. The object of estimation is a conditional relationship rather than a population aggregate, for which weighting is not generally required for consistency and increases the variance of the estimator (Solon et al., 2015); the sample is stratified primarily by region, which enters the specification as fixed effects.

### 3.2 Dependent variables

We construct two dependent variables from the EPA's professional status variable. Solo self-employment equals one for own-account workers without employees, and employer entrepreneurship equals one for employers with employees. Both are estimated as linear probability models.

Both measure the probability of being in a status, conditional on employment, rather than of entering it, so a movement may reflect increased entry, reduced exit or a change in the composition of employment; Online Resource 1 (Appendix A6) reports complementary estimates based on reported tenure, which approximate entry directly. The two categories are not exhaustive: together they account for approximately 14 per cent of employment, the remainder being dependent employment and residual categories. Coefficients therefore measure movements into each status relative to all other statuses combined. We do not analyse

wage employment as a third outcome: its coefficient is not robust to covariate adjustment or to matching, and because the categories are not exhaustive, a decline in one status does not imply a corresponding rise in another.

### 3.3 A measurement limitation

Under the 2014 classification, higher vocational programmes (formación profesional de grado superior) are classified as tertiary and therefore fall in the comparison group. The contrast we estimate is thus between intermediate vocational and post-secondary non-tertiary qualifications, on one side, and a composite of university and higher vocational qualifications, on the other. The public-use microdata do not allow the two components to be separated. Because higher vocational graduates share the property the framework identifies as relevant, this attenuates rather than inflates the estimated differential, and the estimates should be read as a lower bound.

### 3.4 Identification design

We estimate a difference-in-differences model in which the source of variation is differential exposure to a common shock. Educational attainment is predetermined with respect to the pandemic, so the shock affects everyone while educational pathways define groups whose exposure to it differs; the interaction coefficient identifies the differential change in the outcome between them. The identifying assumption is that, absent the pandemic, the difference between the two groups would have followed a common path. It is not directly testable, but its implication for the pre-shock period is examined quarter by quarter in Section 4.3. The baseline specification is

$$Y_{it} = \beta_0 + \beta_1 \cdot VET_i + \beta_2 \cdot Post_t + \beta_3 (VET_i \cdot Post_t) + X'_{it}\gamma + \varepsilon_{it}$$

where Y is the outcome, VET indicates a vocational qualification, Post indicates quarters from 2020Q2 onwards, and X is a vector of covariates described in Section 3.6. The parameter of interest is $\beta_3$.

The shock is dated at 2020Q2, the first quarter fully affected by the state of alarm declared in March 2020, and 2020Q1 is the reference period in the event-study specification.

### 3.5 Matching

Because the two groups differ in observable characteristics, we precede estimation by matching, used as nonparametric preprocessing rather than as an estimator (Ho et al., 2007). The propensity score is estimated by logit on age band, sex, nationality, region, occupation and industry, and matching is performed on its linear index by one-to-one nearest neighbour without replacement, with a caliper of 0.2 standard deviations and restricted to the region of common support (Online Resource 1, Appendix A1).

Because nearest-neighbour matching without replacement is order-dependent and the raw data are ordered chronologically, we randomise the processing order, with a fixed seed, to avoid a matched comparison group whose temporal composition differs from that of the treated group. The caliper leaves 5.6 per cent of treated units unmatched and improves balance. We also match separately within the pre-shock and post-shock periods, which removes any temporal imbalance by construction; this is the preferred specification. Alternative matching configurations are reported in Online Resource 1 (Appendix A2).

### 3.6 Specification and inference

The second stage estimates the difference-in-differences model on the matched sample including the covariates used in the propensity score. Matching never balances covariates perfectly, and the regression absorbs the residual imbalance, yielding an estimator that is consistent if either the score or the outcome model is correctly specified. Specifications estimated without matching include quarter and region fixed effects. Standard errors are clustered by region and quarter, since the identifying variation is at the group-by-period level (Bertrand et al., 2004), which yields 266 clusters.

Because several choices are to some degree arbitrary, we report a ladder of six specifications, including an inverse probability weighted estimator that does not rely on matching, and treat the stability of the coefficient across them as part of the evidence.

### 3.7 Testing for the absence of an effect on the employer margin

Hypothesis 1b predicts the absence of a differential on the employer margin, which a conventional test cannot establish, since failure to reject a null is compatible with insufficient precision. We therefore adopt an equivalence approach and specify in advance a margin of practical equivalence: 10 per cent of the pre-shock rate of employer entrepreneurship in the comparison group (0.0480), that is, 0.0048.

The test is one-sided, since H1b predicts no relative increase and makes no prediction about a decrease. The choice of 10 per cent is a judgement: a differential below one tenth of the baseline rate would correspond, at the scale of the Spanish employed population in these two groups, to a change too small to alter any of the interpretations at issue and well within the measurement error of a household survey.

H1b is supported if the upper limit of the 95 per cent confidence interval falls below 0.0048. This is more demanding than failure to reject the null, since an imprecise estimate centred on zero would fail it. Both margins are estimated on identical samples with identical specifications, so that their contrast cannot be attributed to differences in statistical power.

## 4. Results

### 4.1 Descriptive statistics and matching quality

Of the 460,761 observations in the base window, 89,276 correspond to VET graduates and 371,485 to higher education graduates. Table 1 reports means by educational pathway and period. The rate of solo self-employment among VET graduates rises from 0.0955 before the shock to 0.1065 after it, while among higher education graduates it is essentially unchanged (0.0909 and 0.0913). The rate of employer entrepreneurship is stable, between 0.0470 and 0.0480 in all four cells. Before the shock, 62.6 per cent of higher education graduates work in knowledge-intensive industries, against 36.9 per cent of VET graduates.

**Table 1. Descriptive statistics by educational pathway and period**

| | **Higher education** | | **VET** | |
|---|---|---|---|---|
| | *Pre-shock* | *Post-shock* | *Pre-shock* | *Post-shock* |
| **Employment status** | | | | |
| Solo self-employed (no employees) | 0.0909 | 0.0913 | 0.0955 | 0.1065 |
| Employer entrepreneur | 0.0480 | 0.0470 | 0.0470 | 0.0475 |
| Permanent wage employee | 0.6680 | 0.6742 | 0.6038 | 0.6186 |
| Other (temporary, cooperatives, family workers) | 0.1931 | 0.1874 | 0.2537 | 0.2273 |
| **Covariates** | | | | |
| Female | 0.5313 | 0.5382 | 0.4829 | 0.4722 |
| Foreign national | 0.0424 | 0.0376 | 0.0460 | 0.0426 |
| Knowledge-intensive sector (KIS) | 0.6259 | 0.6385 | 0.3688 | 0.3698 |
| Age (midpoint of five-year band) | 43.5 | 44.4 | 42.3 | 43.2 |
| **Observations** | 194,726 | 176,759 | 47,139 | 42,137 |

*Notes.* Spanish Labour Force Survey (EPA) microdata. Employed individuals aged 16–65 holding either a VET or a higher education qualification. Age is the midpoint of the five-year band recorded in `EDAD1`; the underlying variable is a band code, not a continuous measure. The four occupational-status categories are mutually exclusive and exhaustive. Permanent wage employment and the residual category are reported for completeness; neither is analysed as an outcome (see Section 3.2)

Matching retains 94.4 per cent of treated units and yields a matched sample of 168,488 observations. Table 2 documents its quality. Before matching, occupation and industry show substantial imbalance, with standardised biases of 36.1 and 16.7 per cent; after matching, all covariates fall below 5 per cent. The pseudo-$R^2$ of the treatment equation falls from 0.281 to 0.002, and Rubin's (2001) B and R move from 157.1 and 0.30 to 10.8 and 1.03, within the conventional thresholds. Treated units and matched controls are distributed identically across periods, with pre-shock shares of 0.529 and 0.528.

**Table 2. Matching quality**

*Panel A. Standardised bias by covariate (%)*

| Covariate | Before matching | After matching | Maximum after |
|---|---|---|---|
| Occupation | 36.13 | 0.74 | 2.65 |
| Industry | 16.65 | 1.99 | 6.49 |
| Sex | 11.37 | 3.81 | 3.81 |
| Age band | 5.80 | 0.61 | 2.29 |
| Region | 3.33 | 0.62 | 2.29 |

| Covariate | Before matching | After matching | Maximum after |
|---|---|---|---|
| Nationality | 2.19 | 1.02 | 1.25 |

*Panel B. Overall balance statistics*

| | Pseudo-$R^2$ | Mean bias | Median bias | Rubin's B | Rubin's R |
|---|---|---|---|---|---|
| Unmatched | 0.281 | 12.9 | 5.4 | 157.1 | 0.30 |
| Matched | 0.002 | 1.0 | 0.6 | 10.8 | 1.03 |

*Panel C. Common support and period composition*

| | Treated | Matched controls |
|---|---|---|
| Propensity score range | [0.0022, 0.9579] | [0.0022, 0.9720] |
| Pre-shock share | 0.529 | 0.528 |
| Post-shock share | 0.471 | 0.472 |
| Observations | 84,244 | 84,244 |

*Notes.* Standardised bias computed category by category and averaged in absolute value within each covariate. Conventional thresholds: bias below 5%, Rubin's B below 25, Rubin's R within [0.5, 2]. Share of treated units matched under the caliper: 94.4%.

### 4.2 The margin of entry

Table 3 reports the coefficient on the interaction between VET status and the post-shock indicator for both margins under six specifications: the pooled matched sample without and with covariates (1–2), the sample matched within period without and with covariates (3–4), the full sample with covariates and fixed effects (5), and inverse probability weighting targeting the effect on the treated (6).

**Table 3. Main results: the two margins of entrepreneurial entry**

*Coefficient on the VET × post interaction. Ninety-five per cent confidence intervals in brackets.*

*Panel A. Solo self-employment*

| Specification | Coefficient | SE | p | 95% CI | N |
|---|---|---|---|---|---|
| (1) Pooled matching, unadjusted | +0.0118 | 0.0027 | 0.000 | [+0.0065; +0.0170] | 168,488 |
| (2) Pooled matching, covariate-adjusted | +0.0088 | 0.0025 | 0.001 | [+0.0038; +0.0138] | 168,488 |
| (3) Within-period matching, unadjusted | +0.0105 | 0.0027 | 0.000 | [+0.0052; +0.0158] | 168,474 |
| **(4) Within-period matching, adjusted** | **+0.0081** | **0.0026** | **0.002** | **[+0.0030; +0.0132]** | **168,474** |
| (5) Unmatched, controls and fixed effects | +0.0085 | 0.0023 | 0.000 | [+0.0040; +0.0129] | 460,761 |
| (6) Inverse probability weighting (ATT) | +0.0085 | 0.0024 | 0.000 | [+0.0038; +0.0132] | 460,761 |

*Panel B. Employer entrepreneurship*

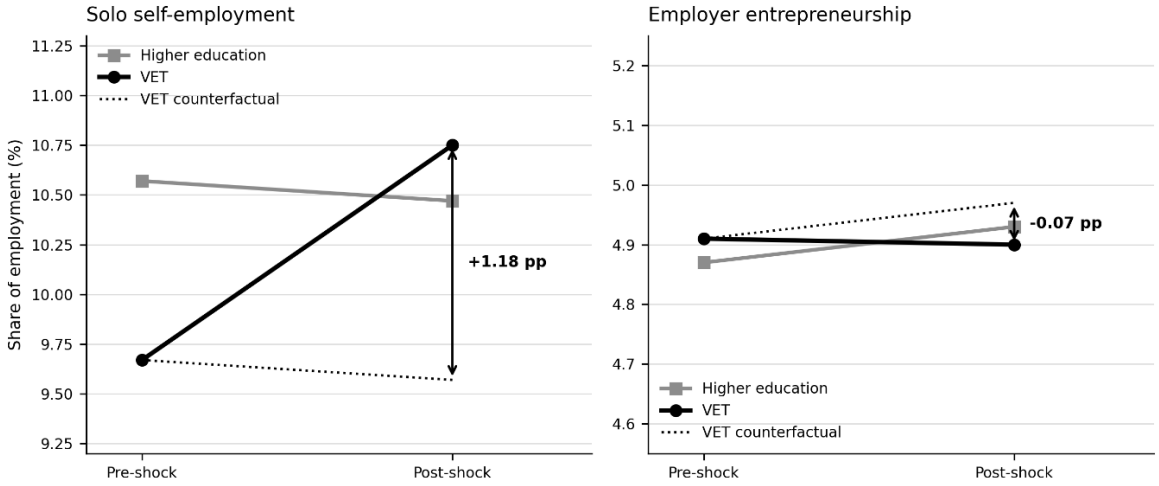
| Specification | Coefficient | SE | p | 95% CI | N |
|---|---|---|---|---|---|
| (1) Pooled matching, unadjusted | −0.0007 | 0.0020 | 0.714 | [−0.0047; +0.0032] | 168,488 |
| (2) Pooled matching, covariate-adjusted | −0.0023 | 0.0018 | 0.210 | [−0.0058; +0.0013] | 168,488 |
| (3) Within-period matching, unadjusted | −0.0016 | 0.0019 | 0.403 | [−0.0055; +0.0022] | 168,474 |
| (4) Within-period matching, adjusted | −0.0025 | 0.0018 | 0.166 | [−0.0059; +0.0010] | 168,474 |
| (5) Unmatched, controls and fixed effects | +0.0015 | 0.0013 | 0.264 | [−0.0011; +0.0041] | 460,761 |

*Notes.* Covariate-adjusted specifications include the same covariates used to estimate the propensity score. Specification (5) additionally includes quarter fixed effects. Specification (4) is the preferred estimate.

The differential in solo self-employment is positive and significant in all six specifications, ranging from +0.0081 to +0.0118, and lies between +0.0081 and +0.0095 in the four covariate-adjusted specifications. In the preferred specification (4) it is +0.0081, with a standard error of 0.0026 and a 95 per cent confidence interval of [+0.0030, +0.0132], an increase of approximately 8.9 per cent relative to the pre-shock rate of 0.0909 among higher education graduates.

Figure 1 illustrates the comparison underlying these estimates, plotting both groups before and after the shock together with the counterfactual trajectory of the vocational group. Because it is built from the matched sample without covariate adjustment, it displays specification (1), whose coefficient on the solo margin is 1.18 percentage points; the adjusted estimates are those reported in Table 3.

**Fig. 1** The difference-in-differences comparison on the two margins of entrepreneurial entry




*Notes.* Group means from the matched sample. The dotted line is the counterfactual obtained by applying the change observed in the comparison group to the pre-shock level of the vocational group; the vertical distance between it and the observed post-shock value is the difference-in-differences coefficient of specification (1) in Table 3. Estimates adjusted for covariates are reported in Table 3. Note the difference in vertical scale between panels.

Panel B reports estimates for employer entrepreneurship. The differential is statistically indistinguishable from zero in every specification, and the point estimate is negative in four of the five. In the preferred specification the estimate is −0.0025 with a standard error of 0.0018 and a 95 per cent confidence interval of [−0.0059, +0.0010].

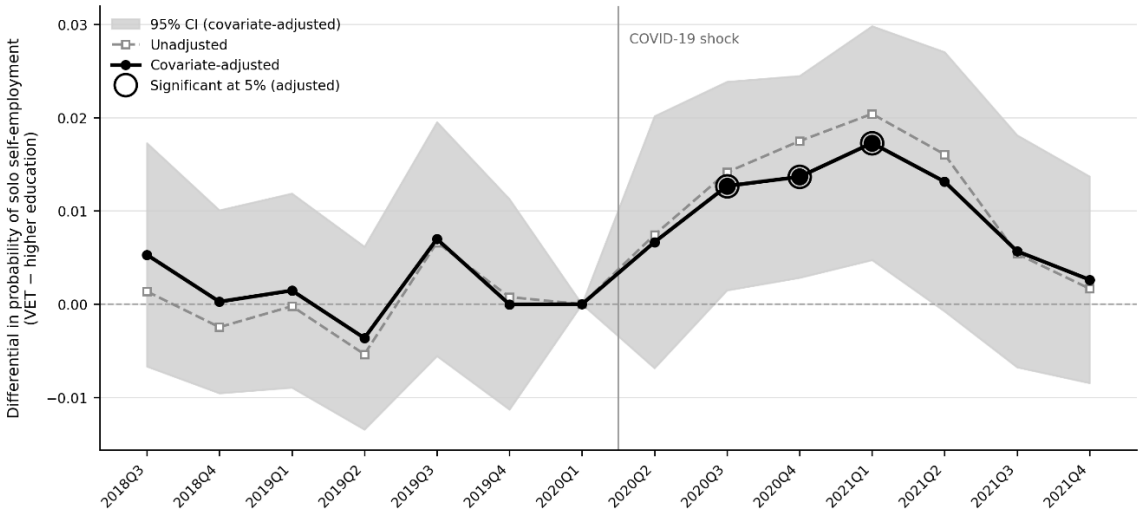
Under the criterion set out in Section 3.7, the upper limit of the confidence interval in the preferred specification, +0.0010, lies well below the equivalence margin of 0.0048 and corresponds to approximately two per cent of the baseline rate; across specifications the upper limits range from +0.0010 to +0.0041. Hypothesis 1b is therefore supported: the estimates exclude any relative increase in the employer share exceeding one fiftieth of its baseline level, against an increase of approximately one eleventh on the solo margin, estimated on the same sample, with the same specification and with comparable precision.

### 4.3 Identification and temporal profile

Figure 2 reports the interaction between VET status and each calendar quarter, relative to 2020Q1, with and without covariate adjustment.

**Fig. 2** Event study

*Quarterly coefficients on the VET × quarter interaction, matched sample, reference 2020Q1.*




None of the six pre-shock coefficients is individually distinguishable from zero. In the covariate-adjusted series they range from −0.0036 in 2019Q2 to +0.0070 in 2019Q3, and a joint test that all six are zero does not reject ($F(6, 266) = 0.66$, $p = 0.680$). The series shows no trend over the seven quarters preceding the shock.

The differential emerges thereafter. The estimate for 2020Q2 is +0.0067 and not significant; from 2020Q3 it is significant at the 5 per cent level in three consecutive quarters, at +0.0127, +0.0137 and +0.0173, the last of these, in 2021Q1, being the maximum. It remains similar in 2021Q2 (+0.0131) but is no longer significant, and then falls to +0.0057 in 2021Q3 and +0.0026 in 2021Q4, about one seventh of its maximum and indistinguishable from zero. The unadjusted series follows the same profile.

Estimated over the full 2017–2023 period, the average differential falls to +0.0056 (standard error 0.0019), as expected if the effect is concentrated between 2020Q3 and 2021Q2 and absent in later years (Online Resource 1, Appendix A4).

### 4.4 Sectoral heterogeneity

Table 4 examines whether the differential varies with the knowledge intensity of the industry in which the individual works. Sectors are classified as knowledge-intensive following the OECD taxonomy of R&D intensity.

**Table 4. Sectoral heterogeneity**

*Dependent variable: solo self-employment. Pooled matched sample. Ninety-five per cent confidence intervals in brackets.*

*Panel A. Triple difference: VET × post × KIS*

| Specification | Coefficient | SE | p | 95% CI | N |
|---|---|---|---|---|---|
| Unadjusted | −0.0082 | 0.0054 | 0.130 | [−0.0188; +0.0024] | 168,488 |
| Common covariate controls | −0.0033 | 0.0054 | 0.543 | [−0.0139; +0.0073] | 168,488 |

| Specification | Coefficient | SE | p | 95% CI | N |
|---|---|---|---|---|---|
| Controls interacted with sector | −0.0047 | 0.0052 | 0.367 | [−0.0148; +0.0055] | 168,488 |

*Panel B. Subsamples, estimated separately*

| Subsample | Coefficient | SE | p | 95% CI | N |
|---|---|---|---|---|---|
| Non-KIS, unadjusted | +0.0133 | 0.0041 | 0.001 | [+0.0053; +0.0214] | 107,156 |
| Non-KIS, covariate-adjusted | +0.0090 | 0.0039 | 0.021 | [+0.0014; +0.0165] | 107,156 |
| KIS, unadjusted | +0.0051 | 0.0031 | 0.102 | [−0.0010; +0.0113] | 61,332 |
| KIS, covariate-adjusted | +0.0035 | 0.0032 | 0.272 | [−0.0027; +0.0097] | 61,332 |

*Notes.* Knowledge-intensive sectors (KIS) defined as categories 6–8 of the one-digit industry classification, following the OECD taxonomy of R&D intensity (Galindo-Rueda & Verger, 2016). Standard errors clustered by region and quarter. Panel B is reported as a descriptive complement: the test of whether the differential varies across sectors is the triple difference in Panel A, not the comparison of the two subsample estimates.

The triple-difference estimates of the interaction between VET status, the post-shock indicator and knowledge intensity are −0.0082 without covariates, −0.0033 with common covariates and −0.0047 when covariate effects differ between sectors, with standard errors of 0.0054, 0.0054 and 0.0052 and p-values of 0.130, 0.543 and 0.367. None rejects the null of no differential effect across sectors. Estimated separately, the differential is +0.0090 (0.0039) in non-knowledge-intensive industries and +0.0035 (0.0032) in knowledge-intensive ones, but this asymmetry should not be read as a sectoral difference: the confidence interval for the latter, [−0.0027, +0.0097], includes the point estimate for the former, and the two subsamples differ in size (107,156 and 61,332 observations). The differential is positive in both sectors and its magnitude cannot be distinguished between them.

### 4.5 Robustness

Online Resource 1 reports further checks. The estimate is insensitive to the caliper (+0.0097 adjusted without it, against +0.0096 with it). Matching with replacement inflates the estimate when few distinct controls are used, since one-to-one matching assigns the 89,276 treated units to only 9,376 distinct controls and yields +0.0243 with a fourfold larger standard error, but the estimates converge towards the baseline as the number of neighbours rises (+0.0111 with twenty). A propensity score restricted to predetermined characteristics (age band, sex, nationality and region) yields +0.0095 after adjustment (standard error 0.0031). Tenure-based measures of recent entry are directionally consistent, with comparable or larger relative magnitudes, though less precisely estimated. Finally, the differential does not differ by sex: the covariate-adjusted triple-difference estimate is +0.0015 (standard error 0.0060, p = 0.807), and the separate estimates are +0.0104 for women and +0.0086 for men.

## 5. Discussion and conclusions

### 5.1 Interpretation

Read separately, none of the three findings is decisive: a rising share of solo self-employment admits several accounts, a null on the employer margin establishes little, and a transitory differential could reflect any number of short-lived disturbances. Read together, they constrain the interpretation considerably. Entry that integrated dispersed knowledge would have produced organisations, which require employees, and would have conferred positions generating rents, which erode slowly rather than vanishing within eighteen months. What the estimates describe is a movement into own-account work that created no organisations and left no durable trace, a pattern difficult to reconcile with opportunity-driven entry and readily

reconciled with the monetisation of occupational competence while its alternative use was unavailable.

### 5.2 Alternative explanations

Four accounts compete with this interpretation.

*Dependent self-employment and platform work*. The movement could reflect reclassification rather than entrepreneurship: platform delivery workers were recorded as self-employed until Royal Decree-Law 9/2021, and the cessation-of-activity benefit and reduced flat-rate contribution altered the incentive to register. We cannot exclude this account, since the one-digit industry variable does not isolate last-mile delivery. But it predicts concentration in the affected industries, which the sectoral test does not show, and persistence rather than reversal, since neither the reclassification nor the incentives unwound during the observation window. Neither implication is borne out, which weakens but does not eliminate the account.

*Compositional selection*. Because the sample is restricted to the employed, a differential contraction of wage employment among vocational graduates would raise the solo share mechanically without any entry. The tenure-based estimates of recent entry are positive across thresholds and of comparable relative magnitude, which is consistent with genuine entry, but they are too imprecise to establish it (Section 5.5).

*Sectoral displacement*. If vocational graduates entered self-employment because the shock destroyed wage employment in the industries where they are concentrated, the differential should be confined to the most disrupted sectors; if, as argued in Section 2.3, the constraint travels with the worker, it should appear wherever they are employed. The differential is positive in both sector groups and the triple difference never rejects equality, which is consistent with the second account. Given the imprecision of the sectoral contrast, the evidence does not support the sectoral account, but it does not refute it.

*Genuine opportunity in solo form*. Some own-account work is opportunity-driven and solo by nature: consultants, developers and creative professionals earn rents without hiring, and outsourcing and platform intermediation allow distant knowledge to be combined without an employment relation. This is the strongest objection to the criterion, and it is why we treat it as asymmetric.

### 5.3 Theoretical implications

The contribution we claim is a criterion, and its scope must be stated precisely. Crossing the employer margin is a sufficient sign that knowledge integration has occurred, because hiring is constitutive of integration rather than merely correlated with it. Not crossing it is not a sufficient sign of its absence, for the reasons just given and because, in a labour market with substantial firing costs and non-wage labour charges, not hiring may reflect the price of employment. Our null on the employer margin therefore supports the statement that no integrative entry is detectable, rather than that entry was non-integrative; combined with the movement on the solo margin and with the reversal, that weaker statement is sufficient for the argument.

This positions the contribution relative to Levine and Rubinstein (2017), whose incorporated–unincorporated margin separates entrepreneurs performing non-routine cognitive work, with higher ability and earnings, from those running one-person businesses. Their margin is legal form rather than employment, and their design is one of cross-sectional selection. Our

contribution is to supply a reason why such a margin should discriminate, the identity between hiring and integration, and to exploit it dynamically, observing how the composition of employment responds to an exogenous shock and whether the response persists.

### 5.4 Policy implications

Two modest implications follow. Policies that promote self-employment as a countercyclical instrument target a margin that, on this evidence, does not generate employment: the increase we observe produced no movement into employer status, and it reversed. Whatever the merits of supporting individuals through a downturn, such an instrument should not be evaluated as employment policy.

Vocational education appears associated with a distinct rather than a lesser labour market response: vocational graduates were more, not less, likely to enter self-employment when wage employment contracted, but they did not create organisations. If this reflects the composition of competences the pathway develops, the implication concerns curriculum rather than entrepreneurial intention: what is missing is not motivation but the breadth of competence that organisations require. We advance this as a hypothesis for further work, since our design speaks to the consequences of the pathway rather than to the content of its programmes.

### 5.5 Limitations

Four limitations qualify the results. First, the outcomes are stocks rather than transitions. The tenure-based estimates approximate entry, but with limited precision; the definitive test would use the six-quarter rotating panel of the EPA and the linkage files published by the statistical institute to trace transitions into and out of each margin, and to reveal whether ventures created during the shock later crossed the employer margin. That is the natural extension of this work. Second, higher vocational graduates fall in the comparison group, which attenuates the differential, so our estimates are a lower bound. Third, the sectoral test lacks the power to establish equality; a finer industry classification or a longer post-shock window would settle the question. Fourth, by design we do not observe motive, so we cannot verify our interpretation against entrepreneurs' own accounts, and the criterion operates in the aggregate and in one direction only.

### 5.6 Conclusions

Necessity and opportunity have organised entrepreneurship research for decades while resisting measurement, because they are defined by a motive that cannot be observed. We have argued that the employer margin supplies an observable, theoretically grounded and asymmetric alternative, available wherever a harmonised labour force survey exists. Applied to Spain, it shows that the specificity of vocational human capital shapes not the propensity to enter self-employment but the form that entry takes, and that what increased after the pandemic was self-employment rather than entrepreneurship: concentrated among those whose competences are most closely bound to an occupation, creating no organisations, and fully reversed within eighteen months. What the episode reveals is not how much the shock changed, but what kind of response it produced.

**References**


Audretsch, D. B., Thurik, A. R., Carree, M. A., & van Stel, A. (2008). Does self-employment reduce unemployment? *Journal of Business Venturing, 23*(6), 673–686. https://doi.org/10.1016/j.jbusvent.2008.01.002

Authors. (2026). [Details removed for anonymised review].

Baptista, R., & Thurik, A. R. (2007). The relationship between entrepreneurship and unemployment: Is Portugal an outlier? *Technological Forecasting and Social Change, 74*(1), 75–89. https://doi.org/10.1016/j.techfore.2006.04.003

Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. T. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the National Academy of Sciences, 117*(30), 17656–17666. https://doi.org/10.1073/pnas.2006991117

Bates, T. (1990). Entrepreneur human capital inputs and small business longevity. *Review of Economics and Statistics, 72*(4), 551–559.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. National Bureau of Economic Research.

Belitski, M., Guenther, C., Kritikos, A. S., & Thurik, R. (2022). Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses. *Small Business Economics, 58*, 593–609. https://doi.org/10.1007/s11187-021-00544-y

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics, 119*(1), 249–275. https://doi.org/10.1162/003355304772839588

Block, J. H., & Wagner, M. (2010). Necessity and opportunity entrepreneurs in Germany: Characteristics and earnings differentials. *Schmalenbach Business Review, 62*(2), 154–174. https://doi.org/10.1007/BF03396803

Brown, R., & Rocha, A. (2020). Entrepreneurial uncertainty during the COVID-19 crisis: Mapping the temporal dynamics of entrepreneurial finance. *Journal of Business Venturing Insights, 14*, e00174.

Calderon, G., Iacovone, L., & Juarez, L. (2015). *Opportunity vs. necessity: Understanding the heterogeneity of female micro-entrepreneurs* (Policy Research Working Paper). World Bank.

Coase, R. H. (1937). The nature of the firm. *Economica, 4*(16), 386–405.

Constant, A., & Zimmermann, K. F. (2006). The making of entrepreneurs in Germany: Are native men and immigrants alike? *Small Business Economics, 26*(3), 279–300. https://doi.org/10.1007/s11187-005-3004-6

Conti, A., & Roche, M. P. (2020). Lowering the bar? External conditions, opportunity costs, and high-tech startup outcomes. *Organization Science*. Advance online publication. https://doi.org/10.1287/orsc.2020.1403

Dawson, C., Henley, A., & Latreille, P. (2009). *Why do individuals choose self-employment?* (IZA Discussion Paper No. 3974). Institute for the Study of Labor.

De Vet, J. M., Nigohosyan, D., Núñez Ferrer, J., Gross, A.-K., Kuehl, S., & Flickenschild, M. (2021). *Impacts of the COVID-19 pandemic on EU industries*. European Parliament, Policy Department for Economic, Scientific and Quality of Life Policies.

Dencker, J. C., Bacq, S., Gruber, M., & Haas, M. (2021). Reconceptualizing necessity entrepreneurship: A contextualized framework of entrepreneurial processes under the condition of basic needs. *Academy of Management Review, 46*(1), 60–79. https://doi.org/10.5465/amr.2017.0471

Doern, R. (2021). Knocked down but not out and fighting to go the distance: Small business responses to an unfolding crisis in the initial impact period. *Journal of Business Venturing Insights, 15*, e00221. https://doi.org/10.1016/j.jbvi.2020.e00221

Donthu, N., & Gustafsson, A. (2020). Effects of COVID-19 on business and research. *Journal of Business Research, 117*, 284–289. https://doi.org/10.1016/j.jbusres.2020.06.008

Dvouletý, O. (2024). Entrepreneurship in Central Europe after COVID-19: Resilience amid a crisis. *Foresight and STI Governance, 18*(4), 8–17. https://doi.org/10.17323/2500-2597.2024.4.8.17

Dvouletý, O., Fernandez de Arroyabe, J. C., & Mustafa, M. (2021). Entrepreneurship during the times of the COVID-19 pandemic: Challenges and consequences. *Journal of Entrepreneurship in Emerging Economies, 13*(4), 489–496. https://doi.org/10.1108/JEEE-09-2021-0461

Fairlie, R. W., & Fossen, F. M. (2020). Defining opportunity versus necessity entrepreneurship: Two components of business creation. In S. W. Polachek & K. Tatsiramos (Eds.), *Change at home, in the labor market, and on the job* (Research in Labor Economics, Vol. 48, pp. 253–289). Emerald Publishing. https://doi.org/10.1108/S0147-912120200000048008

Faria, J. R., Cuestas, J. C., & Gil-Alana, L. A. (2009). Unemployment and entrepreneurship: A cyclical relation? *Economics Letters, 105*(3), 318–320.

Galindo-Rueda, F., & Verger, F. (2016). *OECD taxonomy of economic activities based on R&D intensity* (OECD Science, Technology and Industry Working Papers No. 2016/04). OECD Publishing. https://doi.org/10.1787/5jlv73sqqp8r-en

Government of Spain. (2021). *Royal Decree-Law 9/2021, of 11 May, amending the consolidated text of the Workers' Statute Law to guarantee the labour rights of persons engaged in delivery within the scope of digital platforms*. Official State Gazette, No. 113, 12 May 2021. https://www.boe.es/eli/es/rdl/2021/05/11/9

Government of Spain. (2022a). *Law 28/2022, of 21 December, on the promotion of the startup ecosystem*. Official State Gazette, No. 306, 22 December 2022, pp. 179288–179323. https://www.boe.es/eli/es/l/2022/12/21/28

Government of Spain. (2022b). *Organic Law 3/2022, of 31 March, on the organization and integration of vocational training*. Official State Gazette, No. 78, 1 April 2022, pp. 43546–43635. https://www.boe.es/eli/es/lo/2022/03/31/3

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal, 17*(S2), 109–122. https://doi.org/10.1002/smj.4250171110

Hanushek, E. A., Schwerdt, G., Woessmann, L., & Zhang, L. (2017). General education, vocational education, and labor-market outcomes over the lifecycle. *Journal of Human Resources, 52*(1), 48–87. https://doi.org/10.3368/jhr.52.1.0415-7074R

Hayek, F. A. (1945). The use of knowledge in society. *American Economic Review, 35*(4), 519–530.

Ho, D. E., Imai, K., King, G., & Stuart, E. A. (2007). Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political Analysis, 15*(3), 199–236. https://doi.org/10.1093/pan/mpl013

Hurst, E., & Pugsley, B. W. (2011). What do small businesses do? *Brookings Papers on Economic Activity, 2011*(2), 73–142.

Kambourov, G., & Manovskii, I. (2009). Occupational specificity of human capital. *International Economic Review, 50*(1), 63–115. https://doi.org/10.1111/j.1468-2354.2008.00524.x

Kirzner, I. M. (1973). *Competition and entrepreneurship*. University of Chicago Press.

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*(3), 383–397. https://doi.org/10.1287/orsc.3.3.383

Lazear, E. P. (2004). Balanced skills and entrepreneurship. *American Economic Review, 94*(2), 208–211. https://doi.org/10.1257/0002828041301425

Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics, 23*(4), 649–680. https://doi.org/10.1086/491605

Levine, R., & Rubinstein, Y. (2017). Smart and illicit: Who becomes an entrepreneur and do they earn more? *The Quarterly Journal of Economics, 132*(2), 963–1018. https://doi.org/10.1093/qje/qjw044

Liñán, F., & Jaén, I. (2022). The COVID-19 pandemic and entrepreneurship: Some reflections. *International Journal of Emerging Markets, 17*(5), 1165–1174. https://doi.org/10.1108/IJOEM-05-2020-0491

Lippman, S. A., & Rumelt, R. P. (1982). Uncertain imitability: An analysis of interfirm differences in efficiency under competition. *The Bell Journal of Economics, 13*(2), 418–438. https://doi.org/10.2307/3003464

Marič, M., Jeraj, M., & Pavlin, J. (2010). Entrepreneurship as a solution to the unemployment problem. *Škola Biznisa, 3*, 90–103. https://doi.org/10.5937/skolbiz1003090M

Micozzi, A. (2013). Factors affecting the entrepreneurial dynamics in Italy: A comparison across European countries. *Economia Marche Journal of Applied Economics, 32*(1), 1–22.

National Institute of Statistics. (2024). *Labour Force Survey (EPA): Microdata, 2017–2023*. INE.

Neal, D. (1995). Industry-specific human capital: Evidence from displaced workers. *Journal of Labor Economics, 13*(4), 653–677. https://doi.org/10.1086/298388

Nicolás Martínez, C., & Rubio Bañón, A. (2020). Entrepreneurship in times of crisis: An exploratory analysis of the effects of COVID-19. *Small Business International Review, 4*(2), 53–66. https://doi.org/10.26784/sbir.v4i2.279

Oxenfeldt, A. R. (1943). *New firms and free enterprise: Pre-war and post-war aspects*. American Council on Public Affairs.

Penrose, E. T. (1959). *The theory of the growth of the firm*. Oxford University Press.

Pinilla, J., Barber, P., Vallejo-Torres, L., Rodríguez-Mireles, S., López-Valcárcel, B. G., & Serra-Majem, L. (2021). The economic impact of the SARS-CoV-2 (COVID-19) pandemic in Spain. *International Journal of Environmental Research and Public Health, 18*(9), 4708. https://doi.org/10.3390/ijerph18094708

Polanyi, M. (1966). *The tacit dimension*. Doubleday.

Portuguez Castro, M., & Gómez Zermeño, M. G. (2021). Identifying entrepreneurial interest and skills among university students. *Sustainability, 13*(13), 6995. https://doi.org/10.3390/su13136995

Remeikienė, R., Gasparėnienė, L., Fedajev, A., Aršić, S., & Noga, G. (2023). Challenges of entrepreneurship development in Europe in the light of the pandemic crisis. *Journal of Business Economics and Management, 24*, 354–367. https://doi.org/10.3846/jbem.2023.18612

Robinson, P. B., & Sexton, E. A. (1994). The effect of education and experience on self-employment success. *Journal of Business Venturing, 9*(2), 141–156. https://doi.org/10.1016/0883-9026(94)90006-X

Rubin, D. B. (2001). Using propensity scores to help design observational studies: Application to the tobacco litigation. *Health Services and Outcomes Research Methodology, 2*(3–4), 169–188. https://doi.org/10.1023/A:1020363010465

Rumelt, R. P. (1984). Towards a strategic theory of the firm. In R. B. Lamb (Ed.), *Competitive strategic management* (pp. 556–570). Prentice-Hall.

Salom-Carrasco, J., Albertos-Puebla, J. M., Sánchez-Moral, S., & Solís-Trapero, E. (2025). The economic impact of the global COVID-19 crisis on metropolitan areas: Employment and unemployment in Spanish metropolitan areas. In C. López-Escolano, R. Mecha-López, & A. Vera (Eds.), *Value chains and the remaking of urban and regional spaces*. Springer. https://doi.org/10.1007/978-3-032-01602-7_10

Schoar, A. (2010). The divide between subsistence and transformational entrepreneurship. In J. Lerner & S. Stern (Eds.), *Innovation policy and the economy* (Vol. 10, pp. 57–81). University of Chicago Press. https://doi.org/10.1086/605853

Sharma, G. D., Kraus, S., Liguori, E., Bamel, U. K., & Chopra, R. (2022). Entrepreneurial challenges of COVID-19: Rethinking entrepreneurship after the crisis. *Journal of Small Business Management*. https://doi.org/10.1080/00472778.2022.2089676

Solon, G., Haider, S. J., & Wooldridge, J. M. (2015). What are we weighting for? *Journal of Human Resources, 50*(2), 301–316. https://doi.org/10.3368/jhr.50.2.301

Sunge, R., Mudzingiri, C., & Mkhize, N. (2024). The COVID-19 pandemic and economic recovery: The mediating role of governance, a global perspective. *Heliyon, 10*(22), e39869.

Verheul, I., van Stel, A., Thurik, R., & Urbano, D. (2006). The relationship between business ownership and unemployment in Spain: A matter of quantity or quality? *Estudios de Economía Aplicada, 24*(2), 435–457.

Williams, N., & Williams, C. C. (2014). Beyond necessity versus opportunity entrepreneurship: Some lessons from English deprived urban neighbourhoods. *International Entrepreneurship and Management Journal, 10*(1), 23–40. https://doi.org/10.1007/s11365-011-0190-3

Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. Free Press.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementarymaterial.docx