

# Business creation during COVID-19

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## Abstract

We use data on business registrations in the UK to study the response of firm entry to the COVID-19 pandemic. We find that firm entry increased during the pandemic, unlike typical recessions where firm entry declines. The rise in firm creation is driven by individual entrepreneurs creating companies for the first time, and particularly creating companies in online retail. We link the rise in firm creation to declines in brick-and-mortar retail footfall via Google mobility data, and show that it takes 10 weeks for a firm to be registered after a shock to footfall. To study the impacts of the newly created firms, we merge entry data with online job postings from Indeed and show that the rise in firm creation drives increased vacancy postings. However, we also show there is a higher probability of pandemic startups dissolving relative to pre-pandemic cohorts. Therefore, we conclude that booming firm creation aided the rapid recovery of the UK economy in the short run, but the long-run implications are more uncertain.

**JEL:** E32, L25, L26.

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# 1 Introduction

Firm entry is a fundamental indicator of economic activity. New firms contribute to aggregate job creation and affect both growth and productivity through competition, innovation and reallocation. Typically firm entry is procyclical: it rises in booms and declines in recessions. However, during the COVID-19 recession, entry has been countercyclical, rising as output falls. Motivated by this observation, we analyse the dynamics behind firm creation in the UK during the COVID-19 pandemic. We investigate the drivers of firm creation and ask whether these new firms affect the real economy.

We present five facts on firm creation during the COVID-19 pandemic. The first two facts characterise firm creation during COVID-19. The third fact suggests a demand channel through which entry responded to the pandemic. The fourth and fifth facts present evidence on the real impact of the newly created firms.

- (i) Firm entry increased during the COVID-19 pandemic. This contrasts with past recessions in the UK, but the rise is consistent with other advanced economies during COVID-19.
- (ii) New firms are disproportionately concentrated in the online retail sector and founded by individuals ('solo entrepreneurs') who started their first business.
- (iii) Firm entry is negatively correlated with retail footfall, and it takes roughly ten weeks for a decrease in footfall to have maximum effect on firm entry.
- (iv) New firms post job vacancies and do so at a faster rate than firms created pre-COVID.
- (v) New firms are more likely to exit (dissolve) than firms created pre-COVID.

These facts answer three natural questions about firm dynamics during the pandemic. What happened to firm creation during the COVID-19 pandemic? Facts (i) and (ii). What mechanisms led firm entry to respond during the pandemic? Fact (iii). What effect did firm creation during the pandemic have on the real economy? Facts (iv) and (v). Our results highlight the rapid self-correcting mechanism of the economy during COVID-19. This complements our growing understanding of how targeted policy interventions affected firms in terms of survival, growth and employment (Van Dijke, Buckmann, Turrell, and Key 2021; González-Pampillón, Nunez-Chaim, and Ziegler 2021). There were no *direct* policies targeted at new firm creation, and policies such as furlough (coronavirus job retention scheme), eat-out-to-help-out, and the bounce back loan scheme, all required firms to have been in existence prior to the crisis. Despite this, we observe a quick reaction by entrepreneurs in the economy responding to demand changes and increasing supply in lockdown-compliant sectors (e.g. online retail).

Our findings also suggest, at least in the short-run, that entrepreneurship during the COVID-19 entry boom was not just casual or a substitute for formal employment. The entrants seek to hire workers. We

find that the new firms post job vacancies, and the cohorts of firms that enter during the pandemic post jobs at a faster rate than pre-pandemic entrants. This could reflect that the crisis requires rapid decision making or that there are lower entry costs in lockdown-compliant sectors such as online retail. However, our promising evidence for the short-run effects of COVID-19 firm creation may not hold in the long run. We find that cohorts of firms created during the pandemic are more likely to dissolve, and changes in the composition of ownership structure, *ceteris paribus*, implies weaker hiring and higher dissolution rates in the long run. More broadly, these findings add to growing research on the importance of firm characteristics at start-up for future employment (Sedláček and Sterk 2017; Sterk, Sedláček, and Pugsley 2021). We stress that the composition of ownership structure responds to the recession, which adds a business cycle perspective to research that shows that ownership structure at start-up affects subsequent firm performance (Felix, Karmakar, and Sedláček 2021).

To show our results, we match real-time data from the UK's register of limited firms from Companies House with Google data on footfall, Bureau Van Dijk (BvD) data on firms' ownership structures and Indeed data on job postings. The Companies House data provides the entry date, dissolution date, sector and location of new entrants. The matched data allows us to: estimate the response of entry to footfall in different locations; determine the ownership structure of newly created firms; and to track whether the newly created companies post jobs. To show how entry responds to footfall, we exploit variations in footfall across time and region, and use a local projections methodology to show dynamic effects (speed to start a company). To study the probability of posting a vacancy and probability of dissolving for pre- and post-pandemic cohorts of firms, we use a fixed effects methodology to purge other aggregate effects that influence job postings and dissolutions during the pandemic.

The resilience of firm entry during COVID-19 has been noted for a number of economies. Dinlersoz, Dunne, Haltiwanger, and Penciakova (2021) present evidence for the US, and OECD (2021) provide evidence for OECD countries.<sup>1</sup> Additionally, our finding that entry is concentrated in the online retail sector is consistent with most US registrations being in non-store retail (Haltiwanger 2021). However, the existing literature has not observed the real impact of these new entrants. Benedetti Fasil, Sedláček, and Sterk (2021) show that the initial sharp falls in firm creation in France, Germany, Italy and Spain could have persistent negative effects on employment due to fewer high-growth startups. Our results focus on the surge in firm entry following this initial decline, and suggests that these new firms contribute to the short-run recovery in employment, but the long-run implications are less clear.

The remainder of the paper is structured as follows: Section 2 describes our data; Section 3 presents our five facts (3.1, 3.2, 3.3, 3.4, 3.5) on firm creation during the COVID-19 pandemic.

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<sup>1</sup>Duncan, Galanakis, León-Ledesma, and Savagar (2021) present early-evidence of the aggregate and sectoral effects of the COVID-19 crisis on UK firm creation.

## 2 Data

We use data from Companies House and Bureau van Dijk (FAME) to construct entry and dissolution statistics and ownership information. We use Google mobility data to measure retail footfall in an area. We use data from Indeed to measure job postings by firms.

### 2.1 Business registrations (Companies House & FAME)

We construct data on firm entry from the UK business register provided by Companies House.<sup>2</sup> The Companies House register records all *incorporated companies* in the UK. Incorporated companies are separate legal entities to the business owner, whereas unincorporated companies – which are not on the register – are not legal entities (the owner is fully liable for debts of the business).<sup>3</sup> We restrict the firms' legal status to private limited companies which represent 93% of all companies on the register.

We use the Financial Analysis Made Easy (FAME) dataset provided by Bureau van Dijk (BvD) that keeps track of historical Companies House data in an accessible manner. We use this historical data and build a series of daily firm entry since 2005.

When registering, each firm is provided with a unique company number, a registration date, and has to indicate a legal status, a headquarters address and an industry code (4 or 5-digit SIC). BvD reports all of this information, as well as date, if applicable, that the firm was dissolved. This allows us to measure daily number of incorporations and dissolutions by local authority and industrial sector.<sup>4</sup> We match incorporations to the local authority where the firm is located using the ONS post-code lookup tool.

When registering, firms also have to report their ownership structure (the name of the firms shareholders and the size of their stakes). BvD processes this textual information and provides unique identifiers for shareholders,<sup>5</sup> together with their stake and their type (individual, corporate, unnamed or other). Firms have to update this ownership information every year when it changes, and every 3 years when it doesn't change in their annual returns (Companies House form AR01).

BvD also keeps track of changes to this ownership information over time. We use this historical data and BvD shareholder identifiers to determine existing entrepreneurs that were active prior to the pandemic. We focus on entrepreneurs who have either founded a firm since January 2016 or owned a firm that was live in January 2020 but that was born prior to January 2016. Therefore, these individuals owned at least

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<sup>2</sup>Conditional on the entrepreneur registering their business, updates to the register are automated so there are no concerns about administrative lags that might have arisen during the pandemic.

<sup>3</sup>The most important constituent of unincorporated companies is sole proprietors. In 2021, 56% of all UK businesses were sole proprietors, 37% were companies and 7% were ordinary partnerships (Department for Business, Energy & Industrial Strategy 2021). See Appendix A.1 for a discussion on how Companies House differ from the ONS Census (IDBR).

<sup>4</sup>We follow the [Office of National Statistics](#) (ONS) and exclude post codes with more than 500 incorporations in a single day. Multiple incorporations at a single postcode most often reflect registrations by management and personal service companies or are tax motivated, with little economic impact. See [ONS](#) article for more details.

<sup>5</sup>BvD uses names and titles to define unique identifiers for shareholders. BvD processes the textual ownership information sourced from Companies House with an approximately two month reporting lag.

one business in the five years prior to the pandemic. When a new firm enters during the pandemic with an existing entrepreneur as a shareholder, we consider this an entrant founded by a *serial* entrepreneur.<sup>6</sup> Specifically, we classify new firms founded during the pandemic into the following ownership categories:

- New solo entrepreneurs: firms that have only one 'new' shareholder, i.e. a single individual who has not founded another firm since Jan. 16 nor owned another firm in Jan. 2020.
- Serial solo entrepreneurs: firms that have only one 'serial' shareholder, i.e. a single individual who has founded at least one other firm since Jan. 16 or owned at least one other firm in Jan. 2020.
- Group of individual shareholders where all shareholders are new entrepreneurs.
- Group of individual shareholders, where at least one of the shareholders is a serial entrepreneur.
- Firms where at least one of the shareholders is a corporation.

## 2.2 Retail footfall (Google Mobility)

We use regional retail footfall figures from Google LLC (2021). Specifically, we use mobility trends for 'retail and recreation' which represents places such as restaurants, cafés, shopping centres, theme parks, museums, libraries and cinemas. We refer to 'visits to retail and recreation' as *footfall*. The data shows how visitors to these retail and recreation locations changed compared to a baseline. The baseline is the median value from the 5-week period Jan 3 – Feb 6, 2020 for a specific day of the week. For example, a value of -10% on a Monday in June 2020 in Leicestershire would represent 10% fewer visits to retail and recreation places than the median value for Mondays in Leicestershire over the baseline period. The series begins Feb 6 2020 and has run continuously since then.

Our aim is to assess the impact of changes in retail footfall to firm entry in the same an area. The Google mobility data is divided into 381 specific regions which we match to local authorities using an ONS tool ([ONS region look-up tool](#)) as in Fetzner (2021).

## 2.3 Job postings (Indeed)

We also wish to determine whether new entrants seek to hire workers. To do this, we match data on firm entry to job postings using the name used to register a company and the name used to post a job.

We use data from Indeed to measure job postings. These data include both jobs posted directly on Indeed and on companies' websites aggregated by Indeed.<sup>7</sup> The data records about 20 million job postings

<sup>6</sup>Of the 7 million individual shareholders in our data, 14% are "serial" entrepreneurs, meaning that they owned shares in more than one firm either founded between January 2016 and December 2021, or that was live in January 2020 and founded before January 2016. Of the 4 million firms founded by individuals between January 2016 and December 2021, 40% of them have at least one serial entrepreneur; and one-third of firms founded by solo entrepreneurs over the same period are founded by serial entrepreneurs.

<sup>7</sup>See <https://www.hiringlab.org/indeed-data-faq/> for a description of the data.

from January 2018 to September 2021. Each record consists of a company name, job title and posting date. We match Indeed data with Companies House data using a string-matching algorithm applied to the company name variable in each data set.<sup>8</sup> We drop a match if the company posts a job before it incorporates assuming it is a faulty match.

Of the 20 million job posted between January 2018 and September 2021, we match 15 million to firms in the Companies House register. The remainder are mostly composed of public sector job postings, such as postings by the NHS or the Royal Mail. We view the Indeed data as representative of vacancies in the UK. It matches closely with official statistics on vacancies from the ONS survey (see Appendix A.4).

About 400,00 unique firms have actively posted jobs in the Indeed data or about 10% of the total number of active firms on the register in January 2020. We identify about 20,000 of these firms as having been incorporated in the post-COVID period (since March 2021). 20,000 represents about 2% of all the firms incorporated over the COVID period. Unsurprisingly, companies incorporated more recently (i.e. younger firms) are less likely to be posting jobs and be in Indeed data.

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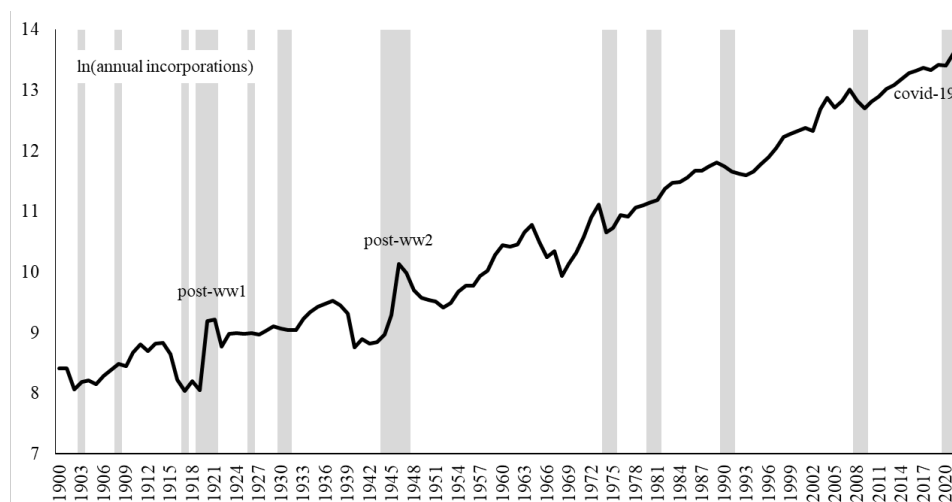
<sup>8</sup>Similar to Van Dijke, Buckmann, Turrell, and Key 2021, we match unique names based on the cosine similarity of 3 n-grams, using the Python string-grouper package. After an initial clean of names excluding all special characters and common words (such as llc, limited, and, etc.), we keep matches with a similarity score larger than 80%.

### 3 Facts

#### 3.1 Entry cyclicality

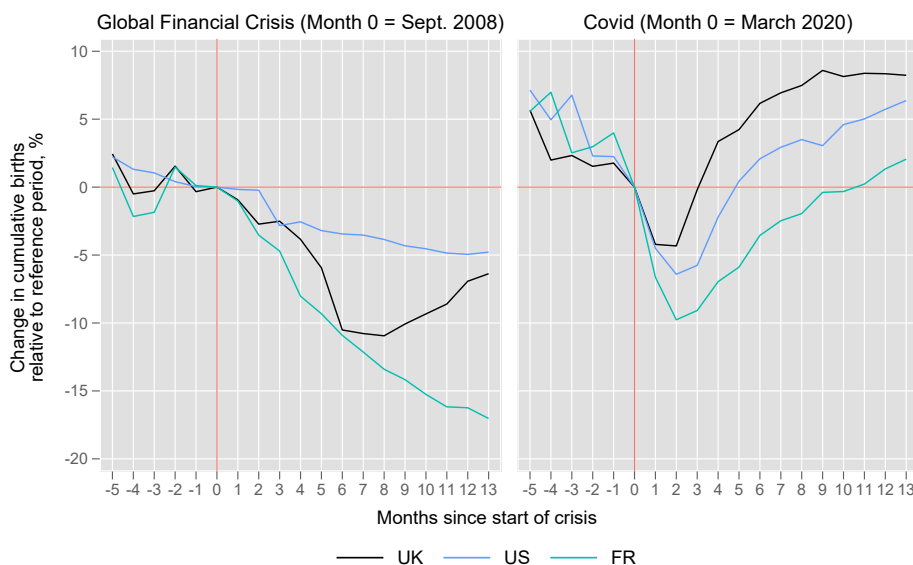
Figure 1: Strong business creation during the COVID-19 pandemic

(a) Cyclicality of business creation in the UK, 1900-2021



Source: Historical Companies House database, BVD, Bank of England A Millenium of Macroeconomic Data Database. Note: Shaded areas correspond to years when UK GDP growth was negative.

(b) Cumulative business creation, Global Financial Crisis (GFC) vs. pandemic, for UK, United States, France



Source: authors' calculations using Companies House, US Census and INSEE. Births of corporations or equivalent. Reference period: similar month of 2018 for Covid, 2006 for the GFC.

It is well-documented that firm entry is procyclical: it rises in booms and declines in recessions (Lee and Mukoyama 2015; Tian 2018). However, our evidence for the UK (Figure 1a) shows that in 'extreme event' recessions, such as wartime and the COVID-19 pandemic, entry is countercyclical. It increases during the crisis. These 'extreme event' recessions share the feature that the economy restructures to substantial shifts

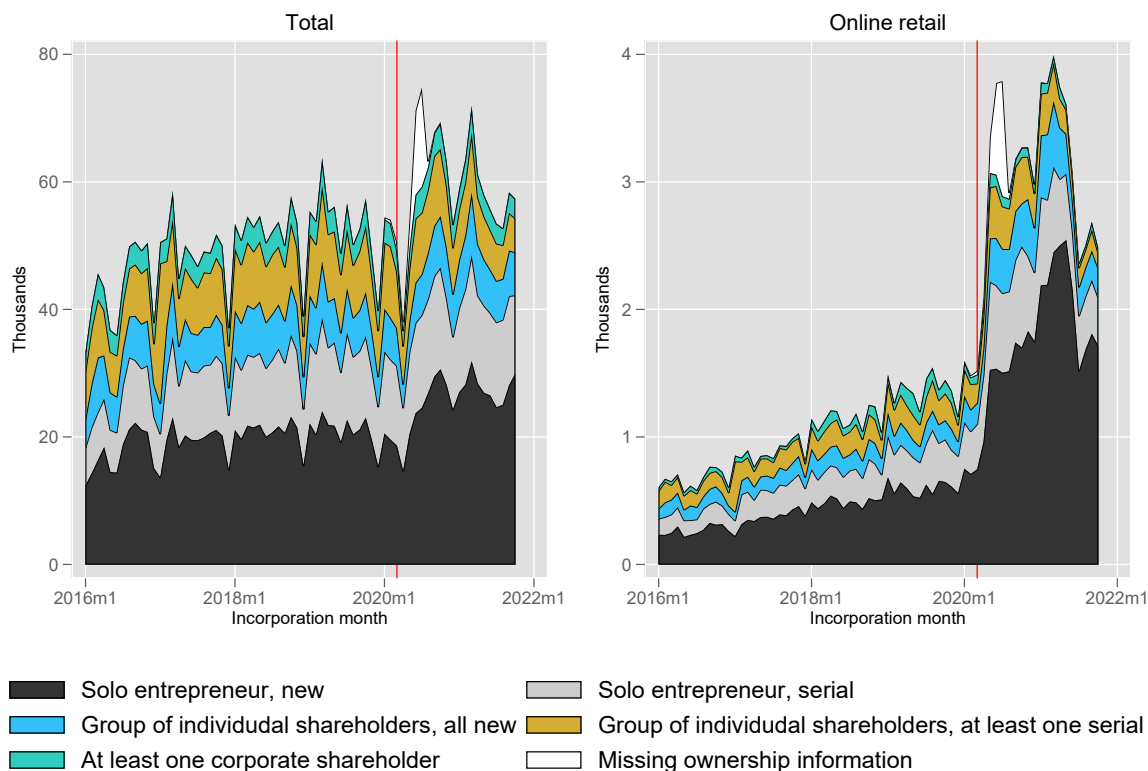
in the patterns of consumer demand and producer supply. The post-war recessions in 1919 and 1946 saw entry boom as wartime production declined and private enterprise restarted. Similarly, during the COVID-19 pandemic widespread lockdowns reallocated demand to sectors that complied with social distancing.

Figure 1b compares firm entry in the Global Financial Crisis (GFC) and COVID-19 recessions. We extend the evidence of Dinlersoz, Dunne, Haltiwanger, and Penciakova (2021) for the US (US Census) to France (INSEE) and the UK (Companies House). We use the same methodology as in Dinlersoz, Dunne, Haltiwanger, and Penciakova (2021) and show cumulative entry from the start of the crisis relative to a reference period. The reference period is the same month in 2006 for the Great Recession and in 2018 for the COVID-19 pandemic. Our evidence confirms that rising entry is common to all three countries in the COVID-19 recession and this differs markedly from the GFC which exhibits declining (procyclical) firm creation in all countries. In the COVID-19 pandemic the initial fall in entry is sharper but bottoms-out after three months. After twelve months, all three economies have cumulative firm creation greater than over the same twelve months in 2018. For example, the UK has 9% more firm creation. Conversely, in the Great Recession cumulative firm registrations fall steadily for twelve months following the onset of the crisis. For the UK and US, 5% fewer firms are created over the twelve months following the onset of the crisis, whereas in France the figure is 17% fewer firms created than the same twelve months in 2006. OECD (2021) show that the sharp fall in firm entry followed by a rebound is common to the majority of 18 OECD countries that they study with data up to September 2020. Clementi and Palazzo (2016) show that the slow recovery in firm creation after the GFC contributed to a slow recovery in employment of the US economy. Our evidence is supportive of the hypothesis that the rapid recovery in firm creation post-pandemic supported recovery in employment. In March 2022 the U.K. unemployment rate was similar to pre-crisis (Office for National Statistics 2022).



### 3.2 Entry composition

Figure 2: Monthly firm creation by type of ownership, total economy and online retail sector, January 2016 to September 2021



Source: authors' calculations using BvD-FAME.

Note: see section 2.1 for a description of ownership categories.

Figure 2 shows monthly firm creation in the aggregate economy (left panel) and for the online retail sector (right panel). Online retail is the SIC 4-digit sector 'Retail sale via mail order houses or via internet'. We present firm creation by ownership structure to determine the source of the new entrants. Intuition might suggest that existing firms quickly adjusted to setup online retail subsidiaries or benefit indirectly from business support packages. We do not find evidence for this. In fact, our evidence points to new solo entrepreneurs playing a disproportionate role. This aligns more closely with the hypothesis that workers in lockdown pursued new ventures given more labour hours from reduced commuting or being furloughed.

In Figure 2 the left panel shows a sharp decline and rapid rise in firm entry after the introduction of the first national lockdown in 2020m3 (red vertical line). Before the crisis there are roughly 50,000 monthly registrations in total and this increases to 60,000 post March 2020. Solo entrepreneurs (grey + black) increase from 60% to 65% of total firm registrations, with the increase driven mostly by new solo entrepreneurs. New solo entrepreneurs account from 40% pre-COVID to 44% of all new monthly

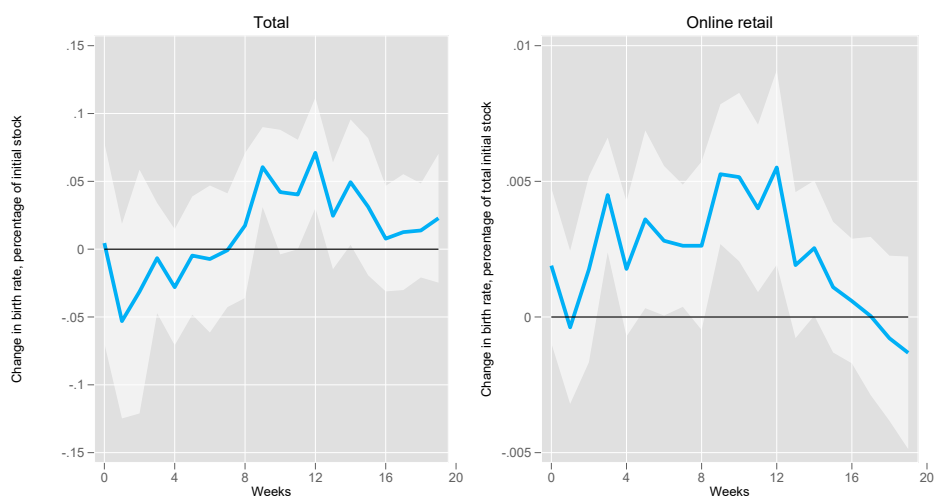
registrations on average from March 2020.

Before 2020m3 average monthly entry in online retail is 1,000 and total monthly entry is 50,000. After 2020m3 average monthly entry in online retail increases threefold to 3,100 and total monthly entry rises to 60,000. Hence, the sector's importance more than doubles from 2% of entry to 5% of entry. For reference, firms in online retail accounted for only 2% of firms in January 2020 (see Appendix A.2 for further details). Despite the sector's modest size in aggregate figures, the contribution of 2,000 extra firms per month in online retail represents one-fifth of the increase of 10,000 in total entry. In other words, online retail makes up 20% of excess entry. Furthermore, the right panel also shows that the surge in firm entry in online retail is driven even more by companies setup by new solo entrepreneurs. Pre-pandemic 65% of monthly firm entry is attributable to solo entrepreneurs and 43% to new solo entrepreneurs; these numbers increase to 75% and 57% respectively. The 15p.p. rise in the share of businesses opened by solo entrepreneurs during the pandemic is entirely driven by entrepreneurs opening a business for the first time (new solo entrepreneurs).

### 3.3 Entry responds to demand changes

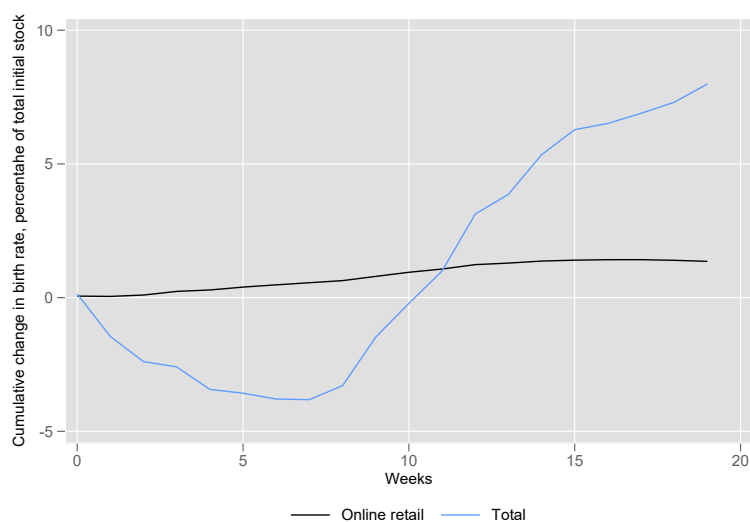
Figure 3: Local projection of retail footfall on the birth rate

(a) Estimated coefficient following a 1% decline in footfall



Note: standard errors are clustered at the county and week level. The light shaded area shows the 90% confidence interval.

(b) Cumulative change in the birth rate following a 30% decline in footfall



Note: 30% is the weekly average fall in the footfall indicator over the pandemic. The birth rate is annualized.

To understand the mechanisms behind the rise in entry, particularly the rise in the online retail sector, we investigate the relationship between firm creation and retail footfall in an area. Footfall is a good indicator of lockdown stringency and reflects the exogenous variation in lockdown policies (Appendix A.3). We find that firm creation and footfall are closely related. A decline in retail footfall in an area leads to a rise in firm entry in the area (Appendix A.3). We interpret the result as a negative local demand shock to brick-and-mortar retail leading to reallocation of demand to other businesses, and a response in supply through firm creation.

We use local projections (Jordà 2005) to estimate the dynamic effect on firm entry of a shock to footfall.

We estimate the following equation:

$$\text{Birth rate}_{k;w+h} = \sum_{j=0}^4 \beta_j \text{Footfall}_{k;w-j} + \sum_{j=1}^4 \gamma_j \text{Birth rate}_{k;w-j} + FE_k + \text{error}_{k;w}$$

Subscripts represent region ( $k$ ), week ( $w$ ), time horizon ( $h$ ) and lags ( $j$ ). We include four lags of the explanatory variables and study a 20-week time horizon. The explanatory variable of interest is Footfall. It is defined as the percentage deviation of visits to retail and recreation locations versus the baseline calculated over Jan 3 – Feb 6, 2020. The dependent variable is birth rate in a region, defined as

$$\text{Birth rate}_{k;w} = \frac{\text{Entry}_{k;w}}{\text{Total firms in Jan 2020}_k}$$

The variable  $\text{Entry}_{k;w}$  measures the number of entrants in location  $k$  in week  $w$  restricted to the sample of interest (online retail or total). We hold the definition of the denominator fixed as the regional total across all firm types. We do this for comparability and to avoid over-weighting regions with small initial levels of firms in online retail.

Figure 3a presents the impulse response functions following a 1% negative shock to footfall. The left panel shows that following the decrease in footfall, the firm birth rate takes 9 weeks to have a significant positive effect with a peak of 0.075% after 12 weeks. The right panel shows that the reaction of online retail is faster, and at the peak new entrants in online retail explain about a tenth (0.005 out of 0.05) of the increase in the total birth rate, despite accounting for 2% of the pre-pandemic stock.

Using these estimates, Figure 3b presents the cumulative increase in firm births over the COVID period following a 30% decline in footfall. This is the average weekly decrease in footfall over the sample period (February 2020-September 2021). The cumulative response reveals an initial dip in total births, but after 15 weeks new firms equivalent to 6% of the initial stock enter. Once cumulated, approximately one-fifth of these firms are in the online retail sector, which matches the share from the raw data (Appendix A.2).

### 3.4 Contribution of young businesses to vacancy postings

We have established the unusual increase in firm entry during the COVID recession and the close relationship to declines in footfall and entry, particularly for online firms. Next we consider whether this increase in entry is having a real economic impact. Are the new firms seeking to hire workers? Are they dissolving at a faster rate? We start by matching our Companies House firm entry data with job posting data from Indeed in order to understand whether newly created firms are likely to have an effect on employment. We interpret job postings as vacancies. Technically, job postings differ from job vacancies as a firm can post a single posting for multiple vacancies. It however is a good signal of the firm's intention to become an employer-firm.

Appendix A.4 shows that our Indeed data matches closely with ONS vacancy survey data.

Figure 4: Cumulative share of firms posting a vacancy by quarter since incorporation: cohort analysis pre/post COVID

(a) Across all firms

(b) By ownership type

Note: This figure plots the age-cohort fixed effects of a regression of the cumulative share of being an employer in Indeed in each quarter by 2-digit sector on a age-cohort and sector-time fixed effects. See section 3.4 for further details. Dotted lines plot the 90% confidence intervals.

We investigate the probability that COVID cohorts of firms post jobs, and we study the speed at which firms post a job after being created. To do so, we analyse the cumulative share of all firms incorporated in a quarter (i.e. quarterly cohorts of firms) that post a job by quarter since incorporation. We compare

these shares for cohorts of firms incorporated during COVID (from 2020q3) and pre-COVID (since 2018). Figure 4 plots the age-cohort fixed effects coefficient from the following regression:

$$\text{Share of firms posting in Indeed}_{s;c;q;age} = FE_{o;age;cohort(c)} + FE_{s;q} + \alpha_{o;s;c;q;age} \quad (1)$$

With  $o$  is the ownership type (as defined in section 2.1),  $s$  is the sector,  $cohort(c)$  a dummy denoting whether the quarterly cohort  $c$  is within the pre- or post-COVID period,  $q$  the quarter and  $age = q - c$ . We first abstract from ownership type in equation (1) and the dependent variable is the cumulative share of all firms in cohort  $c$  posting a vacancy in Indeed by age (quarter since incorporation) and by sector. The purpose of our methodology is to ensure that the shares are not affected by the sectoral composition of entry or by aggregate trends in job posting. The fixed effects are relative to age zero for the retail pre-COVID cohort. The interpretation of  $FE_{age;cohort(c)}$  is the relative probability of becoming an employer pre- and post COVID given sector-time fixed effects  $FE_{s;q}$  are held constant. We then measure the relative probability by type of ownership to see whether new solo entrepreneurs postings differ from postings from other ownership groups (equation 1). The interpretation of  $FE_{o;age;cohort(c)}$  is the probability of becoming an employer pre- and post COVID given sector-time fixed effects  $FE_{s;q}$  are held constant, relative to age zero for the retail new solo entrepreneur pre-COVID cohort.

Figure 4a plots the age-cohort fixed effects coefficient abstracting from ownership types as well as its 90% confidence interval. It shows that a significantly higher share of firms from cohorts of firms incorporated during the COVID pandemic (green line) relative to pre-COVID (black line) tend to post vacancies in the first four quarters following their incorporation. Indeed, the fact that the green line is significantly above the black line means that at each quarter after creation a firm created during COVID is more likely to post a job than a firm in the same sector, subject to the same aggregate shocks, at the same point in its lifecycle, than pre-COVID. Firms born during the pandemic are 4.6 times more likely to post a vacancy in Indeed in the quarter they incorporate than firms born pre-COVID<sup>9</sup>.

Figure 4b presents the age-cohort fixed effects coefficient and their 90% confidence intervals, this time by type of ownership. Again, the plots on the right panel are higher than on the left panel, confirming that a statistically significantly higher share of firms from cohorts of firms incorporated during the COVID pandemic relative to pre-COVID tend to post vacancies in the first four quarters following their incorporation. The panels also show a clear ranking across cohorts. In general, startups with a corporate shareholder are more likely to post a job after creation, next most likely are companies registered with a group of shareholders, and least likely are firms setup by solo entrepreneurs. However, solo entrepreneurs who have previously setup

<sup>9</sup>The coefficient plotted in figure 4a is the cumulative share of firms posting a vacancy in p.p. deviation to the share of firms posting at age zero for the retail 2018q1 cohort. The share for this base level being .5%, we can deduce that the share for firms pre-COVID at age zero is 0.5% on average and  $1.8+0.5=2.3\%$  on average for firms born during the pandemic. This means that firms born during the pandemic post  $2.3/0.5=4.6$  times more than firms pre-pandemic at age zero.

firms (serial entrepreneurs) are more likely to post a job than solo entrepreneurs creating their first firm. Pre-pandemic, 2 years (8 quarters) after incorporation, new solo entrepreneurs posted 25% fewer vacancies than serial entrepreneurs and 75% less than subsidiaries (i.e. firms owned by another corporation) this difference is significant at the 10% level!<sup>10</sup>

The fact that new entrants post jobs at a faster rate post pandemic suggests that entry has helped boost the recovery in vacancies. However, the composition of entry may have less positive implications in the longer run. The tilt towards solo entrepreneurs who tend to post fewer vacancies as time passes could narrow the gap between the pre- and post- covid cohorts on average. In Figure 4a we already see that this gap is narrowing as the post-covid cohort ages, going from 4.6 times more firms posting a vacancy post than pre-COVID within the quarter of their incorporation to 1.3 times more firms within 4 quarters since incorporation.

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<sup>10</sup>The coefficient plotted in figure 4b is the cumulative share of firms posting a vacancy in p.p. deviation to the share of firms posting at age zero for the retail new solo entrepreneur 2018q1 cohort. The share for this base level being .4%, we can deduce that the share for these at 8 quarters is  $3.8 \times 0.4 = 1.52\%$  on average; similarly, this share at 8 quarters is 5.4% for serial solo entrepreneurs and 7.3% for subsidiaries.

### 3.5 Entrants are more likely to dissolve

Figure 5: Cumulative share of rms dissolving by quarter since incorporation: cohort analysis pre/post COVID

(a) Across all rms

(b) By ownership type

Note: This figure plots the age-cohort fixed effects of a regression of the cumulative share of dissolving in each quarter by 2-digit sector on a age-cohort and sector fixed effects. See Section 3.5 for more details. Dotted lines plot the 90% confidence interval.

Figure 5 shows the cumulative share of rms dissolving by quarter since incorporation. The analysis follows the same methodology as the cohort analysis for probability to post a vacancy in Section 3.4. However, dissolutions were strongly affected by the easement period in which Companies House stopped registering dissolutions for the first two quarters of 2020 (see Appendix section A.6 for a more detailed discussion).



We abstract from the 2018q1-2020q2 period and compare dissolutions within the first two years since incorporation for firms born between 2016q1-2017q4 (and dissolving before the easement period) to firms born after 2020q2. The figure shows the age-cohort fixed effects from a regression also including sector fixed effects to control for the sectoral composition of entry.<sup>11</sup>

Figure 5a plots the age-cohort fixed effects coefficient abstracting from ownership types as well as its 90% confidence interval. It shows that a significantly higher share of firms from cohorts of firms incorporated during the COVID pandemic (green line) relative to pre-COVID (black line) tend to dissolve within the first four quarters following their incorporation, and this relative higher probability increases as firms age. In other words, newly created firms during COVID are more likely to dissolve than newly created firms pre-COVID; they are almost twice (+80%) more likely to dissolve within the first year (4 quarters) of their incorporation than firms born pre-COVID.<sup>12</sup>

Figure 5b presents the age-cohort fixed effects coefficient and their 90% confidence intervals, this time by type of ownership. Again, the plots on the right panel are higher than on the left panel at quarter 4, confirming that a significantly higher share of firms from cohorts of firms incorporated during the COVID pandemic relative to pre-COVID tend to dissolve within the first four quarters following their incorporation. The panels also show a clear ranking across types of ownership, and the rank order is preserved across the two panels (COVID and pre-COVID panels). Startups with a corporate shareholder are less likely to dissolve after creation, while solo entrepreneurs firms are more likely to dissolve (with no significant difference between serial and new solo entrepreneurs). The rank ordering for probability of dissolving is the inverse of the rank ordering for probability of posting a job that we analysed in Section 3.4. We also observe that among COVID cohorts, companies with a corporate owner have a relatively shallower gradient such that by their 4th quarter after birth the share that have dissolved is not significantly different to firms founded by corporate owners pre-pandemic. In other words, the pandemic has little impact on the survival probability of companies created by corporate owners. By contrast, new solo entrepreneurs are twice more likely to dissolve if born during the pandemic than pre-pandemic, and this difference is statistically significant at the 10% level.

Combining these results for dissolutions with the result that the composition of solo entrepreneurs increases during the pandemic (Section 3.2) means there are more firms with a higher risk of dissolution setup during the crisis. This dynamic may have a long-run counter-veiling effect on the result that newly created firms are having a positive short-run effect on employment (Section 3.4).

<sup>11</sup>Equation (1) becomes: Share of firms dissolving<sub>o;s;c;q;age</sub> = FE<sub>o;age;cohort(c)</sub> + FE<sub>s</sub> + "o;s;c;q;age.

<sup>12</sup>The coefficient plotted in figure 5a is the cumulative share of firms dissolving in p.p. deviation to the share of firms dissolving at age zero for the retail pre-COVID cohort. The share for this base level being null, we can deduce that the share for firms pre-COVID 4 quarters since incorporation is 3.4% on average and 6.2% on average for firms born during the pandemic. This means that firms born during the pandemic post 6.2/3.4=1.8 times more than firms pre-pandemic within the first year of their existence.

## 4 Conclusion

We study firm creation in the UK during the COVID-19 pandemic. We show that firm entry has been countercyclical during the COVID crisis for several developed economies, and this is at odds with nearly all recessions over the last century in the UK. Furthermore, we investigate the mechanisms through which this puzzling fact arises. The emerging picture is that firm creation has been concentrated in specific sectors like online retail, and of that most registrations come through solo entrepreneurs rather than groups of individuals each with shareholdings or ultimately owned by corporations. Furthermore, firm creation is closely related to shifting patterns in demand. Using footfall data, we show that as demand in brick-and-mortar retailers declines, firm entry in all sectors, especially online retail, expands. Finally, we show that this boom in firm creation has effects on the real economy. Using matched data from online job postings, we show that the newly registered firms go on to post jobs, and they do so quickly after initial setup. However, we also find that firms created during the pandemic are more likely to dissolve. This provides initial evidence that booming firm creation has helped the rapid recovery in the UK economy in the short run, but in the long run the implications are less clear. A rising number of dissolutions and entry concentrated among solo entrepreneurs who tend to hire less and dissolve more could negate the impact of the COVID-19 surge in firm creation.

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## Appendix for online publication

The Appendix is divided into the following sections:

- ^ A1. Companies House: Details about Companies House data and coverage relative to other data sources (IDBR and VAT data).
- ^ A2. Sectoral composition of "excess" entry during the pandemic.
- ^ A3. Google mobility indices : details about the indices and relation to lockdown intensity.
- ^ A5. Indeed job postings: comparison to ONS vacancy survey and detailed cohort analysis.
- ^ A6. Dissolutions: detailed cohort analysis.

## A.1 Companies House vs. IDBR and VAT data

Companies House dataset includes any firm incorporated in the UK. Unfortunately, it only publishes the latest snapshot of live firms on their website, with dissolved firms being removed. However, it publishes an aggregate historical series of annual number of incorporations. As explained in section 2.1 of the main paper, we use BvD FAME to reconstruct a firm-level historical time series of incorporations that matches Companies House official aggregate annual number (see figure A.1).

Figure A.1: Annual number of incorporations by data source

Source: authors' calculations using Companies House and BvD.

Note: shell post codes are post codes with more than 500 registrations in a day.

Companies House differs from the ONS UK Census data (IDBR) as a firm will be included in the IDBR only if it already employs someone (uses PAYE) or if it pays VAT meaning it has a big enough turnover (in 2020 the annual turnover threshold for paying VAT was £85,000). For this reason, firm entry in the IDBR reflects entry of firms at a later stage of their life cycle. Hence, entry in the IDBR or VAT data follows entry in Companies House but with a lag (see figure A.2).

Figure A.2: Entry by data source, 4-quarter growth rate 2005q1-2021q3, %

Source: authors' calculations using Companies House, BvD and ONS.

## A.2 Sector composition of entry during the pandemic

Online retail contributed to 40,000 new firm creation during COVID relative to pre-COVID, contributing to one-fifth of the total increase in firm creation over the period (150,000). By comparison, online retail represents less than 2% of total active firms in January 2020.

Figure A.3: Sector contributions to firm entry during COVID, relative to pre-COVID

Source: authors' calculations using BvD.

Figure A.4: Sector composition of all active firms on the Companies House register on January 2020

Source: authors' calculations using BvD.



### A.3 Google mobility data for retail footfall

Figure A.5 plots Google mobility data for an example region (London). Our measure of lockdown intensity is retail footfall which corresponds to the purple line in the figure. The response of retail footfall is closely correlated with lockdown periods that are indicated by shaded regions.

Figure A.5: Retail footfall as an indicator of lockdown intensity: London example

Source: Coronavirus (COVID-19) Mobility Report, Greater London Authority (GLA).

#### A.3.1 Birth rate and footfall

Figure A.6 shows the relationship between brick-and-mortar retail footfall and the annualised birth rate since the onset of the crisis in late March 2020. The footfall indicator is expressed as changes relative to the first five weeks of 2020, and the birth rate is measured as entry relative to the stock of firms in January 2020. Initially, there is a sharp decline in the birth rate but this recovers by June. The birth rate stabilizes around 15% after June 2021 (2021w23). The footfall indicator co-moves with birth rates. When there is a decline in footfall, birth rates decrease with a slight lag.

Figure A.6: Annualised birth rate and decline in footfall

Source: authors' calculations using BvD, Companies House and Google mobility data.

Note: The footfall indicator is expressed in deviation to the median corresponding day of the week during the five week period Jan 3-Feb 6, 2020; we then take the weekly average of these growth rates. Decline in footfall is the negative of the of the mobility trends for places like cafés, restaurants, shopping centers, theme parks, museums, libraries, and movie theaters.

## A.4 Additional results using Indeed data

### A.4.1 Indeed Postings versus ONS Vacancy Survey (total)

Figure A.7 shows that our Indeed data on job postings follows a similar trend to vacancies in the ONS Vacancy Survey. This figure shows vacancies for the sub-sample of Indeed postings that we are able to match with new firm creation in Companies House. Overall the data shows a sharp decline in job postings from the onset of the pandemic in the first quarter of 2020, and a recovery from Spring 2021. Note that the recovery is stronger in Indeed data relative to the ONS Vacancy Survey. This partly reflects the fact that ONS Vacancy Survey does not include newly incorporated firms, and, as we can see on the figure, the recovery in job postings was strongest for young businesses in Indeed (incorporated within the year of posting the position).

Figure A.7: ONS vacancies vs. Indeed job postings, by posting date, 2019=100

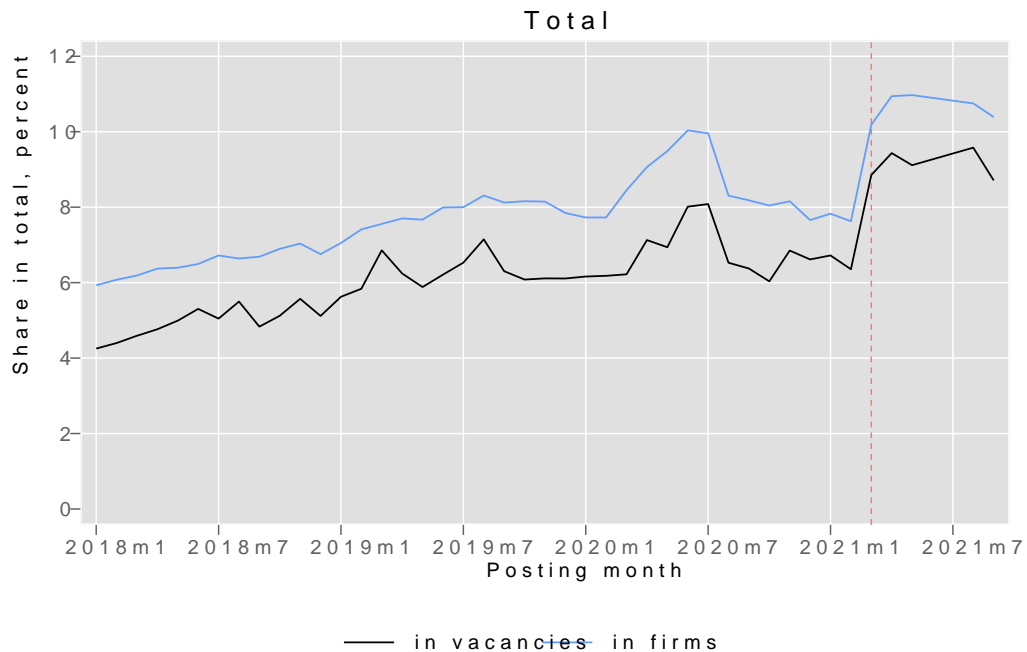
Source: authors' calculations using Indeed and ONS Vacancy Survey data monthly experimental data.

### A.4.2 Young businesses posting jobs

Figure A.8 shows that there has been a recent increase in the share of job postings accounted for by new entrants (firms of less than a year old) as well as an increase in the share of entrants among the firms with job postings. This is most noticeable from March 2021 where we observe that the share of job postings accounted for firms under a year-old increases from 6% to 9% of total job postings (or 8% to 11% of posting firms). The jump in March to June 2020, which corresponds to the sharp collapse in vacancies

documented in Figure A.7, suggests this collapse was sharpest for older firms. This illustrates that the cohort of firms that would have been created in the post-COVID period go on to have a significant effect on the composition of total job postings.

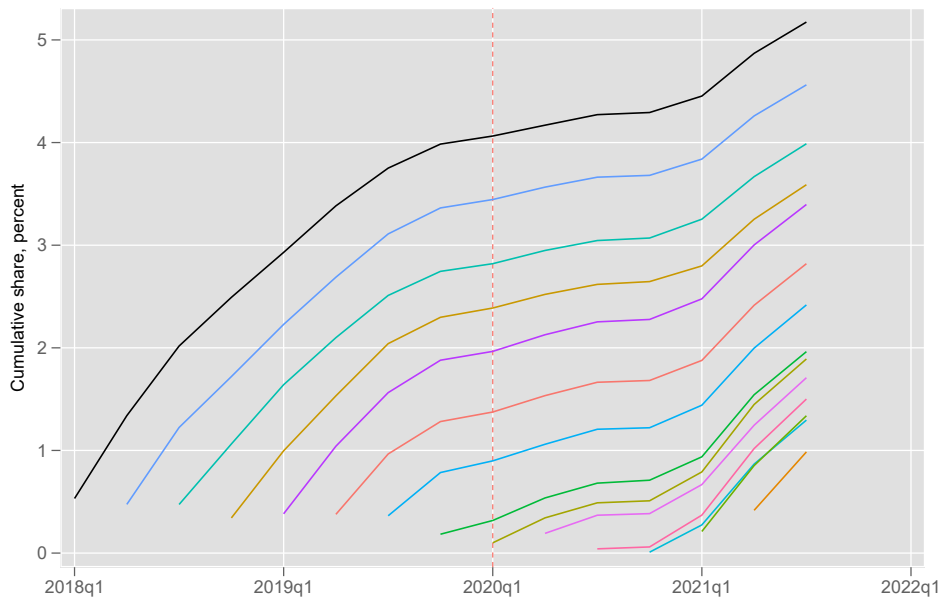
Figure A.8: Share of young businesses in total vacancies posted and total firms posting vacancies, by posting month



Source: authors' calculations using matched Indeed and BvD-FAME data. Note: firms on the right of the red vertical line were born during COVID-19 (post march 2020).

We then look into a cohort analysis to investigate the speed at which firms post vacancies and compare cohorts of firms born pre and post COVID. Figure A.9 plots the cumulative share of firms posting a vacancy in the total cohorts of firms incorporated by quarter. We can clearly see that this share is strongly affected by the aggregate trends in vacancy postings. We next regress this share on age-cohort and sector-time fixed effects, and plot the age-cohort fixed effects in Figure 4 to control for aggregate trends in vacancy postings.

Figure A.9: Cumulative share of firms posting a vacancy by quarterly cohorts of incorporation

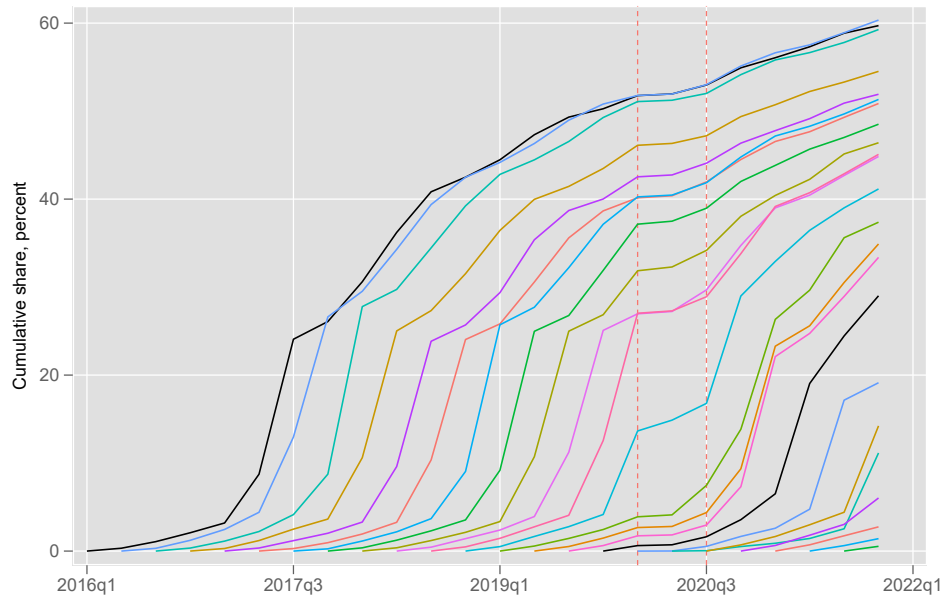


Source: authors' calculations using matched Indeed and BvD-FAME data. Note: firms on the right of the red vertical line were born during COVID-19 (post march 2020).

### A.5 Additional results using dissolutions data

Similarly than for job postings, we look into a cohort analysis to investigate the speed at which firms dissolve and compare cohorts of firms born pre and post COVID. Figure A.10 plots the cumulative share of firms dissolving in the total cohorts of firms incorporated by quarter. We can see that this share is strongly affected by the easement period in which Companies House suspended the process to dissolve companies and strike them off from their register from March to September 2020. For this reason, we compare cumulative shares for cohorts of firms excluding the easement period, that is 2016q1-2017q4 vs. 2020q3-2021q3.

Figure A.10: Cumulative share of firms dissolving by quarterly cohorts of incorporation



Source: authors' calculations using BvD. Note: the red vertical lines denote the easement period.