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Business exit during the COVID-19 pandemic: Non-traditional measures in historical context

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Abstract
Lags in official data releases have forced economists and policymakers to leverage "alternative" or "non-traditional" data to measure business exit resulting from the COVID-19 pandemic. We first review official data on business exit in recent decades to place the alternative measures of exit within historical context. For the U.S., business exit is fairly common, with about 7.5 percent of firms exiting annually in recent years. The high level of exit is driven by very small firms and establishments. We then explore a range of alternative measures of business exit, including novel measures based on paycheck issuance and phone-tracking data, which indicate exit was elevated in certain sectors during the first year of the pandemic. That said, we find many industries have likely seen lower-than-usual exit rates, and exiting businesses do not appear to represent a large share of U.S. employment. As a result, exit appears lower than widespread expectations from early in the pandemic.

1. Introduction
Widespread business exit—death—resulting from the Pandemic Recession would have long-lasting consequences for the U.S. economy. Unfortunately, actual business exit is difficult to measure in real time since official statistics on business dynamics are released with substantial lags: Bureau of Labor Statistics (BLS) data on establishment deaths during the first year of the pandemic will become available in mid-2022, and Census Bureau data on firm deaths will likely not be public until 2023. As a result, economic commentators and policymakers have been relying on "alternative" or "non-traditional" data to measure business exit. For example, business electricity accounts show little imprint of the recent economic stress while vacancy rates for office and retail are reaching levels last seen during the Great Recession. Similarly, defaults jumped, but both "going out of business" search queries from Google and 30-day defaults returned to trend after brief elevation. While the many indicators made available by private firms have

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1 We report these indicators in a prior working paper version of this paper, Crane et al. (2021).

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improved understanding of recent economic developments, it is critical to be aware of historical patterns of business shutdown and how popular alternative indicators compare.

In this paper we review official data on business closures and deaths before the pandemic, providing a set of stylized facts that are necessary for evaluation of alternative indicators of business shutdown. We then evaluate a range of alternative indicators—including several new measures of exit we formulate—and discuss what they suggest about business exits during the first year of the COVID-19 pandemic.

Official data reveal business death to be a common occurrence, with about 7.5 percent of firms and 8.5 percent of establishments exiting in a typical year. Various measures of business closure—temporary and permanent—have been counter-cyclical in the past and rose notably during the Great Recession. Levels and cyclicality of business death are driven primarily by extremely small firms and establishments—those with fewer than 5 employees—though larger firms often permanently close individual establishments (locations) as part of geographic or industry restructuring. The historical facts we document are interesting independent of COVID-19 considerations.

Alternative indicators of exit during the pandemic’s first year, on balance, suggest that exit has been elevated at least among small firms and establishments and particularly in the sectors most exposed to social distancing, though this elevated exit was partially offset by reduced exit in pandemic-friendly industries. A rough estimate is that the most troubled sector, other services (NAICS 81), which includes barber shops and nail salons, saw the permanent exit of more than 100,000 establishments in excess of historically normal exit levels during the 12 months of March 2020 through February 2021. Results for other sectors may have been more mixed; for example, within the leisure and hospitality sector, some businesses—like full-service restaurants—saw significantly elevated exit, while other businesses—such as those focused on outdoor recreation—saw exit rates similar to, or even below, those of previous years. The retail trade sector appears similar in that some industries—such as clothing stores—saw elevated exit, while others—such as grocery stores—saw below-normal exit. Our best non-traditional measures are more indicative of establishment than firm exit, though we do have some firm-based indicators with useful insights.

Taken together along with some prudent guesswork, our sector-level results suggest economywide excess establishment exit—that is, exit above and beyond pre-pandemic rates—was likely below 200,000 establishments during the first year of the pandemic, implying an exit rate about one-quarter to one-third above normal. This is roughly consistent with what we find from rough, preliminary estimates based on existing official Business Employment Dynamics (BED) data, which suggest roughly 185,000 excess establishment exits during the calendar year of 2020. We have less insight into firm exit, though given historical patterns 200,000 excess establishment exits would imply roughly 130,000 excess firm exits. Relative to popular discussion and early expectations, our results may represent an optimistic update to views about pandemic-related business failure. Throughout the paper, though, we emphasize the limitations of our non-traditional data.

We draw these inferences from a number of timely, high-frequency business exit indicators, some of which have been used in existing literature. Two key contributions in this respect, however, are the construction of employment-weighted shutdown indicators from ADP payroll data and a permanent business exit measure based on SafeGraph cell phone geolocation data. We also review more commonly used data on small business operations from Womply, Homebase, and the Census Bureau’s Small Business Pulse Survey. As we show, these alternative measures are most useful in the context of historical patterns of business exit.

A key challenge is distinguishing between temporary shutdown and permanent shutdown (exit), since temporary shutdown was widespread in the early pandemic months (e.g., Cajner et al., 2020). U.S. statistical agencies provide data on business exits, but identifying exits is more difficult in alternative data sources. Typically what can be measured is whether a business is engaged in normal activities—e.g., receiving customer traffic, completing transactions, or paying workers. We use the term “shutdown” to refer broadly to businesses not engaged in normal activities, whether temporarily or permanently, and we attempt (loosely) to make guesses about actual exits based on how long businesses have been inactive. We use the terms “exit” and “death” interchangeably to refer to likely permanent shutdown.

A handful of papers study business closure early in the pandemic using, for example, new surveys (Bartik et al., 2020a) or official data on self-employment (Fairlie, 2020). Wang et al. (2020) and Greenwood et al. (2020) report that 2020 bankruptcy filings by small businesses through August were significantly lower than in prior years (though importantly, bankruptcy is a different concept from exit). Bartik et al. (2020b) and Kurmann et al. (2021) measure business closures in Homebase data, and Chetty et al. (2020) measure early closures in Womply data. Hamilton (2020) uses Womply and Yelp data to estimate that as of July 2020, roughly 400,000 businesses had permanently closed during the pandemic; this number has been widely cited but is likely to be an overestimate in light of official and non-traditional data we review here, which were not available at the time Hamilton (2020) was written.

A number of studies by BLS researchers (Dalton et al., 2020a,b, 2021) track business closure in official business data; the authors use establishment microdata from the Current Employment Statistics (CES) along with establishment microdata with firm identifiers associated with the Quarterly Census of Employment and Wages (QCEW). These papers confirm that many establishment closures during April and May 2020 were temporary, though they note that closure rates stabilized somewhat by July. While the authors find that early establishment closure was far more elevated among small firms than among large firms, in late 2020 they observe an uptick in closures of establishments of firms with 250–500 employees; employment-weighted closures in this group remained historically elevated (by roughly 3 percentage points) into early 2021.

We first provide general background on the importance of business exit, drawing from the literature and the unique aspects of the COVID-19 pandemic (Section 2). We explore historical patterns of business exit, summarizing them as a list of stylized facts, in Section 3. We review a range of official and non-traditional measures of business shutdown during 2020 in Section 4. We take stock and conclude in Section 5.

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2 See Dalton et al. (2021) for estimates through early 2021; see associated slides at https://conference.nber.org/conf_papers/f152529.slides.pdf. Employment-weighted closure rates for establishments of large (500+) firms also remained elevated, though only modestly.
2. Background on business exit

Exit, as part of a broader set of business dynamics patterns, generally enhances aggregate productivity as lower-productivity exiting businesses are replaced by higher-productivity entrants. But in the pandemic environment, patterns of business exit may be driven by the geographic, industrial, and temporal onset of severe infection outbreaks and lockdowns rather than business productivity. As a result, many high-productivity businesses might fail during the COVID-19 episode, while some low-productivity businesses that otherwise would have exited may be saved by pandemic policies (see, e.g., Gournichas et al., 2021).

Outside of business exit situations, a large share of workers that face job separations return to their former employers (“recall hires,” see Fujita and Moscarini, 2017). Exit eliminates this recall option and, potentially, implies longer unemployment spells for workers. While the costs of exit-induced layoffs may be manageable during periods of strong labor markets, releasing workers onto labor markets at a time of high unemployment presents greater potential for long-term harm (Davis and von Wachter, 2011).

Business exit, particularly when it involves entire firms rather than single locations, also means the destruction of firm-specific forms of intangible capital—brand value and tacit knowledge about production or distribution—and costly reallocation of physical capital (Cooper and Haltiwanger, 2007). From the perspective of business owners, the exit of a firm means not only the loss of a job but also potentially the destruction of household wealth. And from the perspective of local economies, widespread business exits may alter the economic geography of neighborhoods and communities.

3. Historical patterns of business closure and death

Both the BLS and the Census Bureau publish official statistics on business closure and death. The BLS publishes establishment closure and death data through the quarterly BED product. These data are based on the state and federal unemployment insurance data underlying the QCEW product, cover the near-universe of U.S. private nonfarm business establishments with formal employees, and start in the early 1990s.

The BLS provides two measures of business shutdown: establishment “closures” are establishments that had positive employment in the third month of the previous quarter but zero employment (or no reported employment) in the third month of the current quarter, and establishment “deaths” are establishments that have been closed for four consecutive quarters.

Separately, the Census Bureau publishes both firm and establishment exit data through the annual Business Dynamics Statistics (BDS) product. Firms and establishments with positive employment in March of the previous year but no employment in March of the current year are counted as deaths. While the BDS only provides annual data, rather than quarterly as in the BED, the BDS has advantages of a longer time series (starting in the late 1970s, though we focus on post-1983 data) and ability to distinguish between firm and establishment deaths.

Fig. 1 reports official data on business closures and deaths in recent decades. The top panel reports annual firm and establishment death rates from the BDS through 2018, with unweighted death rates (deaths as a share of establishments) on the left panel and employment-weighted death rates (employment at deaths as a share of employment) on the right panel. The bottom panel reports quarterly establishment closure and death rates from the BED (seasonally adjusted) through 2019, again with unweighted rates on the left and weighted rates on the right.

Fig. 1 shows that business shutdown and death are common occurrences. In recent years (2015–2018), annual firm death rates have been around 7.5 percent of firms (about 400,000 per year), while establishment death rates have been around 8.5 percent at an annual frequency (about 600,000 per year) or just over 2.5 percent at a quarterly frequency. A comparison of the left and right panels reveals that business death comprises a much smaller share of employment than of firms or establishments, implying that exit is concentrated among smaller businesses, as is exit cyclicity; we show this in more detail in Appendix A.

Fig. 1 also suggests that most measures of business shutdown are countercyclical, with particularly notable increases during the Great Recession (when firm exit rates rose by roughly 1.5 percentage points from the previous expansion low). In Appendix A we report correlations and regressions demonstrating the countercyclicality of exit, with results that are broadly consistent with those of Tian (2018).

Finally, a comparison of quarterly deaths and quarterly closures in BED data indicates that temporary closure is common, affecting roughly 2 percent of establishments or about 0.5 percent of employment each quarter (the difference between the dashed red and solid blue lines); this likely reflects some combination of typical seasonal business suspensions and temporary periods of business distress.

The above data suggest a set of stylized facts that must be kept in mind as alternative measures of business shutdown are examined:

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*See, e.g., Bartelsman et al. (2013), Decker et al. (2017, 2020), Foster et al. (2001), Foster et al. (2006), Foster et al. (2016), and Syverson (2011). For theoretical considerations see, e.g., Hopenhayn (1992) and Hopenhayn and Rogerson (1993). Some business exits occur as large firms restructure their activities across industry and geography, closing some establishments while opening others to better meet demand or to adjust to changing global supply chains (e.g., Davis et al., 2014; Fort et al., 2018). An “establishment” is a single business operating location (with few exceptions). A “firm” is a collection of one or more establishments under common ownership or operational control.

4 In all panels we use (Davis et al., 1996) (DHS) denominators, where the current and previous quarters’ or years’ values are averaged (using longitudinally precise lag values where possible).

5 Quarterly rates need not aggregate to annual rates due to short-lived establishments or potential discrepancies between BDS and BED data.

6 We also note that exit rates are driven largely by younger firms. Among the smallest firms (those with fewer than five employees), those with age of zero saw exit rates above 20 percent in recent years, while firms of age ten or above saw exit rates well below 10 percent.
• Annual firm exit rates have averaged around 7.5 percent in recent years—roughly 400,000 firms—or 2 percent of employment.
• Annual establishment exit rates have averaged around 8.5 percent in recent years—roughly 600,000 establishments—or 3.5 percent of employment.
• Quarterly establishment death rates have averaged about 2.5 percent, or about 0.5 percent of employment.
• Business exit is countercyclical; in particular, firm exit rates rose by about 1.5 percentage points in the Great Recession.
• The overall rate of business exit and the countercyclicality of exit are driven primarily by very small firms and establishments.
• Temporary business closure is common, affecting about 2 percent of establishments per quarter.

4. Has COVID-19 sparked a surge in business exit?

Official data on business exit are released with a lag: BED data on establishment closures are currently available through the second quarter of 2021, but BED deaths are only available through the third quarter of 2020. BDS data on firm deaths during 2020 will (presumably) not be available until late 2023.8 In the meantime, we must rely on some guesswork along with non-traditional
measures of business activity to assess the magnitude of business exit during the first year of the pandemic. We now describe several such measures.

4.1. ADP

We first describe business closure measures based on microdata from ADP, a provider of payroll processing services for businesses comprising about one-fifth of total private sector employment. Key advantages of ADP data are their comprehensive coverage across business size and industry cells as well as the ability to observe both unweighted and employment-weighted business closure measures. A challenge—in the context of business shutdown—is that true shutdown cannot be distinguished from ADP client turnover, a limitation present in many non-traditional business microdata sources.

We observe paycheck issuance events at the business level, and we measure business shutdown based on the length of time a business goes without issuing pay. Since we have a long history of ADP data, we focus on comparing the 2020–2021 experience to the average experience from recent years (2015–2019) to abstract from typical patterns of ADP client turnover. We begin in mid-February 2020 and, for each week thereafter, we tally up the share of businesses that were operating in February 2020 but are in the midst of a shutdown period. We compare this share to the same-week average for the 2015–2019 period (i.e., the average for February cohorts of businesses starting in each of 2015–2019). For example, the 2019 cohort data extend from February 2019 through February 2020.

The top-left panel of Fig. 2 shows the results for various shutdown durations. The solid blue line shows the share of businesses that are in a shutdown spell of at least 25 days, in 2020 relative to the 2015–2019 average for a given week. By late April of 2020, the share of businesses in a 25-day (or more) shutdown spell was nearly 12 percentage points higher than it was at the same time in past years. After that time, however, closed businesses reopened such that the share of businesses that were shut down returned to the historical pace by late August. The dot-dash red line uses a more stringent criterion for measuring shutdowns, reporting the share of businesses that were in shutdown spells of at least 36 days (relative to the same measure in previous years). This ensures that businesses that pay on any pay frequency—weekly, biweekly, or monthly—do not count as spurious shutdowns. By late April 2020, the share of businesses that were in shutdown spells of at least 36 days exceeded historical patterns by more than 6 percentage points. The dashed black line focuses on shutdown spells of 70 days or more.

In short, while business shutdown, including shutdown spells of more than two months, was elevated in the late spring of 2020, by the end of August we observe no evidence of excessive, ongoing business inactivity; in fact, shutdown was well below normal by late 2020. The historically low pace of shutdowns in late 2020 likely reflects, in large part, increased client retention during 2020, which has been noted in ADP earnings calls. This makes the data difficult to interpret; still, though, if permanent death were extremely elevated in 2020, it would likely be reflected in this large dataset. So the data, while not dispositive, are at least suggestive.

The top-right panel of Fig. 2 shows the same concepts in an employment-weighted form. To calculate employment-weighted shutdowns in any given week, we identify businesses that meet a given shutdown criterion (25 days, 36 days, or 70 days) then calculate their employment share based on their February 15, 2020 employment as a share of total employment. Hence, the top-right panel of Fig. 2 shows the share of February’s employment that is associated with businesses that shut down in some weeks thereafter, in 2020 compared with the 2015–2019 average for that week. Employment-weighted shutdown also peaked in late April/early May 2020, when businesses inactive for at least 25 weeks accounted for a share of February employment that exceeded past years’ share by about 5 percentage points. In employment terms, extremely long shutdown spells of 70 days or more were barely more common in mid-2020 than in past years; and by late August the share of employment attached to closed businesses was lower than average.

The differences between the top-left and the top-right panels of Fig. 2 suggest that the elevated shutdown in spring 2020 relative to past years was driven largely by smaller units. We can see this more clearly in the bottom-left panel of Fig. 2, which shows (unweighted) 70-day shutdown rates in 2020 relative to 2015–2019 averages, separated by business size. The dot-dash black line shows that shutdown rates among the largest units—those with at least 500 employees—were similar to the pace of previous years for much of 2020 then dipped even lower by the end of the year. Smaller units saw significantly elevated shutdown rates in late April/early May 2020, but by August all business sizes saw shutdown rates well below historical patterns. The bottom-right panel shows that shutdown patterns do vary some across sectors; but while the mid-2020 cross-sector variation is intuitive, the shutdown rates show striking convergence by the end of the year.

Taken at face value, the ADP data suggest that business shutdown was elevated during the middle of the year, but on net these excess shutdowns were all temporary; since then, shutdown has moved well below historical rates, even among small units. This is a striking result, since the ADP data are reasonably comprehensive in terms of coverage across sectors and establishment size classes. If permanent business shutdown were accounting for a sizeable share of businesses and employment, we would expect to see evidence of it in the large sample of ADP clients. We again emphasize, however, that ADP data can be affected by patterns of client turnover in addition to true business shutdown, and elevated customer retention is readily apparent late in 2020.

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9 Cajner et al. (2018) describe ADP microdata in detail and document representativeness across business size and industry. Cajner et al. (2020) use ADP data to explore various dimensions of the early pandemic recession including business shutdowns and reopenings, temporary versus permanent job losses, and wage dynamics. Some ADP clients may process payroll at the establishment level, while others may process at the firm level or something in between; we follow Cajner et al. (2018) in treating ADP units as establishments. We apply sampling weights to ADP payroll units from the QCEW (with weights in terms of NAICS sector and establishment size as of March of 2020).
Fig. 2. Measures of business closure from ADP payroll data (2020–2021 relative to 2015–2019 average). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

4.2. Small business trackers

We next turn to two popular measures of small business activity, shown on Fig. 3. The left panel reports daily data from Womply, a credit card transaction processor, on the share of firms that have ceased processing point-of-sale transactions since mid-February.\footnote{Womply is a credit card analytics firm that aggregates data on card transactions. Data reported by Womply reflect card transactions (or lack thereof) among small businesses as defined by the Small Business Administration (see Chetty et al. (2020) or https://www.womply.com/blog/data-dashboard-how-coronavirus-covid-19-is-impacting-local-business-revenue-across-the-u-s/). We follow Chetty et al. (2020) in treating Womply businesses as firms.} The right panel reports weekly data from Homebase, a provider of clock-in/clock-out tracking software, showing the share of firms that have stopped reporting clock events since mid-February 2020 (and, conveniently, we can observe 2019 data for Homebase as...
In both cases, the sample of businesses is restricted to those that were operating in February 2020 (or February 2019 for the 2019 Homebase line), abstracting from entry into the sample (consistent with our ADP-based exercises above). Importantly, presence in these datasets may be less costly than for ADP data; for example, many Homebase clients use a free tier of the service, which implies different selection considerations than may be present in ADP data.

These measures, which are focused on small firms in customer-facing industries, suggest that business shutdown rose sharply in March and April, but many closed businesses reopened in May and June. Still, the recent observations indicate that shutdown was indeed elevated during the first year of the pandemic. Homebase data suggest that, as of the end of February 2021, shutdown in well-covered industries was elevated by roughly 3 percentage points relative to the same time a year earlier. Given the Homebase comparison to 2019, the absence of historical comparisons for Womply data warrants extreme caution in interpreting Womply shutdown rates.

Small businesses have also been the subject of a number of surveys, most notably the Census Bureau’s Small Business Pulse Survey. This survey is particularly interesting because it asks respondents about their exit expectations. We describe the survey and notable results in Appendix C. Most notably, for a time in mid-to-late 2020, small business exit expectations were elevated roughly one-quarter relative to historical actual exit rates.

Importantly, a limitation that is common to ADP, Womply, and Homebase data—as well as surveys like the Small Business Pulse Survey—is the possibility that exit patterns are driven by client or respondent attrition rather than business shutdown. Our comparisons to past-year patterns in ADP and Homebase data are designed to provide perspective on this; roughly speaking, the question is not whether we observe exit in these data but, rather, whether we see excess exit relative to historical patterns. We next turn to a measure that is not subject to the particular limitation of client or respondent attrition.

4.3. SafeGraph

SafeGraph is a company that aggregates anonymized location data from numerous mobile device applications to provide insights about physical places. The company temporarily made their micro-level data available to researchers and government agencies studying the impact of COVID-19, and a number of papers have used the data in studying the effects of COVID-19 (e.g., de Vaan et al., 2021; Farboodi et al., 2021). The company links location data from roughly 45 million mobile devices to a registry of around 6 million points of interest nationwide to record, at a daily frequency, individual visits to these points of interest.

11 Homebase provides clock-in/clock-out software for small businesses and can therefore observe employment activity in close to real time. As of early 2020, Homebase data included over 60,000 establishments with about 500,000 (hourly) employees. Coverage is concentrated among very small establishments (mostly those with fewer than 20 employees) in retail and service industries that happened to be particularly affected by social distancing. We aggregate Homebase establishment data to the firm level using their (anonymized) company identifier. See Kurmann et al. (2021) for extensive detail on Homebase representativeness, and see http://joinhomebase.com/data for more details on Homebase data.

12 To enhance privacy, SafeGraph excludes census block group information if fewer than five devices visited an establishment in a month from a given census block group.

13 While the exact universe of businesses covered by SafeGraph data is difficult to define, with 6 million points of interest it is likely that a large share of U.S. establishments are covered. The BLS QCEW data for March 2019 show about 10 million establishments in the U.S., which may be an overstatement of employer businesses since Census Bureau BDS data for 2018 show about 7 million establishments.
In Appendix B we describe a methodology that identifies temporary closure and likely permanent establishment exit based on patterns of visits to business locations. These indicators should be considered as establishment, not firm, indicators since they are based on business operating locations.\(^{14}\) This customer and worker \textit{traffic}-based measure of business operation is distinct from the payroll- or revenue-based measures of ADP, Womply, and Homebase described above. Importantly, traffic-based measures of business shutdown are more useful in some industries than in others; for example, in construction, traffic patterns may not be useful as workers may report to various construction sites each day. Similarly, such measures applied to industries like landscaping services or food trucks would also be problematic. Generally speaking this methodology is appropriate for industries that rely on consumer (and worker) visits to businesses at a stationary location, a situation that applies to many retail and service businesses. It is convenient, though, that industries likely to be most sensitive to social distancing concerns are also those for which our traffic-based closure measure may be most appropriate.

We first illustrate these measures for full-service (“sit-down”) restaurants (NAICS 722511), an industry that is well-suited to this methodology, has good coverage in SafeGraph data, and is sensitive to social distancing concerns and restrictions; note that this industry excludes fast food and takeout establishments (NAICS 722513).\(^{15}\) The blue bars in Fig. 4 show estimates of temporary restaurant closure during each month of 2020 and into early 2021, based on a calibrated drop in consumer visits relative to normal patterns for that establishment. This fraction was low, around 3–4 percent in the months before the pandemic, but then jumped to over 50 percent in the months of March and April as social distancing policies were put in place. The overall contour of the remaining months fits the pattern of impacts of COVID-19: some declines in temporary closure in the summer months followed by increases in November, 2020 to January, 2021 before declining once again.

Estimates of the flow of restaurants that may have \textit{permanently} closed each month are shown by the red bars in Fig. 4; these are restaurants that closed during the indicated month and had still not reopened by February, 2021.\(^{16}\) The monthly exit rate jumps in March 2020 to around 1.5 percent of restaurants and then increases again in July and August. The cumulative 12-month exit rate of restaurants, from March 2020 to February 2021, based on this measure is 13.5 percent, about 70 percent above rates seen in official data in recent years (around 8 percent). The data therefore suggest that establishment exit has been substantially elevated in the full-service restaurant industry.

We also calculate cumulative (March 2020 to February 2021) permanent closure rates using the SafeGraph-based measure for a number of other industries and compare the experience of the first 12 months of the COVID-19 pandemic to historical exit rates in official data. Table 1 reports the establishment count, the average 2015–2018 establishment exit rate from the BDS, the SafeGraph-based exit rate for March 2020-February 2021, the implied excess exit rate, and the implied count of establishment deaths in excess

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14. The methodology outlined in Appendix B turns out to be similar in spirit to what is done in de Vaan et al. (2021) when studying the spillover effects of store closure.

15. Our measure is reasonably robust to the notable shift of restaurants to carry-out service, which is evident in the SafeGraph data based on changes in the duration of consumer visits (see Appendix B Figure B1). Carry-out or delivery service still requires a visit to the business address.

16. The monthly estimates for the short benchmark period of January–February of 2020 (0.1 to 0.2 percent) are below the average monthly rate of exit for restaurants from BDS data (0.7 percent), so our SafeGraph measure might understate exit somewhat in other periods. BDS data for NAICS 7225—a broader category than the six-digit industry studied here—indicate recent (2015–2018) annual establishment death rates of 8.1 percent, implying monthly rates of a bit under 0.7 percent.
of historical norms. The industry-level variation in excess business closure largely aligns with intuition, as shown in the Excess Rate column of Table 1. The Broad sectors portion of the table shows these comparisons for select 2-digit NAICS sectors, while the bottom portion shows select 4-digit industry-group detail. The highest rates of excess closure are in industries relying heavily on in-person contact (other services, such as personal care services), experiencing COVID-related reductions in demand (automotive repair), or that are close substitutes with e-commerce (clothing stores). Some industries with lower-than-typical closure rates include grocery stores and electronics and appliance stores, two industries that have seen increased demand during the pandemic.

A few other industry results are worth discussing. The excess closure rate for accommodation and food services (and traveler accommodation in particular) is lower than might be expected given the large drops in travel and restaurant dining induced by the pandemic (and the elevated exit we observe among full-service restaurants mentioned above). But anecdotes suggest that certain areas of this sector have been resilient to the pandemic; indeed, the aggregated industry group of restaurants and other eating places (NAICS 7225) saw exit rates only modestly above historical averages, suggesting that the high rate we document for full-service restaurants was partially offset by low exit rates among limited-service restaurants like pizza delivery, fast food, and takeout. More broadly, the Paycheck Protection Program (PPP) targeted the accommodation and food services sector for special treatment, allowing virtually the entire sector to qualify rather than just small firms, potentially facilitating continued operation despite large declines in revenue.17

The low excess closure rate for “arts, entertainment, and recreation” is also striking, though this industry is a mix between establishments that specialize in pandemic-friendly outdoor recreation (i.e., golf courses, skiing facilities) and those that specialize in riskier indoor recreation (i.e., museums, fitness centers, and bowling alleys). The retail trade sector likely saw considerable heterogeneity in exit rates, combining high-exit industries like clothing stores with low-exit industries like grocery stores and (likely) nonstore retail. We expect exit rates to have been lower in the broad sectors not reported here, with the possible exceptions of mining (due to oil market developments) and, perhaps, education.

The implications of our SafeGraph-based estimates can be found in the last column of Table 1. Our SafeGraph-based estimates suggest excess exit of about 123,000 establishments in other services, with negligible figures in other sectors. Since we expect other sectors that are less well measured by SafeGraph to have fared better than the social distance-sensitive sectors we report here, excess exit for the economy as a whole was likely not far off from the figure for the worst-off sector of other services. That is, these data suggest that excess exit was likely below (say) 200,000 establishments during the first year of the pandemic. Of course, this is a guess in which we assume that sectors other than other services saw relatively low excess exit; if our guess is reasonable, it would imply that overall exit has been elevated by about one-third, as the average annual number of establishment exits during 2015–2018 was about 600,000 in BDS data.18

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17 While the PPP was generally only available to small firms, for the accommodation and food services sector the size qualification was based on establishment size. Decker et al. (2021) find that more than 99 percent of establishments in that sector met the size qualification.

18 Our mixing of BLS and Census Bureau data on Table 1 is not without consequence and is its own source of uncertainty since the BLS reports about 35 percent more private establishments than the Census Bureau. Scaling down the establishment counts from Table 1 using a 1.35 ratio suggests an upper bound estimate of 150,000 excess establishment exits, which would imply overall exit was elevated by about one-fourth.
In summary, the measure inferred from mobile device location data—which is not subject to the customer attrition concerns of our previously described data sources—appears to show elevated exit rates for restaurants and other industries that align with the effects from COVID-19. However, this unconventional measure of business exit should be treated with caution as there remain several unique features of our measurement that may not align with true business exit.

4.4. Comparing our estimates to early official data

While official data on firm and establishment exits are not yet available for the full time period we study, we can use existing BED data on establishment closures, openings, and births for the full calendar year of 2020 to assess the sensibility of our estimates from non-traditional data. In the BED, establishment closures in 2020 exceeded their 2019 pace, but openings were also elevated. Moreover, by comparing openings with births, we can quantify reopenings of previously closed establishments and thereby estimate the number of closed establishments that have not reopened.

In the BED data, cumulative closures during the four quarters of 2020 totaled 2,176,000, while cumulative reopenings during the second quarter of 2020 through the first quarter of 2021 totaled 1,116,000. The difference between these figures—1,060,000—is a reasonable estimate of establishment exits throughout 2020. The average annual exit pace of 2015–2019 in BED data was 875,000, suggesting that 2020 saw excess exits of roughly 185,000, remarkably consistent with our estimate above (though covering a slightly different time period).

Data on actual establishment exits are currently available through the third quarter of 2020; the annualized pace of actual exits for the first three quarters of 2020 is 1,117,000, which would imply an exit exit rate close to 242,000. This is higher than, but still reasonably consistent with, our estimate based on non-traditional data; moreover, closures declined in the fourth quarter, so we might expect actual exits to have been lower in that as-yet unmeasured quarter as well.

We emphasize that our non-traditional data-based exit estimates for the first full year of the pandemic were computable in March of 2021, at which time BED data on establishment closures were only available through the third quarter of 2020, with no death data for 2020 at all, such that the above BED-based estimates were still infeasible for a few quarters yet.

5. Taking stock

Our analysis suggests that business exit likely was elevated during the first year of the pandemic. We find direct evidence of increased establishment deaths among full-service restaurants, personal care services, automotive repair, and certain retailers (apparent in SafeGraph data) and suggestive direct evidence for elevated deaths among small firms in related industries generally (apparent in Womply and Homebase data). But within sectors, variation across industries appears to be partially or fully offsetting, such that most sectors did not see dramatically elevated exit; the primary exception is other services, where we estimate that establishment exits exceed prior years’ pace by about 120,000. From this estimate, and considering our relatively modest estimates for other sectors, we judgmentally estimate that excess establishment exits were below 200,000 during the first year of the pandemic.20 Separately, our ADP data suggest that any rise in business exits has not reached larger business units or even enough smaller units to account for a material share of employment, which would be consistent with past patterns of employment-weighted exit cyclicality. This result may be somewhat too optimistic, however, as Dalton et al. (2021) find employment-weighted exit to be materially elevated among certain firm size classes.

Excess establishment exits below 200,000 during the first year of the pandemic—and excess firm exits below 150,000, if historical shares continued—with little associated excess job destruction would likely be a positive outcome relative to widespread expectations from early in the pandemic. Some of the detrimental consequences of elevated exit—permanent job dislocation, potential productivity impacts if selection works adversely, and the destruction of intangible and physical capital—may be modest in aggregate if exit does not reach large firms or a greater number of small firms. Other detrimental consequences—loss of job and wealth for business owners and abrupt changes to local economic geography—have welfare implications even if exit is not substantial on an activity-weighted basis.

Given various dataset-specific caveats mentioned in the main text, we view our evidence as suggestive, not conclusive. Early and ongoing policy actions may have helped businesses in the relatively optimistic sectors to survive the worst of the pandemic and sustainably reopen.21 Alternatively, it may be that our imperfect indicators underestimate the magnitude of the surge in exit. Ultimately, we will not have certainty about business exit during 2020–2021 until high-quality official data are published. In this respect, our work highlights the importance of timely data production and underscores the value of official data producers.

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20 Our results seem roughly consistent with the Census Bureau’s weekly, pandemic-inspired Small Business Pulse Survey business expectations during the pandemic; see Appendix C. Separately, early evidence suggests business entry surged during the first year of the pandemic (Dinlerosz et al., 2021). Combined with our evidence of lower-than-expected exit, it may be that the effect of the pandemic on the net change in establishment or firm numbers will turn out to be modest.

21 While it is still too early for clear results, several studies find evidence of material positive effects of the Paycheck Protection Program (PPP); see, for example, Autor et al. (2020), Doniger and Kay (2021), and Kurmann et al. (2021).
CRediT authorship contribution statement

Leland D. Crane: Methodology, Software, Formal analysis, Writing – review & editing. Ryan A. Decker: Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – original draft, Visualization. Aaron Plaen: Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Visualization. Adrian Hamins-Puertolas: Software, Investigation, Writing – review & editing, Data curation. Christopher Kurz: Conceptualization, Writing – review & editing.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jmacro.2022.103419.

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