

Entrepreneurship and the Gig Economy: Evidence from U.S. Tax Returns*

Matthew Denes[†]
Spyridon Lagaras[‡]
Margarita Tsoutsoura[§]

October 31, 2023

Abstract

Platform intermediation of goods and services has considerably transformed the U.S. economy. We use administrative data on U.S. tax returns to study the effect of the gig economy on entrepreneurship. We find that gig workers are more likely to become entrepreneurs, particularly those who are lower income, younger, and benefit from flexibility. We track all newly created firms in the economy and show that the gig economy facilitates learning by potential entrepreneurs who experiment with starting riskier firms. Overall, our findings provide novel evidence about how on-the-job learning promotes entrepreneurial entry and shifts the type of firms started by entrepreneurs.

JEL Classification: G30, J21, J22, J24, L26

Keywords: Entrepreneurship, Gig Economy, Learning, Experimentation

[†]Carnegie Mellon University. Email: denesm@andrew.cmu.edu.

[‡]University of Pittsburgh. Email: slagaras@katz.pitt.edu.

[§]Washington University at St. Louis, CEPR, ECGI, and NBER. Email: tsoutsoura@wustl.edu.

*We thank Paul Beaumont, Greg Buchak, Tony Cookson, Mike Ewens, Slava Fos, Yael Hochberg, Johan Hombert, Edith Hotchkiss, Katrin Hussinger, Emilie Jackson, Ankit Kalda, William Kerr, Cameron LaPoint, Tong Liu, David Robinson, David Sovich, Rick Townsend, Melanie Wallskog, Sheng-Jun Xu, Ting Xu, and Hanyi (Livia) Yi and conference participants at CEPR Endless Summer, Corporate Finance Day, Craig Holden Memorial Finance, ECB-CEPR Labour Market, FIRS, FOM, FSU SunTrust Beach, Labor and Finance Group, LBS Summer Finance, MFA, Munich Summer Institute, NBER Entrepreneurship, NFA, Northeastern University, CMU-Pitt-Penn State Conference, RCFS Winter, Red Rock, and WFA, and seminar participants at the Bank of Greece, Boston College, Georgia Tech, North Carolina State University, University of Oregon, University of Oxford, and U.S. Department of Treasury for helpful comments. We gratefully acknowledge funding support from the Annie E. Casey Foundation, the Block Center for Technology and Society, the Ewing Marion Kauffman Foundation, and the W.E. Upjohn Institute for Employment Research. This research is conducted through the Joint Statistical Research Program of the Statistics of Income Division of the IRS. Terry Cheng, Caitlin Hartley, Casey Li, Maxwell Sacher, Jacob Triplett, and Collin Zoeller provided excellent research assistance. We thank many people at the IRS for their assistance with and support of our research, including Anne Herlache, Alicia Miller, and Tomas Wind. The views and opinions presented in this paper reflect those of the authors and do not necessarily reflect the views or the official position of the Internal Revenue Service. All results have been reviewed to ensure that no confidential information is disclosed.

1 Introduction

Labor markets play a central role in an individual’s decision to become an entrepreneur (Hombert et al. (2020), Gottlieb, Townsend, and Xu (2022), and Hacamo and Kleiner (2022)). Relying on recent technological advancements, the gig economy has disrupted labor markets and reshaped income opportunities for many individuals. There has been a correspondingly large take-up, with nearly 10 million people participating in the U.S. gig economy over the past decade. Characterized by relatively low entry costs and flexibility, the gig economy can reduce uncertainty and encourage experimentation, which are vital components of entrepreneurship (Manso (2011) and Kerr, Nanda, and Rhodes-Kropf (2014)). In this paper, we use novel data linking gig workers to their newly created firms and provide the first evidence about how the gig economy alters the profiles of new entrepreneurial ventures.¹

Uncertainty is an inherent element of entrepreneurship. The gig economy might influence the risks faced by potential entrepreneurs in several ways. First, opportunities in the gig economy can mirror the experiences of an entrepreneur, allowing individuals to learn about entrepreneurship and accumulate industry-specific experience. Second, the costs of experimentation impact innovative activities (Ewens, Nanda, and Rhodes-Kropf (2018)). The gig economy may reduce these costs and provide an additional source of startup capital. Third, it lowers downside risk by providing entrepreneurs with the ability to smooth income. By encouraging learning and supporting risk taking by prospective founders, the gig economy may facilitate the creation of firms that eventually grow larger and disproportionately contribute to economic growth.

To study the interaction between the gig economy and entry into entrepreneurship, we use administrative data from federal tax returns filed with the Internal Revenue Service (IRS) on the universe of firms and individuals in the United States. For every year in our

¹A growing number of papers study the gig economy. Entry of ride-hailing services (Barrios, Hochberg, and Yi (2022)) and short-term rentals (Mao et al. (2023)) are associated with higher aggregate firm creation. We connect gig workers with their newly created firms to examine how they differ from those in the U.S. economy.

sample from 2012 to 2021, the micro-level information allows us to observe income received in the gig economy for each individual linked with entrepreneurial entry.² We also track firms at founding and their subsequent performance over time, in addition to the characteristics of entrepreneurs. Using these novel data, we seek to understand how the gig economy influences the types of new firms started by gig workers and offer insights about mechanisms spurring new firm creation.

In our first set of analyses, we study the effect of the gig economy on entry into entrepreneurship. We compare the likelihood of starting a new firm for all individuals in the U.S. aged 25 to 65 who previously received income from the gig economy relative to those who have not participated in it. We find that gig workers are 1.0 percentage points more likely to create a new firm. This estimate holds across a variety of specifications, where the strictest model absorbs time-varying local economic conditions and saturates the model with granular fixed effects for individual characteristics to account for differences in income and age, in addition to other controls. We also separately examine entrepreneurs who start a firm for the first time and show that they account for about three-quarters of the effect of the gig economy on entrepreneurial entry. Last, we find that gig workers receiving income from both transportation and non-transportation gig firms are more likely to create a new firm, although the effect is larger for non-transportation gig firms. These results provide the first micro-level evidence connecting gig income for specific individuals with entrepreneurial entry.

We continue our individual-level analyses by evaluating the characteristics of gig workers who respond by creating new firms. We investigate the role of capital constraints, lifecycle considerations, and flexibility in spurring entrepreneurial entry. These characteristics will allow us to provide insights into possible mechanisms driving new firm creation by gig workers and the types of firms that they create. We find that individuals who participate in the gig

²We observe an individual's income from the gig income using information returns filed by those firms operating in the gig economy. We measure firm creation in tax returns using the most common type of firms, which are sole proprietorships. Sections 2.2 and 3.1 explains how we construct data on gig income and firms, respectively. We exclude firms that are mechanically created due to tax reporting requirements.

economy and have relatively lower incomes are more likely to start new firms. We measure income using adjusted gross income, income distribution in a particular county-year, and whether an individual received an income-related tax credit. We also show that the propensity to become an entrepreneur is higher for younger gig workers. Further, individuals often have flexibility about when they participate in the gig economy. To proxy for individuals who might benefit from this flexibility, we examine all individuals with dependents as well as single filers with dependents. We find that both groups are significantly more likely to become entrepreneurs when participating in the gig economy. Taken together, the first set of results links gig workers with entrepreneurial entry, highlighting shifts in the profile of responsive individuals.

Next, we study the universe of firms created in the United States from 2012 to 2021. For each firm, we determine whether an entrepreneur participated in the gig economy before the firm was created (“gig founder”) or if the individual did not receive gig income prior to starting the firm (“non-gig founder”). This distinction allows us to evaluate how firms spurred by participation in the gig economy differ from other firms. To our knowledge, this is the first paper that links individuals deriving income from the gig economy with the firms that they create.

We start our firm analyses by asking two related research questions. First, how does the industry composition of firms created by gig founders compare to non-gig founders? For all firms in our sample, we determine the share of newly created firms in a particular industry separately for gig- and non-gig-founded firms. We find that gig workers create a higher share of firms in personal services, trade, and transportation. We corroborate the industry composition of gig-founded firms by exploring the transition of gig workers into entrepreneurship based on their experience in the gig economy. In this approach, we calculate the proportion of gig workers who start a firm in a particular industry based on the type of gig firm from which they received income. We show that gig founders often transition from the gig economy into similar industries. This evidence is consistent with

learning, where the industry-specific experience of gig workers influences the types of firms that they start. Second, what is the role of prior work experience for entrepreneurs? Using the universe of earnings reported for salaried employees and independent contractors, we find that entrepreneurs who previously participated in the gig economy are significantly more likely to start a firm in an industry where they have prior work experience. We separately examine the importance of experience in the gig economy and show that it remains elevated for gig workers. Overall, these findings suggest that learning might be an important mechanism in the gig economy for facilitating entry into entrepreneurship.

In the next set of analyses, we investigate firm-level characteristics at founding and subsequent performance to shed light on potential mechanisms that might spur entry into entrepreneurship by gig workers. We hypothesize that gig workers learn to experiment through their experience in the gig economy. Recent literature highlights the importance of experimentation in entrepreneurial endeavors (Manso (2011) and Kerr, Nanda, and Rhodes-Kropf (2014)). We contribute to this literature by linking on-the-job learning with experimentation by gig founders using micro-level data on gig income received by founders and the firms that they start. We first evaluate firm size at founding based on revenues and employees. Using both measures, we find that gig-founded firms are significantly larger relative to firms created by individuals not participating in the gig economy. These estimates hold when we include county fixed effects to absorb time-invariant local differences and year fixed effects to account for macroeconomic trends. We also include industry fixed effects to compare firms created in the same industries. This suggests that gig workers who become entrepreneurs bear more risk when they form a new firm.

We now turn to evaluating firm performance. For each firm in our sample, we track whether the firm survives to a particular year and, conditional on surviving to this period, we determine its performance using profitability and employment. We construct these measures for years one to three after founding because many firms are recently created. We find that there is a 2.6 to 3.3 percentage point decline in the likelihood of survival for gig-founded

firms, which is a 3.8% to 7.3% decrease relative to the respective sample means. These estimates continue to include county, year, and industry fixed effects. When we examine measures of performance, we show that the profitability of gig-founded firms is about 37% to 45.4% higher relative to firms with a founder who did not participate in the gig economy. Additionally, gig-founded firms are both more likely to have employees and to operate firms with a relatively high number of employees, defined as having at least five employees. Taken together, gig workers appear to learn through their experiences in the gig economy. When they establish a new firm, they bear more risk by starting larger firms. Consistent with experimentation, these firms appear to be riskier as they survive for shorter periods of time, yet they realize higher performance. Shorter survival, on average, is also consistent with gig founders learning about the prospects of their firms more quickly and shutting down less promising firms sooner.

We also provide additional evidence indicating that gig founders learn through the gig economy. The administrative data on U.S. tax returns allow us to track the number of workers at a firm and whether employees are salaried workers or independent contractors. For every firm in our sample, we measure the extensive margin based on whether a firm has any independent contractors and the intensive margin using the number of independent contractors employed. Similar to our previous analyses, we track employment for one to three years after founding. On the extensive margin, we find that gig-founded firms are 9.3% to 18.6% more likely to use independent contractors relative to firms with a non-gig founder. We also evaluate the intensive margin and show economically large increases in the number of independent contractors hired by gig-founded firms. These findings further highlight that gig workers may learn by transferring their knowledge and experience from the gig economy to the new firms that they create.

In the final set of firm-level analyses, we explore the capital structure of newly created firms. We use reported information on a firm's interest expense to measure whether a firm has debt by a particular year after founding. We find that the likelihood of having debt

is significantly higher for gig-founded firms. In economic terms, there is a 10% to 17.8% increase in the probability of a gig-founded firm having debt. This suggests that the gig economy might enable gig workers, particularly those who are capital constrained, to access capital markets.

We conclude our analyses by evaluating how gig founders fare after starting a new firm. Prior papers highlight that entrepreneurs may start firms for non-pecuniary reasons (Moskowitz and Vissing-Jørgensen (2002)), though there is substantial real option value embedded in the decision to create firms (Manso (2016)). In this analysis, we evaluate the effect of being a gig worker on a founder's subsequent income. We track both whether a founder's income increases in the years after founding and if a founder's rank in the income distribution changes. We find that gig founders have higher subsequent income compared to founders who do not participate in the gig economy. We also show that their rank in the income distribution is more likely to rise. This highlights that gig founders are better off than other entrepreneurs in terms of income.

In sum, we use administrative data on U.S. tax returns to study gig workers and the firms that they create. Gig income facilitates entry into entrepreneurship and allows gig workers to learn about becoming entrepreneurs. The outcomes at newly created firms started by gig founders suggest that gig workers experiment with new ideas. We contribute to the growing literature on the factors impacting entrepreneurial entry by demonstrating the crucial interactions between labor markets and entrepreneurship. Potential entrepreneurs can leverage their work experience, both from the gig economy and salaried work, to alter the profile of ideas that are translated into nascent firms. Furthermore, this work provides tax administration with a foundational understanding of the potential service needs of newly created firms and how these needs may differ based on firm characteristics.

Our paper broadly contributes to the literature on entrepreneurship. Newly created firms support economic growth and spur new jobs (Haltiwanger, Jarmin, and Miranda (2013)). Accordingly, there has been a large focus on factors influencing entrepreneurial

entry. Capital constraints often limit new firm creation (e.g., Evans and Jovanovic (1989), Hurst and Lusardi (2004), Cagetti and De Nardi (2006), and Bianchi and Bobba (2013)). A related stream of papers shows that cash windfalls often lead to more entrepreneurs (Bellon et al. (2021) and Cespedes, Huang, and Parra (2023)). Regulations reduce entrepreneurship (Klapper, Laeven, and Rajan (2006)), while banking deregulation spurs creative destruction (Kerr and Nanda (2009)). Government programs frequently target entrepreneurial activity, though it can be unsuccessful (Denes et al. (2023)). A connected set of papers argues that experimentation is a key ingredient of entrepreneurship (Manso (2011) and Kerr, Nanda, and Rhodes-Kropf (2014)), and that lower costs increase innovation (Ewens, Nanda, and Rhodes-Kropf (2018)). Additionally, the option value of entrepreneurship plays an important role in experimentation (Manso (2016) and Catherine (2022)). We link gig workers with their newly created ventures to highlight the importance of labor markets in supporting entrepreneurship through learning and how this promotes experimentation.

Our paper is most closely related to Barrios, Hochberg, and Yi (2022) and Mao et al. (2023), which study aggregate measures of entrepreneurship following the entry of a gig firm.³ Barrios, Hochberg, and Yi (2022) show that the launch of ride-hailing services is associated with an increase in new business registrations and internet searches about entrepreneurship. Mao et al. (2023) find that the introduction of short-term rentals is positively related to new firm creation. We corroborate their findings and differ in several important dimensions. First, we use granular administrative data from U.S. tax returns to track individuals participating in the gig economy and the firms that they start, overcoming prior limitations to connecting gig income with entrepreneurial entry. Second, and related, this allows us to provide new evidence on mechanisms driving new firm creation, specifically learning by gig workers who experiment by starting riskier firms. Third, we study the universe of firms and individuals using the gig economy in the U.S., capturing a wide range of gig firms and corresponding

³Burtch, Carnahan, and Greenwood (2018) is an earlier paper about a ride-hailing service from 2012 to 2015, and explores its relationship with self-employment based on crowdfunding activity in Kickstarter and the Current Population Survey. They report a negative association between these measures and the availability of a ride-hailing service.

economic activity.

More generally, we also add to the growing literature on the gig economy. A relatively early group of papers documented the size of the gig economy using survey and administrative data (Abraham et al. (2018), Collins et al. (2019), and Lim et al. (2019)). A series of recent papers examine how unemployed individuals use the gig economy (Fos et al. (2021) and Jackson (2022)). Flexibility is often valuable for gig workers (Hall and Krueger (2018) and Chen et al. (2019)). Additionally, access to financing impacts participation at ride-hailing gig firms (Buchak (2023)).

Our findings are also related to work at the intersection of finance and labor. One strand of this literature studies how financial distress affects an individual’s decision to start a firm (Babina (2020) and Hacamo and Kleiner (2022)). Further, labor-related regulation can influence entrepreneurial entry through increases in different types of employment insurance (Hombert et al. (2020) and Gottlieb, Townsend, and Xu (2022)). We focus on the effect of the gig economy, which is a major disruption to labor markets, and its role in newly created firms by gig workers.

2 Gig Economy

In this section, we describe the gig economy in the United States and how we measure it using U.S. tax returns. Section 2.1 provides information on the platforms in the gig economy that we study in our analyses. Section 2.2 details how income from gig work is observed for all individuals in the United States. Section 2.3 provides summary statistics on economic activity in the gig economy.

2.1 Gig Economy in the United States

The gig economy typically refers to short-term income opportunities. While this part of the economy existed long before the 2000s, this paper specifically studies recent technological

advancements that substantially expanded the size of this market. Mobile devices allow platforms to match customers with workers across numerous goods and services. This has disrupted many industries and altered the income opportunities for an increasingly large number of individuals. Throughout the paper, we refer to the “gig economy” to capture these recent changes, including the related platforms (“gig firms”) and individuals receiving income from these arrangements (“gig workers”).

In the United States, many gig firms were founded in the first decade of the 2000s. However, the corresponding economic activity started to rise in the following decade. In Section 2.3, we show that a million individuals received income from gig firms by 2015. We focus on gig firms that broadly fall into four categories. First, we include platforms offering transportation services to customers. Second, we incorporate gig firms that allow individuals to monetize their assets. Third, we add marketplaces providing opportunities for individuals to sell goods. Fourth, we include gig firms where individuals can provide short-term services that generally require specific skills.

As the gig economy continues to grow, so has the debate surrounding its benefits and costs. In this paper, we study whether the gig economy enables gig workers to become entrepreneurs and evaluate the firms that they create. If gig workers are better off by pursuing entrepreneurial entry, which we examine in Section 6, then new firm creation could be considered a benefit, along with the flexibility afforded by the gig economy. Yet it is also important to highlight costs that might be borne by gig workers. These include the loss of worker protections because gig workers are independent contractors (Ravenelle (2019)) and negative spillovers, such as driving fatalities (Barrios, Hochberg, and Yi (2023)).

2.2 Measuring the Gig Economy

We use administrative data from U.S. tax returns to measure participation in the gig economy. This allows us to directly observe income received by individuals in the U.S. from firms operating in the gig economy. This section describes how we construct an individual’s

income from the gig economy for each year. We primarily use information returns provided to the IRS by gig firms supplemented with data from tax returns of individuals.

We manually compile a list of gig firms in the U.S. We begin with a list developed by previous researchers using tax returns to study different aspects of the gig economy (Collins et al. (2019)), which contains about 50 gig firms. We conduct extensive internet searches to expand the coverage of the gig economy. We classify each gig firm into one of the following categories: leasing, selling, services, and transportation. Due to confidentiality reasons, we cannot identify specific firms in the underlying data. The combined lists include a total of 174 gig firms. Appendix Figure A1 shows the distribution of gig firms in our sample.⁴ About half of gig firms are in the services sector. Almost 50 firms are operating in the transportation sector. The remaining gig firms are equally in the leasing and selling sectors.

We observe an individual's participation in the gig economy using information returns provided to the IRS by gig firms. Specifically, we use Forms 1099-MISC, 1099-NEC, and 1099-K to measure income received by an individual from gig firms.⁵ Though tax returns can be filed jointly, information returns identify the exact individual who received income from a gig firm. We construct a dataset of gig income using the list of 174 gig firms matched to the universe of Forms 1099-MISC, 1099-NEC, and 1099-K. We augment these data by using individual tax returns. Gig workers generally file a Schedule C as part of Form 1040 to report income derived from the gig economy. This schedule includes a description of the activity related to its filing. If this description includes the name of a gig firm in our list, we add it to the dataset on gig income. The combined dataset using Forms 1099-MISC, 1099-NEC, and 1099-K, in addition to Schedule C, allows us to track the gig income that is received by an individual over time.

⁴Section 2.3 details individuals in the sample and the distribution by type of gig firm. It shows that the majority of individuals participating in the gig economy receive income from gig firms operating in the transportation sector.

⁵There are thresholds for reporting information using these forms. Gig firms are required to report when individuals receive at least \$600 in non-employee compensation. Form 1099-NEC replaced Form 1099-MISC for reporting non-employee compensation in 2020. Form 1099-K is used by certain gig firms classified as third-party networks and has higher thresholds. It is based on transactions and required when the total income from these transactions is higher than \$20,000 and there are more than 200 transactions.

While U.S. tax returns offer novel insights into individuals participating in the gig economy, a caveat should be mentioned about the data. We primarily rely on information returns provided to the IRS by gig firms to observe gig income. The requirement to provide this information is generally based on the amount of income or the number of transactions paid to an individual. Accordingly, we do not observe gig income below these thresholds unless gig firms voluntarily provide the information to the IRS.⁶ However, it is also important to note that we rely on information returns provided by gig firms to the IRS, rather than individuals reporting gig income on Form 1040.⁷

[Insert Figure 1 Here]

Figure 1 maps participation in the gig economy from 2012 to 2021. For each state, we determine the number of individuals who participated in the gig economy during the sample period relative to the state’s labor force in 2021. Darker blue shading represents a larger share of participation in the gig economy. The map highlights that there has been substantial participation in the gig economy during the past decade. At the top quartile of states, 9% to 20% of individuals have received income from the gig economy. These states are largely represented by coastal states and Illinois. In sum, there has been a striking and broad participation in the gig economy throughout the United States.

2.3 Summary Statistics on the Gig Economy

This section provides summary statistics on the gig economy in the United States. We use administrative data from U.S. tax returns described in Section 2.2. The sample period goes from 2012 until 2021. We start in 2012 since gig activity prior to this year is minimal. We end in 2021 since this is the last year when data are currently available.

⁶The vast majority of gig firms only provide information returns to the IRS if required.

⁷There can be underreporting or no reporting of gig income by a tax filer on Form 1040. Consequently, it is important to use Forms 1099-MISC, 1099-NEC, and 1099-K to capture a substantial share of activity in the gig economy.

[Insert Figure 2 Here]

In Figure 2, Panel A shows the cumulative number of individuals who have worked in the gig economy by a particular year. We focus on the cumulative number to capture the extent of participation in the gig economy over the past decade. We find that the number of U.S. individuals who received income in the gig economy has markedly increased, starting at less than one million individuals in the first few years to about 10 million in the last year of the sample. Panel B provides the total amount of income in billions of dollars received by gig workers in a particular year. We adjust this to real terms by converting to dollars in 2012. We show that gig income follows a similar trajectory, growing from less than \$10 billion at the beginning of the sample period to \$120 billion in 2021. Overall, this figure demonstrates the marked rise of the gig economy in the United States.

[Insert Table 1 Here]

Table 1 provides summary statistics on the U.S. gig economy. Panel A tabulates the number of individuals participating in the gig economy each year and shows information on their income. We find that the number of gig workers exceeds one million individuals in 2015 and mostly rises in subsequent years.⁸ Mean gig income is winsorized at the 1% level in each tail to reduce the influence of outliers and converted to dollars in 2012. It ranges from \$8,000 to \$20,000 over the sample period.⁹ We also show that gig income received by individuals is often substantial, with about a quarter of gig workers earning more than \$10,000 and at least 10% obtaining more than \$20,000 in every year of the sample.

Panel B shows the characteristics of individuals in the first year they received gig income. *Adjusted Gross Income* is a gig worker's adjusted gross income converted to dollars in 2012 and *W-2 Income* is a gig worker's W-2 income converted to dollars in 2012. *Receives EITC*

⁸The number of gig workers declines in the middle of the sample since some gig firms no longer submitted information returns that they were not required to file with the IRS. This also explains why mean gig income is relatively lower in 2015 and 2016.

⁹Due to confidentiality reasons, all income values reported in the paper are rounded to thousands.

is an indicator variable equaling one if a gig worker receives an Earned Income Tax Credit. The means of these variables suggest that gig workers are often lower-income individuals. The average age of gig workers is 39 and the majority of gig workers are male. Gig workers are usually single and just under half have dependents.

Last, we examine differences in the number of gig workers by type of gig firm. Appendix Figure A2 plots U.S. participation in the gig economy from 2012 to 2021 based on gig firms classified as transportation relative to non-transportation, which includes leasing, selling, and services. Panel A shows the cumulative number of individuals working in the gig economy and Panel B provides the total amount of income in billions of dollars received by gig workers in a particular year, which is converted to dollars in 2012. The lighter gray bars show participation in the gig economy for gig firms categorized as transportation. The darker red bars indicate participation in the gig economy for gig firms categorized as non-transportation. While the trends are similar for both types of gig firms, the number of gig workers and gig income have grown at a higher rate for transportation gig firms.

3 Data from U.S. Tax Returns

This section details how we use U.S. tax returns to study entrepreneurship. These data allow us to overcome several challenges with linking new firm creation to participation in the gig economy, which is described in Section 2. First, comprehensive data on every new firm in the economy is generally not provided in publicly available datasets. Second, it can be difficult to observe the performance of new firms at and following their creation. Third, the characteristics of founders, their prior labor income, and employees at their firms are usually unavailable. Federal tax returns represent a new and largely unexplored approach to studying entrepreneurship in the U.S. economy. Section 3.1 explains how we measure entrepreneurship. Section 3.2 provides information on additional data incorporated into the analyses and summary statistics.

3.1 Measuring Entrepreneurship

Our paper seeks to understand the role of the gig economy on entry into entrepreneurship. We use the universe of U.S. tax returns to determine when individuals start new firms.¹⁰ To measure entrepreneurial activity across a wide swath of potential entrepreneurs, we focus on sole proprietorships. This is motivated by several considerations. First, sole proprietorships are the most common type of firm in U.S. tax returns.¹¹ Second, focusing on one firm type allows us to construct standardized measures of firm outcomes. Third, we observe ownership of sole proprietorships and these types of firms are wholly owned by one individual.

In U.S. tax returns, sole proprietorships file Schedule C, which is part of a household's Form 1040. This schedule identifies the specific entrepreneur owning and operating the firm within a household. To construct a dataset on firms for our analyses, we start with the universe of Schedule C filings, which are available from 1997 to 2021.¹² We restrict our attention to Schedule C filings that include an employer identification number (EIN) to focus on firms that are separate entities.¹³ If a particular tax return is amended, we use the most recent filing available.¹⁴

An important aspect to consider when using Schedule C filings to measure entrepreneurship is alternative reasons why taxpayers might file this schedule. In the context of this paper, individuals participating in the gig economy are generally required to file a Schedule C to report gig income, which does not represent entrepreneurial activity. As mentioned in the

¹⁰We received access to the universe of U.S. tax returns through the Joint Statistical Research Program of the Statistics of Income Division of the IRS.

¹¹The other firm types in U.S. tax returns are broadly partnerships and corporations. Partnerships file Form 1065, S corporations file Form 1120-S, and C corporations file Form 1120. Individuals participating in the gig economy are potentially more likely to form a sole proprietorship when starting a new firm relative to partnerships and corporations.

¹²The sample for our analyses is from 2012 to 2021. Using data back to 1997 allows us to identify when individuals are first-time entrepreneurs.

¹³The main requirement for firms to have an EIN is if they file employment returns or have a qualified retirement plan. Additional details about requirements for having an EIN are available on the IRS website at: <https://www.irs.gov/instructions/i1040sc>.

¹⁴We also apply the following filters to construct the dataset. First, we only use Schedule C filings with valid zip codes. Second, we remove filings where the same EIN appears on a Schedule C for a different Form 1040 in the same year. Third, we drop filings where the EIN is the same as a social security number (SSN) or the SSN is used as an EIN.

preceding paragraph, we only use Schedule C filings with an EIN. This restriction will remove gig workers who file a Schedule C solely to report gig income and do not have an EIN. We incorporate two additional steps to eliminate Schedule C filings solely used to report gig income. First, using the data on gig income described in Section 2.2, we drop firms where the reported income is within a narrow band of the gig income. Specifically, we remove those Schedule C filings where the gross receipts or sales is within \$100 of the gig income received by an individual in a particular year. Second, we remove Schedule C filings where the firm name matches the name of a gig firm. Overall, we implement several approaches to remove filings that stem from tax reporting requirements.

[Insert Figure 3 Here]

Figure 3 maps the geography of entrepreneurship in the United States from 2012 to 2021, which is the sample period for our analyses. We determine the number of new firms created in a state for a particular year relative to the total number of new firms created in the U.S. in a particular year. For each state, we average the share of new firms created in the state across years. Then, we determine the quartile ranking across states. Darker blue shading indicates a larger share of firms created in a particular state. New firm creation is highest in California, the East Coast, and Texas. These patterns are broadly similar to aggregate patterns of entrepreneurship (Andrews et al. (2020)), supporting our measure of entrepreneurship using U.S. tax returns.

3.2 Other Data and Summary Statistics

We incorporate additional data from U.S. tax returns for individuals and entrepreneurs. We use adjusted gross income, filing status, dependents, and Earned Income Tax Credit (EITC) from Form 1040. For adjusted gross income, we also construct income percentiles by county-year. Filing status indicates whether a taxpayer is a single or joint filer in a particular year. We add data on age and gender using information from the Social Security Administration.

We use data from Schedule C to construct firm outcomes at founding and subsequent performance. Since we focus on sole proprietorships with an EIN, we use this unique identifier to track firms over time. We construct variables to measure firm survival, revenues, employment, and profitability. We determine if a firm hires an independent contractor using Forms 1099-MISC, 1099-NEC, and 1099-K.¹⁵ We use interest expense to determine if a firm has debt.

[Insert Table 2 Here]

Table 2 provides summary statistics for variables used in our analyses. Panel A shows variables for individual analyses, which includes the universe of individuals in the U.S. from 2012 to 2021 aged 25 to 65 in the year of filing a tax return.¹⁶ These variables include nearly 1.3 billion individual-years. About 1.4% of the sample are gig workers prior to year t . Almost 0.7% of individuals start a new firm in a particular year. One-third of the sample is low income and half of individuals have dependents. Panel B includes variables for the cross-section of entrepreneurs. About 3.5% of founders are previously gig workers. Panel C has the variables for firm outcomes. More than half of firms do not survive three years after founding. Approximately 10% of firms use independent contractors in years one, two, and three following their opening.

¹⁵We broadly measure whether firms hire independent contractors using the universe of these forms in a particular year. For Forms 1099-MISC and 1099-NEC, we use the reported information on “nonemployee compensation” to capture independent contractors. We do not focus specifically on gig firms since we cannot directly observe in tax returns if a firm hires a gig worker through a gig firm.

¹⁶We split tax returns filed by a household with more than one person to separately include an observation for the primary filer and for the spouse.

4 Entrepreneurship and the Gig Economy

In this section, we use administrative data on the population of U.S. tax filers to study the role of the gig economy in facilitating entry into entrepreneurship. Section 4.1 provides univariate evidence on the connection between gig work and entrepreneurial activity. Section 4.2 evaluates the effect of gig work on entry into entrepreneurship. Section 4.3 examines the characteristics of individuals working in the gig economy who create new firms.

4.1 Univariate Evidence

We start by providing two pieces of univariate evidence about the connection between gig work and entrepreneurial activity. The administrative data on tax returns comprise the universe of U.S. tax filers. A novel aspect of these data is that we are able to identify and follow over time the population of individuals receiving gig income from a wide swath of gig firms.¹⁷ Additionally, we can observe when they start new firms. This allows us to link when individuals participate in the gig economy with new firms that they create over time. Section 2 explains how we measure the gig economy and Section 3 describes the administrative data that we use on U.S. tax filers from 2012 to 2021.

We first evaluate when individuals participate in the gig economy around starting new firms. For each new firm created in our sample, we form a five-year window around the year when the firm is founded. We construct an indicator variable equaling one if an individual received gig income in a particular year in this event window. Then, we determine the share of individuals working in the gig economy in a particular event year. Since we are examining the role of gig work in spurring new firm creation, this sample includes only individuals who work in the gig economy before starting a new firm, whom we refer to as “gig founders.”

[Insert Figure 4 Here]

¹⁷A common limitation of the literature on the gig economy is that it is challenging to jointly observe participation in the gig economy and related outcomes.

Figure 4 shows the share of individuals participating in the gig economy around new firm creation. We find a steady increase in the percent of gig founders working in the gig economy before starting a new firm, rising from about 20% five years before starting a new firm to almost 50% in the year before a new firm is created. This share sharply drops in the year when a firm is founded. It also continues to drop each year following a new firm’s creation. This highlights that gig workers primarily derive income from the gig economy before starting new firms and provides suggestive evidence that the gig economy might support individuals who are seeking to create new firms.

We next present univariate evidence on entrepreneurial activity and individual characteristics for different samples of our data. This analysis is at the individual-year level and the sample period is 2012 to 2021. *U.S. Population* includes all individuals filing taxes in the U.S. aged 25 to 65 in a particular year. *Gig Workers* contains those individuals in the *U.S. Population* who received gig income in a particular year. We also separate those founders receiving gig income before starting a firm (*Gig Founders*) from those who do not receive gig income prior to creating a firm (*Non-gig Founders*). We explore the following variables for these samples. *Founder* is an indicator variable equaling one if an individual starts a new firm in a particular year. *Adjusted Gross Income* is the adjusted gross income of an individual as reported on Form 1040 in a particular year. *Low Income* is an indicator variable equaling one if an individual’s adjusted gross income is in the bottom tercile in a particular county-year. *Receives EITC* is an indicator variable equaling one if an individual receives an Earned Income Tax Credit in a particular year. *Single with Dependents* is an indicator variable equaling one if an individual’s filing status on Form 1040 in a particular year is single and the individual has dependents attached to Form 1040. *Age* is an individual’s age in a particular year.

[Insert Table 3 Here]

Table 3 shows the means for entrepreneurial activity and individual characteristics. We

find that 3.5% of gig workers create new firms, which is significantly higher than the average in the population of 0.7%. Gig workers have lower income and often are located in the bottom of the income distribution. We also find that gig workers are more likely to be single and have dependents, suggesting that gig workers are individuals who appear to have relatively less flexibility. Additionally, gig workers tend to be younger. We also examine differences between founders who are gig workers relative to those who are not. The average income for gig founders is about half relative to non-gig founders, which is also reflected in 43% of gig founders having low income. A significantly higher share of gig founders are single with dependents and gig founders are younger than non-gig founders.

Overall, the univariate evidence provides two key insights about the interactions between gig work and entrepreneurship. First, gig work increases in the years preceding an individual’s entry into entrepreneurship. Second, gig work appears to support entrepreneurship for those individuals who are capital constrained and who might require relatively more flexibility in their work arrangements. We provide regression evidence for the effect of gig work on entry into entrepreneurship and which individuals respond in the following sections.

4.2 Entry into Entrepreneurship

We next study the effect of participating in the gig economy on entry into entrepreneurship. On the one hand, the gig economy may ease barriers faced by an individual looking to start a new firm. Alternatively, the gig economy could substitute for entrepreneurial activity. Previous work has shown ride-hailing services (Barrios, Hochberg, and Yi (2022)) and monetizing an asset for short-term rentals (Mao et al. (2023)) are associated with increases in new firm creation at the aggregate level. Using the population of U.S. tax filers from 2012 to 2021 for a wide range of gig firms, we compare the likelihood of starting a new firm for individuals who previously received income from the gig economy relative to those who did not participate in the gig economy. Our approach includes granular fixed effects and individual characteristics to account for differences in gig economy participation. Accordingly, a distinct feature of

our data is that we directly estimate the impact of the gig economy on the propensity to enter into entrepreneurship at the individual level.

We estimate the following specification at the individual-year level:

$$Y_{cit} = \alpha_{c \times t} + \beta \cdot \text{Gig Worker}_{i,t-1} + \gamma \cdot X_{i,t-1} + \varepsilon_{cit}, \quad (1)$$

where Y_{cit} is the outcome variable measuring the incidence of new firm creation by individual i located in county c in year t . $\text{Gig Worker}_{i,t-1}$ is an indicator variable equaling one if individual i received gig income prior to year t . Section 2.2 describes how we identify individuals who received gig income using a manually compiled list of gig firms and primarily Forms 1099-MISC, 1099-NEC, and 1099-K. The vector $X_{i,t-1}$ includes log adjusted gross income, gender, filing status, whether an individual has any dependents, and log age. The specification includes county-year fixed effects ($\alpha_{c \times t}$) to absorb unobserved time-varying county-level variation. In our strictest specification, we include granular fixed effects for each category of our control variables. The inclusion of granular fixed effects allows us to compare entrepreneurial entry for individuals who differ in terms of participation in the gig economy and are the same across observable characteristics. Standard errors are clustered at the county level. The coefficient of interest is β , which estimates the marginal effect of participating in the gig economy on entrepreneurial entry.

We begin by evaluating the effect of the gig economy on entry into entrepreneurship. Our main measure of new firm creation is Founder_{it} , which is an indicator variable equaling one if individual i starts a new firm in year t . We also examine $\text{First-time Founder}_{it}$, which is an indicator variable equaling one in year t where an individual i starts a firm for the first time. The first measure allows us to evaluate the overall impact of the gig economy on new firm creation, while we use the second variable to specifically understand the role of the gig economy in facilitating entry into entrepreneurship for individuals who have not previously created a firm. A potential concern is that gig workers use Schedule C filings to report gig

income, which might be interpreted as new firm creation. Accordingly, we carefully exclude all Schedule C filings used for this reason as described in Section 3.1.

[Insert Table 4 Here]

Table 4 provides estimates on the effect of the gig economy on entry into entrepreneurship using equation (1). The sample for these analyses is the population of U.S. individuals from 2012 to 2021 aged 25 to 65 in a particular year. Panel A focuses on all newly created firms. In column (1), we include county fixed effects to absorb time-invariant heterogeneity across locations and year fixed effects to account for macroeconomic time trends. We find that individuals participating in the gig economy are 1.0 percentage points more likely to create a new firm.¹⁸ The effect is statistically significant and economically substantial, representing more than a doubling in the propensity of starting a new firm relative to the sample mean of 0.7%.

Using the population of U.S. individuals allows us to include increasingly stricter fixed effects to assess the robustness of our estimates. In column (2), we interact county and year for the fixed effects to absorb time-varying local economic activity. The estimate for the effect of gig work on entrepreneurial entry remains statistically and economically unchanged. Next, we use individual characteristics to account for differences in the composition of individuals who participate in the gig economy. In column (3), we find that the result is quite similar when we include the controls. The last specification augments our model by saturating it with granular fixed effects for each individual characteristic by including fixed effects for each percentile of the income distribution and for each age, along with the other control variables.¹⁹ In column (4), we show that gig workers are 1.0 percentage points more likely to start a new firm. Overall, these results show that individuals participating in the gig economy are substantially more likely to start a new firm. These micro-level estimates are

¹⁸The R^2 is low since an individual creating a new firm in a particular year is relatively infrequent.

¹⁹Specifically, this model includes 100 fixed effects for each income percentile, which is determined using an individual's adjusted gross income in a particular county-year. It also includes 41 fixed effects for each age from 25 to 65. Further, it includes indicator variables for gender, filing status, and having any dependents.

also consistent with aggregate evidence provided by Barrios, Hochberg, and Yi (2022) and Mao et al. (2023) for specific gig firms.

Next, we turn to separately studying the effect of the gig economy on starting a new firm for the first time. In Panel B, column (1) shows that gig workers are 0.8 percentage points more likely to start a new firm, which includes county and year fixed effects. Comparing this estimate to the corresponding model in Panel A, we find that about 74% of the effect of the gig economy on entrepreneurial entry is explained by individuals creating a firm for the first time. We include increasingly stricter fixed effects or controls as in Panel A. We continue to find nearly identical estimates when using county-year fixed effects (column (2)), adding controls (column (3)), and incorporating granular fixed effects (column (4)). These findings highlight the importance of the gig economy in supporting first-time entrepreneurs.

We provide several extensions of the baseline analysis. First, we consider alternative measurements of an individual’s participation in the gig economy. In Appendix Table A1, we define *Gig Worker Previous Year* as an indicator variable equaling one if an individual received gig income in year $t - 1$. Across the same specifications as in Table 4, we find participating in the gig economy increases an individual’s likelihood of starting a new firm by 0.9 percentage points. These estimates support our baseline results and indicate that recent gig income plays an important role in facilitating entry into entrepreneurship. Next, we construct *Gig Worker Number of Years* as the number of years that an individual received gig income in any year up to and including $t - 1$. Panel B shows that a one-year increase in the number of years an individual received gig income increases the propensity of starting a new firm by 0.5 percentage points. We also differentiate between the source of gig income as transportation or non-transportation, which includes leasing, selling, and services as defined in Section 2.2. We find that transportation gig work increases the likelihood of starting a new firm by 0.9 to 1.0 percentage points, while non-transportation gig work amplifies the probability of creating a firm by 1.2 to 1.3 percentage points. This suggests that non-transportation gig work plays a somewhat larger role in stimulating entrepreneurship.

Additionally, we examine robustness of the baseline estimates using the staggered availability of gig work. Following the approach of Jackson (2022), we define a county as treated starting in the first year when at least 30 individuals located in the county receive gig income. Table A3 reports the results. For each specification, we include county-year fixed effects, which absorbs the term in the specification for treated counties after the availability of gig work. In columns (1) and (2), we find that gig workers are 1.0 percentage points more likely to create a new firms. In columns (3) and (4), we show that the effects are largely explained by gig workers who become entrepreneurs for the first time. These estimates are similar to the baseline findings and offer additional evidence suggesting that gig work facilitates entry into entrepreneurship.

Taken together, we provide the first micro-level evidence about the effect of the gig economy on new firm creation across the entire U.S. population for a large array of gig firms. The results highlight that individuals with exposure to the gig economy are substantially more likely to start new firms and new firm creation is driven by those with no prior entrepreneurial experience. These findings build on prior literature about levers influencing entry into entrepreneurship (e.g., Evans and Jovanovic (1989), Kerr and Nanda (2009), Hombert et al. (2020), and Gottlieb, Townsend, and Xu (2022)) and complement previous findings about the gig economy.

4.3 Who Responds?

We next examine the characteristics of individuals in the gig economy who respond by creating new firms. Detailed information on individuals available in U.S. tax returns allows us to explore differential responses based on specific traits. We focus on heterogeneity in terms of risk taking by potential entrepreneurs.

We extend our baseline specification by interacting an individual's particular character-

istic with participation in the gig economy as follows:

$$\begin{aligned}
 Y_{cit} = & \alpha_{c \times t} + \beta \cdot \text{Gig Worker}_{i,t-1} \cdot \text{Characteristic}_{i,t-1} \\
 & + \delta \cdot \text{Gig Worker}_{i,t-1} + \theta \cdot \text{Characteristic}_{i,t-1} + \varepsilon_{cit}.
 \end{aligned}
 \tag{2}$$

We focus on all newly created firms as the outcome in this section ($Founder_{it}$). We continue to define $Gig Worker_{i,t-1}$ as an indicator variable equaling one if an individual received gig income prior to year t . The variable $Characteristic_{i,t-1}$ is the characteristic of individual i in year $t - 1$. We include county-year fixed effects ($\alpha_{c \times t}$) to absorb unobserved time-varying county-level variation. Standard errors are clustered at the county level. The coefficient of interest is β , which estimates the marginal effect of having a specific characteristic and previously participating in the gig economy on entry into entrepreneurship. The specification also includes terms for the direct effects of both participation in the gig economy and the specific individual trait.

We broadly investigate three categories of individual characteristics. First, we evaluate the differential response by individuals with lower income. Since the downside of entrepreneurship is relatively smaller for this group, they might be more willing to experiment with a new idea (Salgado (2020)). Second, we explore heterogeneity in entrepreneurial entry by age. This characteristic relates to the potential importance of lifecycle considerations in entrepreneurial choice (Azoulay et al. (2020) and Bernstein et al. (2022)). Third, gig workers generally can decide when to participate in the gig economy. This flexibility might be particularly valuable for time-constrained gig workers, especially compared to other income opportunities such as salaried employment. We explore the importance of flexibility in facilitating entrepreneurial entry for individuals who potentially face relatively higher time constraints. By entering the gig economy, these individuals might be more likely to experiment through entrepreneurial activities.

[Insert Table 5 Here]

Table 5 presents the estimates for the individual characteristics using equation (2). In column (1), we start with log adjusted gross income (*Log AGI*) as the characteristic and find that gig workers with lower income are more likely to start new firms. In economic terms, gig workers with 25% lower income are 1.3 percentage points more likely to start a new firm.²⁰ Similarly, the estimates in columns (2) and (3) show that gig workers who are in the bottom of the income distribution or claim income-related tax credits, respectively, are more likely to create new firms. We also continue to report throughout the estimates in this table that gig workers are more likely to become entrepreneurs, which is consistent with Section 4.2.

Next, we evaluate the differential effect of age. In column (4), we find that the propensity to become entrepreneurs is significantly higher for relatively younger gig workers. Last, we explore the role of flexibility using two measures. In column (5), we proxy for individuals with relatively higher time constraints as those with dependents (*Has Dependents*) and show that gig workers with dependents are 0.1 percentage points more likely to start new firms. In column (6), we focus on gig workers with dependents and whose filing status is single to measure individuals facing particularly elevated time constraints. We find that the estimate for these individuals is comparatively larger since they might be relatively more time-constrained. The likelihood of becoming an entrepreneur for gig workers who are single with dependents increases by 0.2 percentage points.

In sum, our results highlight the role of individual heterogeneity in the responsiveness to entrepreneurial entry. Gig workers who are lower income, are relatively younger, and benefit from flexibility are substantially more likely to create new firms. These findings suggest that the gig economy crucially facilitates entry into entrepreneurship by individuals who might not otherwise start a firm. In the next section, we link gig workers to the firms they create to understand how they compare to the population of firms in the U.S.

²⁰This is calculated as $-0.045 \times \log(0.75) = 0.013$.

5 Mechanisms

This section studies newly created firms linked to individuals receiving income from the gig economy over time. The previous findings highlight that the gig economy plays an important role in facilitating entrepreneurial entry. Using all firms in the U.S. during the sample period, we evaluate firms at founding and their subsequent performance to provide novel evidence on two mechanisms. In Section 5.1, we examine the characteristics of firms when they are started and show evidence consistent with a learning channel. Section 5.2 turns to assessing firm performance and experimentation by gig founders. Section 5.3 seeks to understand how the gig economy fosters firm growth based on employment decisions and capital structure.

5.1 Learning

We start by studying newly created firms at founding and how the gig economy influences learning by gig workers who become entrepreneurs. We use the universe of firms in the United States described in Section 3.1 from 2012 to 2021. For each firm, we determine whether an entrepreneur participated in the gig economy before the firm was started (“gig founder”) or if the individual did not receive gig income prior to founding (“non-gig founder”). This allows us to precisely link individuals deriving income from the gig economy with the firms that they create. To our knowledge, this is the first paper to provide insights on firms directly started by gig workers.

We begin our firm-level analyses by evaluating how the industry composition of firms started by gig founders compares to those created by non-gig founders. We extract information on the industry classification of newly created firms from the two-digit North American Industry Classification System (NAICS) code reported in firms’ tax returns. For all firms in the sample, we construct the share of newly created firms in a particular industry for gig

founders.²¹ We also separately determine these shares for firms with non-gig founders.

[Insert Figure 5 Here]

Figure 5 provides the share of new firms started in industries split by gig and non-gig founders.²² The darker red bars show the proportion of firms in a particular industry for founders receiving gig income before creating a firm. The lighter gray bars display the share of firms formed in a particular industry for non-gig founders. We find that a substantial amount of entrepreneurship is concentrated in personal and professional services and trade across all firms. There is also large variation in industries based on gig versus non-gig founders. Gig founders tend to create more firms in personal services, transportation, and trade. Since gig workers generally work in these industries, this provides initial evidence that learning might play a role in newly created firms for gig founders.²³ Further, we show that non-gig founders start a relatively higher share of firms in healthcare, manufacturing, and professional services.

Next, we evaluate the role of learning in the gig economy by examining the transition into entrepreneurship based on the type of gig firm from which a gig worker received income. For this analysis, we restrict our attention to entrepreneurs who previously participated in the gig economy and classify an entrepreneur's experience in the gig economy based on gig firm type. As in Section 2.2, each gig firm is classified into four categories based on the tasks intermediated by the specific platform: leasing, selling, services, and transportation. Then, we estimate the share of individuals receiving gig income and starting new firms in a particular industry across the different gig firm categories.

²¹We aggregate each two-digit NAICS sector in parentheses to nine broad industries using the following classification: Arts and Media (51, 71), Finance and Real Estate (52, 53, 55), Healthcare (62), Manufacturing (23, 31, 32, 33), Personal Services (61, 72, 81), Professional Services (54, 56), Resource Extraction (11, 21, 22), Trade (42, 44, 45), and Transportation (48, 49). We exclude firms with no industry reported and those in sector 92 (Public Administration).

²²The shares sum to one for firms started by gig founders and also sum to one for firms created by non-gig founders.

²³It is important to highlight that we exclude Schedule C filings that are used to report gig income as described in Section 3.1.

[Insert Table 6 Here]

Panel A of Table 6 reports the transitions from gig firm type to the industry of newly created firms. To the extent that entrepreneurs use the experience accumulated from engaging with specific types of gig tasks, we expect firm creation to be disproportionately concentrated in closely related industries. We broadly find evidence that entrepreneurs transition from the gig economy into similar industries, consistent with a learning channel. For example, 67.2% of entrepreneurs with experience in selling through the gig economy operate in the trade industry. Likewise, about half of entrepreneurs participating in the services sector of the gig economy operate in personal and professional services.

We complement our preceding analysis by comparing the likelihood of creating a firm in a sector where an entrepreneur has been previously employed for gig and non-gig founders. Specifically, we employ the following specification for our sample of entrepreneurs:

$$Y_{cjt} = \alpha_c + \alpha_t + \beta \cdot \text{Gig Worker}_{j,t-1} + \varepsilon_{cjt}, \quad (3)$$

where Y_{cjt} is the outcome variable equaling one if entrepreneur j starts a firm in year t at county c in the same sector as any prior employment. $\text{Gig Worker}_{j,t-1}$ is an indicator variable equaling one if entrepreneur j received gig income prior to year t . We include county fixed effects to capture time-invariant heterogeneity in the local economy (α_c) and founding-year fixed effects to absorb time trends in firm creation (α_t). Standard errors are clustered at the county level.

Panel B of Table 6 provides the results using equation (3). We separately investigate overlap in an entrepreneur's newly created firm with any prior experience in a sector and, specifically, experience in the gig economy. In column (1), the outcome variable (*Repeat Sector*) is an indicator variable equaling one if an entrepreneur starts a new firm in the same sector as prior work experience based on W-2 and 1099 income.²⁴ We find en-

²⁴This measure of experience includes *any* W-2 and 1099 income received before starting a new firm, including both from gig and non-gig firms.

trepreneurs who previously participated in the gig economy are 4.1 percentage points more likely to create a firm in a sector where they have prior experience. The effect is statistically significant at the 1% level and economically large, representing an 8.1% increase relative to the sample mean. We also explore the role of the gig economy in entrepreneurial learning by defining *Repeat Sector Gig* as an indicator variable equaling one if an entrepreneur’s newly started firm is in the same sector as any prior gig experience. In column (2), we show that entrepreneurs who previously participated in the gig economy are 1.2 percentage points more likely to create a firm in the sector where they have prior gig experience.

Overall, our findings highlight that the gig economy acts as a pathway to entrepreneurship by allowing individuals to learn about a specific industry. This is also consistent with our results on who responds by entering into entrepreneurship: those individuals who are lower income, relatively younger, and value flexibility are likely potential entrepreneurs with a higher marginal benefit to on-the-job learning. By learning from gig experiences, the gig economy can alleviate information frictions associated with the uncertainty of entrepreneurship, allowing individuals to accumulate industry-specific knowledge and business-related acumen.

5.2 Experimentation

In this section, we investigate firm-level characteristics at founding and subsequent performance. Experimentation plays a key role in entrepreneurship (Manso (2011) and Kerr, Nanda, and Rhodes-Kropf (2014)). The previous section provides evidence that gig founders learn from their experience in the gig economy. We next examine whether this knowledge alters risk taking by gig founders who may increase experimentation in their new endeavors.

We evaluate firm-level characteristics at founding and subsequent performance by comparing firm outcomes for entrepreneurs who have previously participated in the gig economy

with founders who have not received gig income using the following specification:

$$Y_{ckst} = \alpha_c + \alpha_t + \alpha_s + \beta \cdot \text{Gig Worker}_{k,t-1} + \varepsilon_{ckst}, \quad (4)$$

where Y_{ckst} is an outcome for firm k founded in year t located in county c and industry s . We measure outcomes at founding in the year a firm is created. We also examine performance in years one to three after a firm is started. $\text{Gig Worker}_{k,t-1}$ is an indicator variable equaling one if an individual received gig income in any year prior to year t . We include county (α_c) and industry (α_s) fixed effects to capture time-invariant heterogeneity in the local economy and industry, respectively. We use founding-year fixed effects to absorb time trends in firm creation (α_t). Standard errors are clustered at the county level. The coefficient of interest, β , estimates the marginal effect of participating in the gig economy by an entrepreneur on a firm outcome.

If the gig economy primarily alleviates frictions associated with entrepreneurial entry, newly created firms are more likely to survive, be profitable, and create jobs. Alternatively, the gig economy might lower the costs of entry into entrepreneurship, allowing founders to experiment and take greater risks. Then, newly created firms would exhibit more extreme outcomes, including higher exit rates and better performance at surviving firms. Finally, if entrepreneurial talent is homogeneous, firm outcomes would not differ regardless of involvement in the gig economy.

[Insert Table 7 Here]

In Table 7, we first examine the size of newly created firms at founding for entrepreneurs with and without prior experience in the gig economy using equation (4). We use two measures of firm size. First, we define *Revenues* as the log of one plus revenues as reported on a firm's Schedule C.²⁵ Second, we construct *Employees* as a count of the number of

²⁵Revenues has nonnegative values. Since it can be zero and is a continuous variable, we add one before taking the log.

employees at a firm.²⁶ In column (1), we find that firms started by gig workers have revenues that are 21.5% higher than those founded by entrepreneurs who have not participated in the gig economy.²⁷ In column (2), we use a Poisson model since the outcome is a count variable (Cohn, Liu, and Wardlaw (2022)). We show that the number of employees at gig-founded firms is 39.6% higher at firms started by gig workers. These results suggest that the gig economy allows individuals to bear more risk by starting larger firms at founding.

We provide several extensions to assess the robustness of these results. First, we include the following controls in equation (4): log adjusted gross income, gender, filing status, an indicator for having dependents, and log age. In Table A4, we continue to find that firms started by gig workers have higher revenue and more employees at founding.²⁸ Second, following the approach of Jackson (2022), we define a county as treated starting in the first year when at least 30 individuals located in the county receive gig income. Accordingly, we augment equation (4) to include *Gig Work Availability*, which is an indicator variable equaling one if when there are at least 30 individuals located in the county receiving gig income by a particular year. Table A5 reports the results. We show that firms started by gig workers remain larger in terms of revenues and employees in their founding year. Last, we condition the sample to include firms with at least one employee within the first five years of founding. In Table A6, we find that firms started by gig workers have more employees. The estimate for revenues at founding is positive, but it is not statistically significant. Overall, we broadly find consistent evidence that gig workers form larger firms in their founding year.

We continue our firm-level analysis by evaluating firm outcomes in the years following creation. We construct the following firm outcomes in years one to three after a firm is established. To capture the likelihood of survival, we define *Survival* as an indicator variable

²⁶This measure includes both salaried employees measured using Form W-2 and independent contractors based on Forms 1099-MISC, 1099-NEC, and 1099-K.

²⁷When the outcome is a natural logarithm, we report the exponentiated coefficient minus one in the text. The tables contain the raw coefficients.

²⁸In Figure A3, we examine the differential response based on the founders' characteristics. We estimate the coefficients for subsamples based on income, flexibility, and age. Panels A and B provide the estimates for revenues and employees at founding, respectively. We generally find that most estimates are similar to the baseline coefficients.

equaling one if a firm is observed in a particular year after founding.²⁹ We also construct *Profitability* as the inverse hyperbolic sine of a firm's gross profits as reported in a firm's Schedule C for a particular year after a firm is started.

[Insert Table 8 Here]

Table 8 provides the results for firm performance. There are two primary findings that are critical for understanding the role of the gig economy in fostering entrepreneurship. First, Panel A shows the estimates for the effect of participating in the gig economy on firm survival. We find that firms started by gig founders are significantly less likely to survive in the one to three years following their creation relative to firms formed by non-gig founders. These effects are present in both the short and long run.³⁰ Gig-founded firms are 2.6 percentage points less likely to survive in the first year after founding, which rises to 3.3 percentage points three years following creation. Relative to the respective sample means, this is a decrease of 3.8% to 7.3% in the likelihood of survival. Second, Panel B examines firm profitability for years one to three after founding. Since firm performance is only available for existing firms, it is necessarily conditional on survival. For firm profitability, we find that firms started by gig workers have 37% to 45.4% higher profits. These two results combined suggest that there is experimentation at firms started by gig founders and increased risk taking.

We examine the robustness of the estimates for firm performance. In Table A7, we include controls for income, gender, filing status, dependents, and age, and report similar estimates.³¹ In Table A8, we use the staggered availability of gig work and find that the estimates are economically and statistically nearly the same. In Table A9, we reestimate the results for firms with at least one employee within the first five years of founding and report broadly consistent findings.

²⁹Specifically, a firm is observed in a particular year if a Schedule C with the same EIN is filed by a tax filer with the same SSN as at the firm's founding.

³⁰In this table, the number of observations decreases across specifications since recently created firms do not yet have survival measures for future years.

³¹In Figure A3, we provide the estimates for subsamples based on income, flexibility, and age. Panels C and D show the estimates for survival and profitability three years after founding, respectively. We largely find that most estimates are close to the baseline coefficients.

[Insert Table 9 Here]

In the last set of analyses for this section, we provide additional evidence about the performance of gig-founded firms by examining the evolution of employment in newly established firms. Table 9 presents the estimates. In Panel A, the outcome is an indicator variable equaling one if a firm has any employees in a particular year (*Has Employees*). We find that gig-founded firms are 0.9 to 2.1 percentage points more likely to have employees, which is a 5.6% to 12.5% increase relative to the respective sample means. Panel B reports estimates where the outcome is an indicator variable equaling one if a firm has at least five employees in a particular year after founding (*At Least Five Employees*). We show that gig-founded firms tend to have a significantly higher number of employees. In particular, firms started by gig workers are 0.5 to 1.2 percentage points more likely to employ at least five individuals, which is a 7.1% to 15.8% rise compared to the respective sample means. This indicates that gig-founded firms contribute disproportionately to employment creation.

Paired with the results on learning in Section 5.1, these findings offer novel evidence on the role of the gig economy in changing the profile of firms started by gig workers. Gig founders appear to learn through their experiences in the gig economy. When they establish new firms, gig workers bear more risk by starting larger new ventures. However, surviving firms realize higher performance and grow larger over time. Shorter average survival is also consistent with gig founders learning about the prospects of their firm more quickly and shutting down sooner. In the next section, we examine additional firm characteristics after founding that are consistent with these mechanisms.

5.3 Independent Contractors and Capital Structure

We conclude our firm-level analyses by offering additional evidence on how the gig economy fosters firm growth by using information on their employment decisions and capital structure. First, we revisit the role of learning and experimentation through the gig economy. To the

extent that experience in the gig economy acts as a vehicle for learning, gig founders might rely relatively more on independent contractors to accelerate firm growth and more flexibly respond to unexpected shocks. Additionally, if the gig economy encourages experimentation by entrepreneurs, we expect gig-founded firms to use more independent contractors to explore the prospects of new entrepreneurial ventures.

The administrative data on U.S. tax returns allow us to separately track salaried workers, based on receiving a W-2, and independent contractors, based on information returns provided by firms to the IRS. For every firm in our sample, we construct an extensive margin measure based on whether a firm employs independent contractors (*Has Contractors*). We also define an intensive margin proxy using the number of independent contractors employed in a particular year (*Number of Contractors*). Similar to our previous analyses, we track employment of independent contractors for one to three years after founding.

[Insert Table 10 Here]

Table 10 presents the results. Panel A shows the extensive margin. We find that gig-founded firms are significantly more likely to employ independent contractors relative to firms with a non-gig founder in the one to three years after founding. The increases are statistically significant at the 1% level and economically substantial. The likelihood of hiring an independent contractor is 9.3% to 18.6% higher at gig-founded firms relative to ones with a non-gig founder compared to the respective sample means. Panel B provides the intensive margin, which is estimated using a Poisson model because the outcome is a count variable. There is an economically large increase of 24.4% to 41.9% in the number of independent contractors hired by gig-founded firms. These findings corroborate the hypothesis that gig workers transfer knowledge and experience from the gig economy to their newly created firms as reflected in the use of independent contractors.

In the final set of firm-level analyses, we evaluate the role of the gig economy in facilitating access to credit for entrepreneurs. Participation in the gig economy might allow

entrepreneurs to earn additional income, subsequently increasing liquidity and the likelihood of accessing external credit. Additionally, the gig economy often relies on the provision of an individual's physical capital (Buchak (2023)), which may improve access to external financing for gig founders who can use this capital as collateral. We use information on a firm's interest expense as reported in Schedule C to measure whether a firm has debt in a window after founding.³² We define *Has Debt* as an indicator variable if a firm has debt by a particular year after founding based on reporting interest expense.

[Insert Table 11 Here]

Table 11 provides the results on capital structure. We find that there is a sizeable increase in access to external credit for gig founders relative to firms started by entrepreneurs who have not received gig income. In the first year after a firm is started, a gig founder is 1.2 percentage points more likely to use debt. The estimate rises to 3.4 percentage points by year three. In economic terms, there is a 10% to 17.8% increase in the probability of a gig-founded firm having debt one to three years after creating a new firm relative to the respective sample means. This suggests that the gig economy enables gig workers, particularly those who are capital constrained, to access capital markets.

In sum, this section supports the mechanisms of learning and experimentation by gig founders. It is important to note that other mechanisms may also contribute to the effect of the gig economy on entrepreneurial activity. We find that gig workers who start new firms are more likely to use independent contracts. We also provide evidence that gig founders have greater access to credit. Together these results suggest that the gig economy supports firm growth.

³²We are unable to directly observe debt contracts and the potential use of gig-related physical capital for accessing credit.

6 Are Gig Founders Better Off?

A longstanding puzzle in the entrepreneurship literature is why individuals start new firms if they appear to receive less income and bear more risk (Hamilton (2000) and Moskowitz and Vissing-Jørgensen (2002)). An explanation is the option to return to a job may encourage individuals to experiment with entrepreneurship (Manso (2016) and Catherine (2022)). Motivated by this literature, this section evaluates the income of individuals participating in the gig economy who enter into entrepreneurship. Based on the results in Section 5, the effect on an entrepreneurs' income is not necessarily clear as survivorship is lower for gig-founded firms, while performance is generally higher.

We compare changes in income for entrepreneurs who participate in the gig economy prior to starting a firm relative to those who have not received gig income using the following specification:

$$Y_{cist} = \alpha_c + \alpha_s + \alpha_t + \beta \cdot \text{Gig Worker}_{i,t-1} + \varepsilon_{cist}, \quad (5)$$

where Y_{cist} is an outcome that measures income changes for entrepreneur i who created a firm in year t , which is located in county c and industry s . $\text{Gig Worker}_{i,t-1}$ is an indicator variable equaling one if individual i received gig income prior to year t . We continue to include county (α_c) and industry (α_s) fixed effects to capture time-invariant heterogeneity in the local economy and industry, respectively. We use founding-year fixed effects to absorb time trends in firm creation (α_t). Standard errors are clustered at the county level.

Using the administrative data on U.S. tax returns, we track the income dynamics using adjusted gross income for all entrepreneurs over time, which we can observe regardless of a firm's survival. We construct two measures of an entrepreneur's income. First, we define *Change in Income* as the difference in the log of an entrepreneur's adjusted gross income in a particular year relative to the firm's founding year. This variable provides an estimate of the growth in a founder's income since starting a firm. Second, we form *Increase in Income Percentile* as an indicator variable equaling one if an entrepreneur's

income percentile in a particular year increases relative to the firm's founding year. Income percentiles are based on adjusted gross income within a county-year.

[Insert Table 12 Here]

Table 12 presents the results. In Panel A, we evaluate the change in an entrepreneur's income relative to founding. Column (1) shows that gig founders earn 3% higher adjusted gross income in the year after they start a firm relative to entrepreneurs who have not participated in the gig economy. The wedge between gig and non-gig founders is persistent and gradually grows over time, increasing to 9.2% and 12.7% two and three years after founding, respectively (columns (2) and (3)). In Panel B, we report the estimates for the change in an entrepreneur's income percentile relative to a firm's founding year. This approach allows us to compare the ranking of an entrepreneur in the income distribution in a specific geography and at a particular time. We show that gig founders are more likely to rise in the income distribution relative to non-gig founders. Column (1) shows that there is a 1.1 percentage point increase in the likelihood of rising in the income distribution one year after founding, which grows to 1.8 and 1.9 percentage points two and three years after founding, respectively (columns (2) and (3)). Economically, this represents a 2% to 3% increase compared to the respective sample means.

Overall, our findings suggest that gig workers who start new firms are better off in terms of their income. This provides evidence that participating in the gig economy benefits workers through higher future income from opportunities beyond the gig job itself. An important caveat for these results is that we compare gig founders to entrepreneurs, which might not be an appropriate reference group for a gig worker's income trajectory. However, this group likely has a higher income trajectory relative to many gig workers. These results are also consistent with gig founders experimenting with entrepreneurship that is characterized by higher risks and higher rewards.

7 Conclusion

The gig economy has grown considerably in the U.S. economy over the past decade. We use detailed administrative data on U.S. tax returns for the universe of firms and individuals from 2012 to 2021 to study the effect of the gig economy on entrepreneurial entry. We find that individuals who previously received income from the gig economy are significantly more likely to start new firms. We also show that first-time entrepreneurs account for three-quarters of this effect. To draw inferences regarding the underlying mechanisms, we investigate the role of capital constraints, lifecycle considerations, and flexibility in spurring entrepreneurial entry by exploring heterogeneity in terms of individual characteristics. We find that the effect is amplified for individuals with lower income, who are relatively younger, and who might benefit from flexibility.

We track the universe of firms created in the United States during our sample period linked to individuals participating in the gig economy. This allows us to study firms at founding and evaluate their subsequent performance. Consistent with the critical role of learning through participating in the gig economy, we find that gig workers generally start firms in industries similar to the gig firms from which they received income. Entrepreneurs who had participated in the gig economy create larger new ventures at founding. Following these firms over time, we show that gig-founded firms are less likely to survive. However, surviving firms realize higher performance and grow larger relative to firms started by non-gig founders. These findings highlight that experience in the gig economy allows individuals to learn about entrepreneurship and experiment through their newly created firms.

Labor market disruptions can play a role in the profile of entrepreneurial endeavors. As the gig economy grows, much attention has been paid to its benefits and costs. We provide evidence that the gig economy can provide a pathway to entrepreneurship and show that gig workers appear to be better off. Future research can expand our understanding of transitions between the gig economy and other labor markets. There are also open questions about how

the gig economy might reduce or amplify shocks faced by individuals and firms.

References

- Abraham, Katharine G., John C. Haltiwanger, Kristin Sandusky, and James R. Spletzer, 2018, Measuring the Gig Economy: Current Knowledge and Open Issues, *Working Paper*.
- Andrews, R.J., Catherine Fazio, Jorge Guzman, Scott Stern, and Yupeng Liu, 2020, The Startup Cartography Project, *Working Paper*.
- Azoulay, Pierre, Benjamin F. Jones, J. Daniel Kim, and Javier Miranda, 2020, Age and High-Growth Entrepreneurship, *American Economic Review: Insights*, 2(1), 65–82.
- Babina, Tania, 2020, Destructive Creation at Work: How Financial Distress Spurs Entrepreneurship, *Review of Financial Studies*, 33(9), 4061–4101.
- Barrios, John M., Yael V. Hochberg, and Hanyi Yi, 2022, Launching with a Parachute: The Gig Economy and New Business Formation, *Journal of Financial Economics*, 144(1), 22–43.
- 2023, The Cost of Convenience: Ridehailing and Traffic Fatalities, *Journal of Operations Management*, 69(5), 823–855.
- Bellon, Aymeric, J. Anthony Cookson, Erik P. Gilje, and Rawley Z. Heimer, 2021, Personal Wealth, Self-Employment, and Business Ownership, *Review of Financial Studies*, 34(8), 3935–3975.
- Bernstein, Shai, Emanuele Colonnelli, Davide Malacrino, and Tim McQuade, 2022, Who Creates New Firms When Local Opportunities Arise?, *Journal of Financial Economics*, 143(1), 107–130.
- Bianchi, Milo and Matteo Bobba, 2013, Liquidity, Risk, and Occupational Choices, *Review of Economic Studies*, 80(2), 491–511.
- Buchak, Greg, 2023, Financing the Gig Economy, *Journal of Finance*, Forthcoming.
- Burtch, Gordon, Seth Carnahan, and Brad N. Greenwood, 2018, Can You Gig It? An Empirical Examination of the Gig Economy and Entrepreneurial Activity, *Management Science*, 64(12), 5497–5520.
- Cagetti, Marco and Mariacristina De Nardi, 2006, Entrepreneurship, Frictions, and Wealth, *Journal of Political Economy*, 114(5), 835–870.
- Catherine, Sylvain, 2022, Keeping Options Open: What Motivates Entrepreneurs?, *Journal of Financial Economics*, 144(1), 1–21.

- Cespedes, Jacelly, Xing Huang, and Carlos Parra, 2023, More Money, More Options? The Effect of Cash Windfalls on Entrepreneurial Activities in Small Businesses, *Working Paper*.
- Chen, M. Keith, Peter E. Rossi, Judith A. Chevalier, and Emily Oehlsen, 2019, The Value of Flexible Work: Evidence from Uber Drivers, *Journal of Political Economy*, 127(6), 2735–2794.
- Cohn, Jonathan B., Zack Liu, and Malcolm I. Wardlaw, 2022, Count (and Count-Like) Data in Finance, *Journal of Financial Economics*, 146(2), 529–551.
- Collins, Brett, Andrew Garin, Emilie Jackson, Dmitri Koustas, and Mark Payne, 2019, Is Gig Work Replacing Traditional Employment? Evidence from Two Decades of Tax Returns, *Working Paper*.
- Denes, Matthew, Sabrina T. Howell, Filippo Mezzanotti, Xinxin Wang, and Ting Xu, 2023, Investor Tax Credits and Entrepreneurship: Evidence from U.S. States, *Journal of Finance*, 78(5), 2621–2671.
- Evans, David S. and Boyan Jovanovic, 1989, An Estimated Model of Entrepreneurial Choice under Liquidity Constraints, *Journal of Political Economy*, 97(4), 808–827.
- Ewens, Michael, Ramana Nanda, and Matthew Rhodes-Kropf, 2018, Cost of Experimentation and the Evolution of Venture Capital, *Journal of Financial Economics*, 128(3), 422–442.
- Fos, Vyacheslav, Naser Hamdi, Ankit Kalda, and Jordan Nickerson, 2021, Gig-Labor: Trading Safety Nets for Steering Wheels, *Working Paper*.
- Gottlieb, Joshua D., Richard R. Townsend, and Ting Xu, 2022, Does career risk deter potential entrepreneurs?, *Review of Financial Studies*, 35(9), 3973–4015.
- Hacamo, Isaac and Kristof Kleiner, 2022, Forced Entrepreneurs, *Journal of Finance*, 77(1), 49–83.
- Hall, Jonathan V. and Alan B. Krueger, 2018, An Analysis of the Labor Market for Uber’s Driver-Partners in the United States, *ILR Review*, 71(3), 705–732.
- Haltiwanger, John, Ron S. Jarmin, and Javier Miranda, 2013, Who Creates Jobs? Small versus Large versus Young, *Review of Economics and Statistics*, 95(2), 347–361.
- Hamilton, Barton H., 2000, Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment, *Journal of Political Economy*, 108(3), 604–631.

- Hombert, Johan, Antoinette Schoar, David Sraer, and David Thesmar, 2020, Can Unemployment Insurance Spur Entrepreneurial Activity? Evidence from France, *Journal of Finance*, 75(3), 1247–1285.
- Hurst, Erik and Annamaria Lusardi, 2004, Liquidity Constraints, Household Wealth, and Entrepreneurship, *Journal of Political Economy*, 112(2), 319–347.
- Jackson, Emilie, 2022, Availability of the Gig Economy and Long Run Labor Supply Effects for the Unemployed, *Working Paper*.
- Kerr, William R. and Ramana Nanda, 2009, Democratizing Entry: Banking Deregulations, Financing Constraints, and Entrepreneurship, *Journal of Financial Economics*, 94(1), 124–149.
- Kerr, William R., Ramana Nanda, and Matthew Rhodes-Kropf, 2014, Entrepreneurship as Experimentation, *Journal of Economic Perspectives*, 28(3), 25–48.
- Klapper, Leora, Luc Laeven, and Raghuram Rajan, 2006, Entry Regulation as a Barrier to Entrepreneurship, *Journal of Financial Economics*, 82(3), 591–629.
- Lim, Katherine, Alicia Miller, Max Risch, and Eleanor Wilking, 2019, Independent Contractors in the US: New Trends from 15 Years of Administrative Tax Data, *Working Paper*.
- Manso, Gustavo, 2011, Motivating Innovation, *Journal of Finance*, 66(5), 1823–1860.
- 2016, Experimentation and the Returns to Entrepreneurship, *Review of Financial Studies*, 29(9), 2319–2340.
- Mao, Yifei, Xuan Tian, Jiajie Xu, and Kailei Ye, 2023, Sharing Economy and Entrepreneurship, *Working Paper*.
- Moskowitz, Tobias J. and Annette Vissing-Jørgensen, 2002, The Returns to Entrepreneurial Investment: A Private Equity Premium Puzzle?, *American Economic Review*, 92(4), 745–778.
- Ravenelle, Alexandra J., 2019, *Hustle and Gig: Struggling and Surviving in the Sharing Economy*, University of California Press.
- Salgado, Sergio, 2020, Technical Change and Entrepreneurship, *Working Paper*.

Figure 1: Gig Economy in the United States

This figure provides a map of the gig economy in the United States from 2012 to 2021. For each state, we construct the number of individuals who participated in the gig economy during the sample period relative to the state's labor force in 2021. Then, we determine the quartile ranking across states. Darker blue shading represents a larger share of individuals participated in the gig economy for a particular state. Section 2.2 describes the data on the gig economy using federal tax returns.

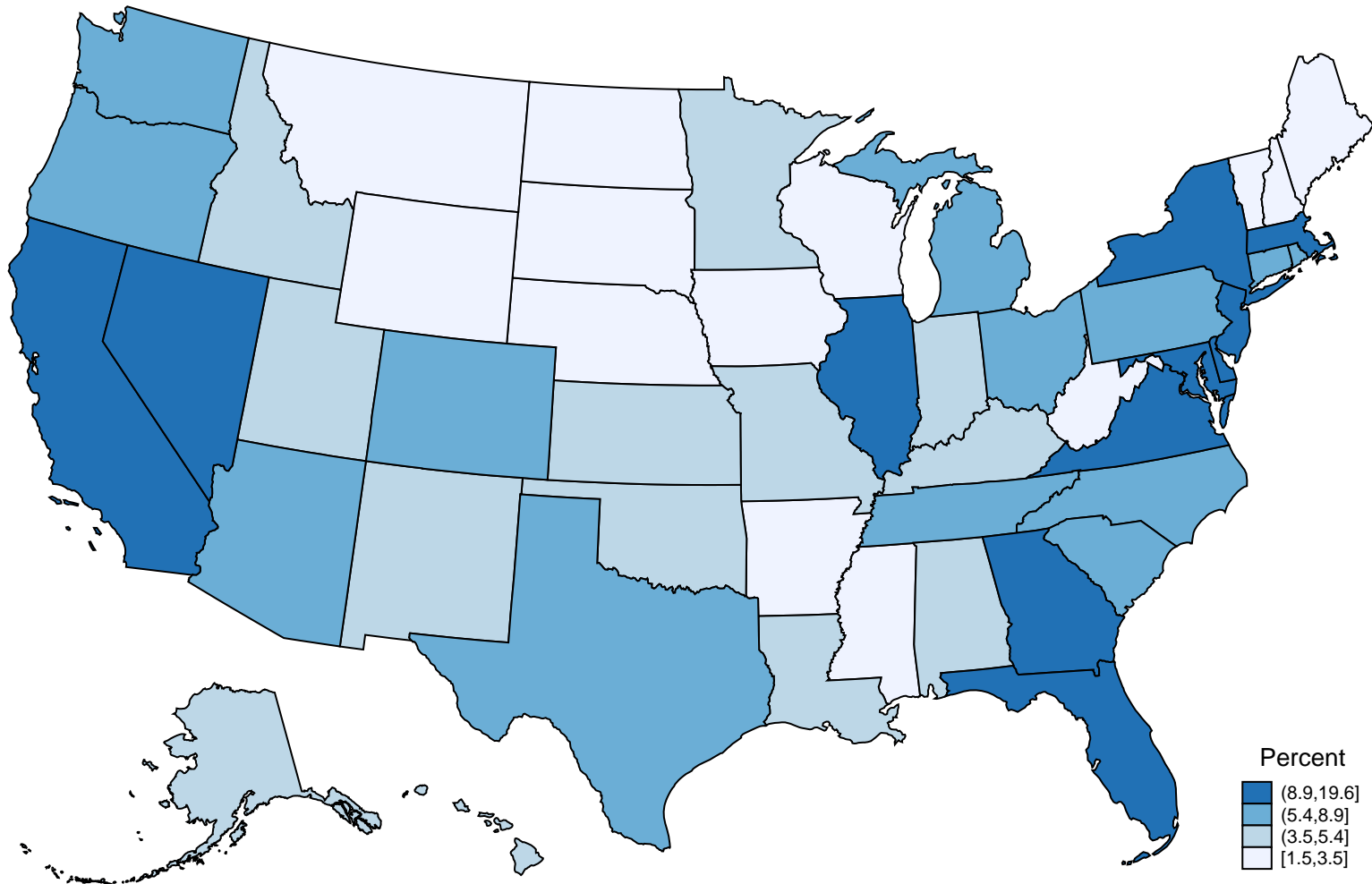
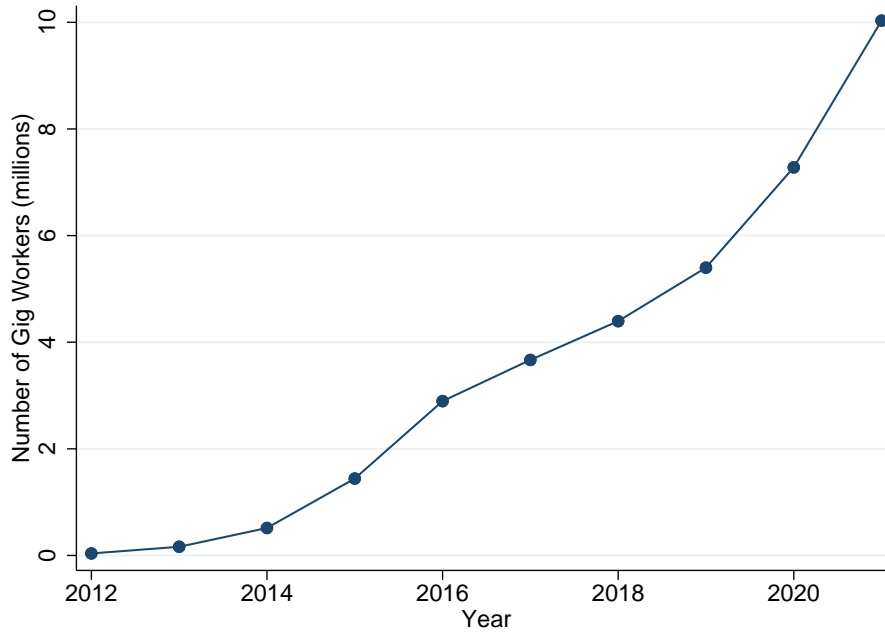


Figure 2: Gig Economy from 2012 to 2021

This figure plots U.S. participation in the gig economy from 2012 to 2021. Panel A shows the cumulative number of individuals who have worked in the gig economy by a particular year. Panel B provides the total amount of income in billions of dollars received by gig workers in a particular year, which is converted to dollars in 2012.

Panel A: Cumulative Number of Gig Workers



Panel B: Gig Income (\$ 2012)

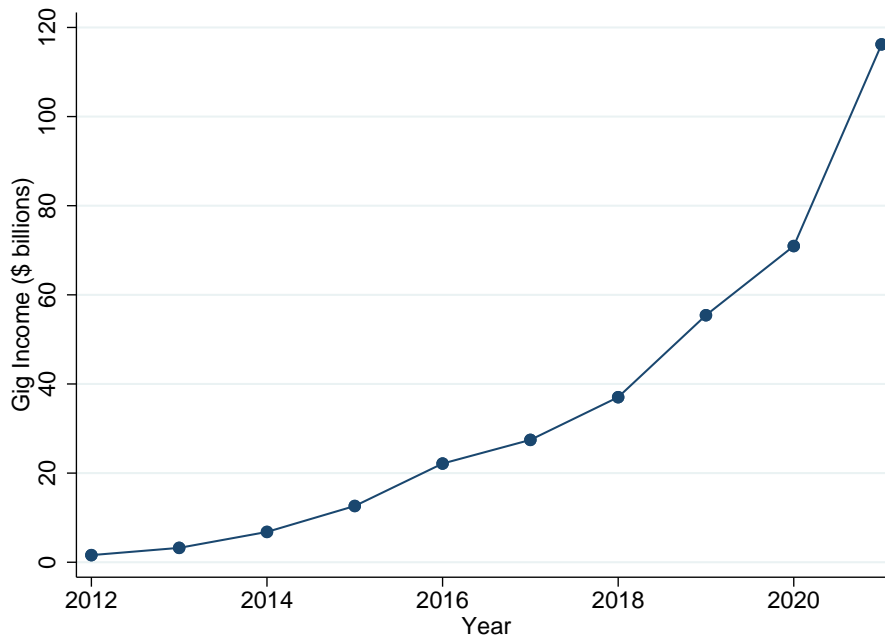


Figure 3: Entrepreneurship in the United States

This figure provides a map of new firms created in the United States from 2012 to 2021. We determine the number of new firms created in a state for a particular year relative to the total number of new firms created in the U.S. in a particular year. For each state, we average the share of new firms created in the state across years. Then, we determine the quartile ranking across states. Darker blue shading indicates a larger share of firms created in a particular state. Section 3.1 describes how new firm creation is measured using federal tax returns.

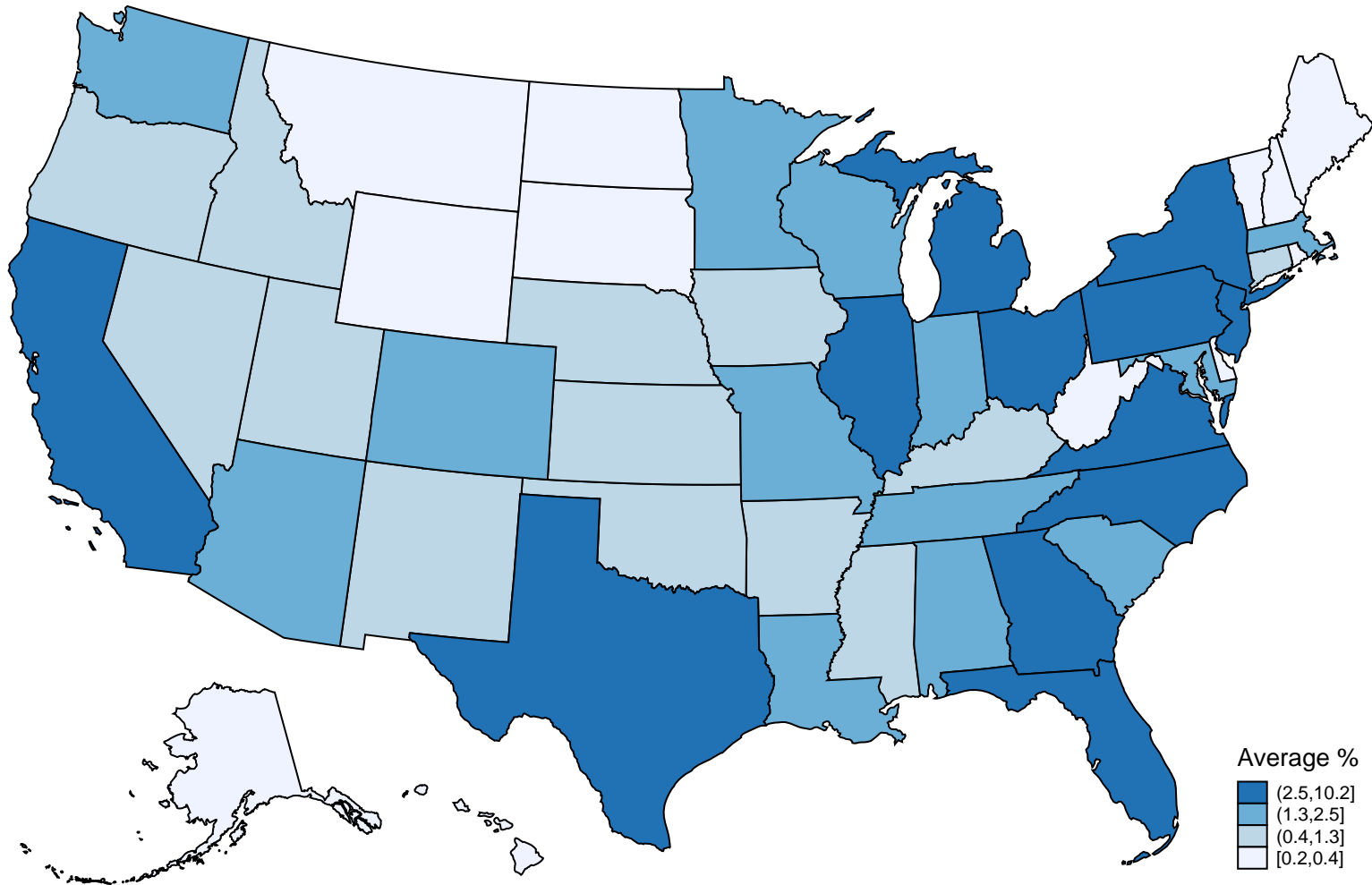


Figure 4: Timing of Gig Work and Entrepreneurship

This figure shows the timing of participation in the gig economy around new firm creation. The sample includes individuals participating in the gig economy before starting a new firm from 2012 to 2021. Each event year around starting a new firm is the number of individuals working in the gig economy relative to this sample. Section 2.2 describes the data on the gig economy and Section 3.1 explains how new firm creation is measured using federal tax returns.

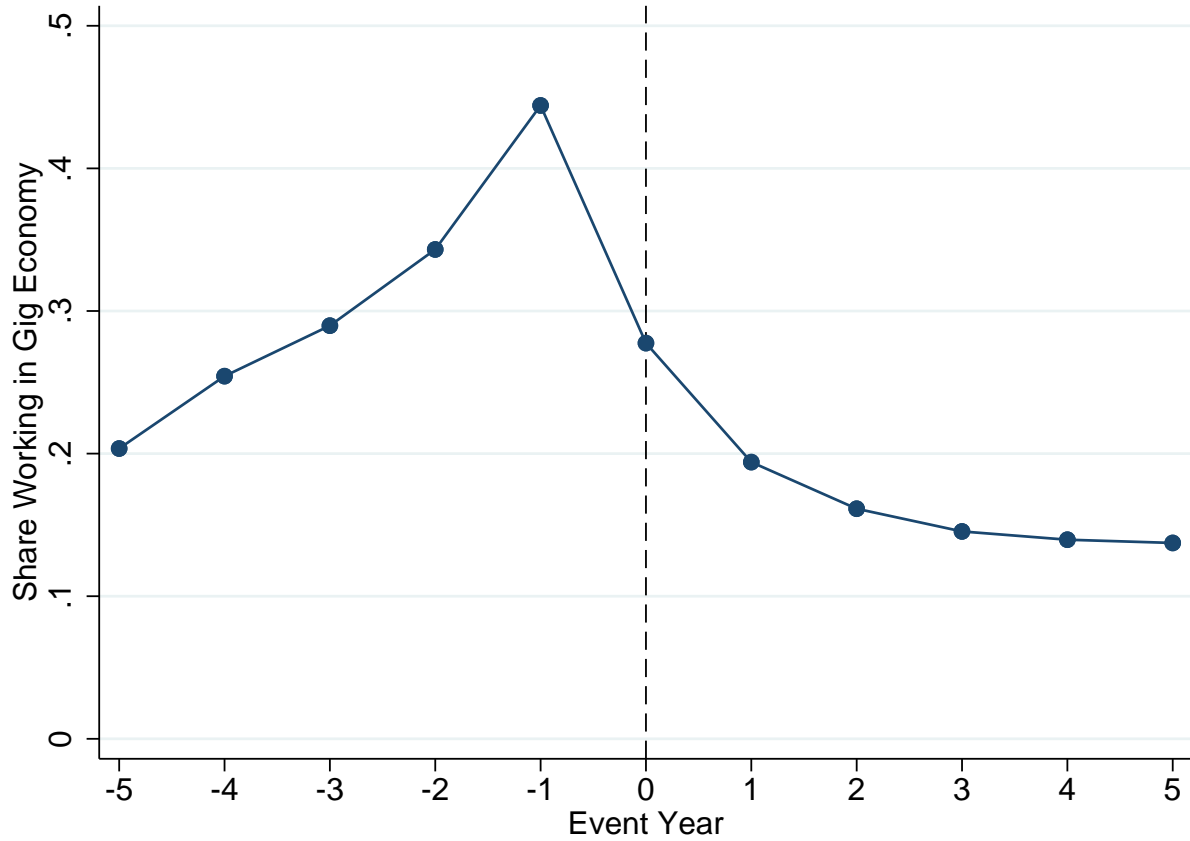


Figure 5: Industry Composition of New Firms

This figure provides the industry composition of new firms created from 2012 to 2021. The industries are based on groupings of two-digit NAICS as defined in Section 5.1. The darker red bars show the share of firms created in a particular industry by founders receiving gig income before starting a firm. The lighter gray bars display the share of firms started in a particular industry by founders who did not receive gig income before starting a firm. Section 2.2 describes the data on the gig economy and Section 3.1 explains how new firm creation is measured using federal tax returns.

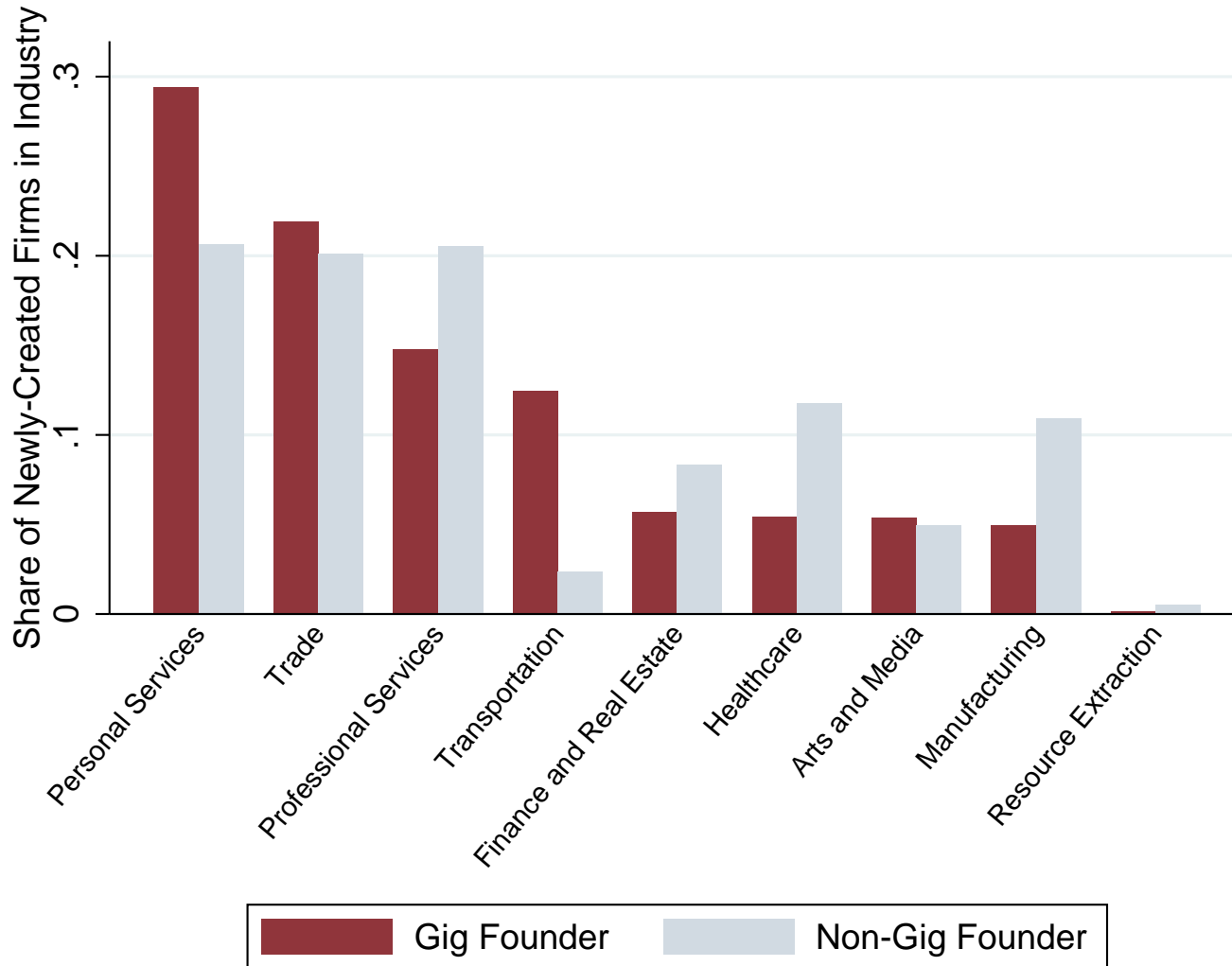


Table 1: Gig Economy in the United States

The table provides summary statistics on the gig economy in the United States from 2012 to 2021. Panel A tabulates the number of individuals participating in the gig economy each year. Gig income is the total income received by a worker from gig firms defined in Section 2.2. All measures of gig income in this panel are converted to dollars in 2012. Panel B shows the characteristics of individuals in the first year they received gig income. *Adjusted Gross Income* is a gig worker’s adjusted gross income converted to dollars in 2012. *W-2 Income* is a gig worker’s W-2 income converted to dollars in 2012. *Receives EITC* is an indicator variable equaling one if a gig worker received an Earned Income Tax Credit. *Age* is a gig worker’s age. *Single* is a gig worker’s filing status. *Has Dependents* is an indicator variable equaling one if a gig worker has any dependents based on Form 1040. *Female* is an indicator variable equaling one if a gig worker is female. Gig income, adjusted gross income, and W-2 income are rounded due to confidentiality reasons. Appendix A provides additional details on variable definitions.

Panel A: Gig Work from 2012 to 2021

Year	Number of Gig Workers	Mean Gig Income (in \$2012)	Gig Income > \$10,000	Gig Income > \$20,000	Standard Deviation of Gig Income
2012	37,572	10,000	0.218	0.124	22,000
2013	148,348	12,000	0.280	0.164	23,000
2014	450,646	10,000	0.237	0.139	21,000
2015	1,155,501	8,000	0.178	0.107	20,000
2016	2,125,347	8,000	0.199	0.116	19,000
2017	1,488,755	14,000	0.303	0.236	26,000
2018	1,401,706	18,000	0.369	0.305	31,000
2019	1,962,557	20,000	0.410	0.333	31,000
2020	3,111,025	14,000	0.251	0.176	30,000
2021	4,959,749	14,000	0.255	0.181	30,000

Panel B: Characteristics of Gig Workers

	Number of Gig Workers	Mean	Median	Standard Deviation
AGI (in \$2012)	9,840,231	38,000	24,000	852,000
W2 Income (in \$2012)	9,840,231	28,000	18,000	129,000
Receives EITC	9,840,231	0.440	0.000	0.496
Age	9,840,231	39.351	37	10.532
Single	9,840,231	0.682	1.000	0.465
Has Dependents	9,840,231	0.443	0.000	0.496
Female	9,840,231	0.348	0.000	0.476

Table 2: Summary Statistics

This table provides summary statistics for variables used in our analyses. Panel A shows variables for individual analyses, which are conducted at the individual-year level. Panel B includes variables for the cross-section of entrepreneurs. Panel C has firm outcomes. The sample period is 2012 to 2021. All variables are defined in Appendix A.

Panel A: Individual-Year Variables

Variable	Number of Observations	Mean	Median	Standard Deviation
Gig Worker	1,265,172,170	0.014	0.000	0.119
Gig Worker Previous Year	1,265,172,170	0.006	0.000	0.079
Gig Worker Number of Years	1,265,172,170	0.022	0.000	0.218
Gig Worker Transportation	1,265,172,170	0.012	0.000	0.111
Gig Worker Non-transportation	1,265,172,170	0.002	0.000	0.044
Founder	1,265,172,170	0.007	0.000	0.081
First-time Founder	1,265,172,170	0.005	0.000	0.073
Log AGI	1,265,172,170	10.758	10.968	1.647
Low Income	1,265,172,170	0.325	0.000	0.469
Receives EITC	1,265,172,170	0.197	0.000	0.398
Has Dependents	1,265,172,170	0.505	1.000	0.400
Single with Dependents	1,265,172,170	0.143	0.000	0.350
Log Age	1,265,172,170	3.750	3.784	0.273

Panel B: Entrepreneur Variables

Variable	Number of Observations	Mean	Median	Standard Deviation
Gig Worker	9,805,806	0.035	0.000	0.183
Change in Income in One Year	7,988,688	0.075	0.095	1.942
Change in Income in Two Years	6,681,572	0.153	0.168	2.120
Change in Income in Three Years	5,575,492	0.211	0.223	2.208
Increase in Income Percentile in One Year	7,988,688	0.550	1.000	0.497
Increase in Income Percentile in Two Years	6,681,572	0.604	1.000	0.489
Increase in Income Percentile in Three Years	5,575,492	0.635	1.000	0.481

Table 2 (continued)
Panel C: Firm Variables

Variable	Number of Observations	Mean	Median	Standard Deviation
Gig Worker	9,910,508	0.035	0.000	0.184
Repeat Sector	9,910,508	0.504	1.000	0.500
Repeat Sector Gig	9,910,508	0.000	0.000	0.021
Log Revenue at Founding	9,910,508	8.006	8.700	3.297
Number of Employees at Founding	9,910,508	2.636	0.000	81.475
Survival One Year After Founding	8,694,929	0.694	1.000	0.461
Survival Two Years After Founding	7,487,511	0.550	1.000	0.498
Survival Three Years After Founding	6,387,234	0.452	0.000	0.498
Profitability in One Year	5,458,610	8.294	9.999	4.977
Profitability in Two Years	3,625,469	8.517	10.204	4.854
Profitability in Three Years	2,557,390	8.700	10.309	4.745
Log Revenue in One Year	5,458,610	8.854	9.547	3.241
Log Revenue in Two Years	3,625,469	9.105	9.741	3.266
Log Revenue in Three Years	2,557,390	9.105	9.798	3.249
Has Employees in One Year	5,458,610	0.154	0.000	0.361
Has Employees in Two Years	3,625,469	0.164	0.000	0.370
Has Employees in Three Years	2,557,390	0.167	0.000	0.373
At Least Five Employees in One Year	5,458,610	0.069	0.000	0.253
At Least Five Employees in Two Years	3,625,469	0.073	0.000	0.260
At Least Five Employees in Three Years	2,557,390	0.074	0.000	0.262
Has Contractors in One Year	5,458,610	0.094	0.000	0.292
Has Contractors in Two Years	3,625,469	0.099	0.000	0.298
Has Contractors in Three Years	2,557,390	0.099	0.000	0.299
Number of Contractors in One Year	5,458,610	0.589	0.000	9.092
Number of Contractors in Two Years	3,625,469	0.584	0.000	7.149
Number of Contractors in Three Years	2,557,390	0.591	0.000	13.951
Debt in One Year	5,458,610	0.121	0.000	0.327
Debt in Two Years	3,625,469	0.163	0.000	0.369
Debt in Three Years	2,557,390	0.190	0.000	0.392

Table 3: Entrepreneurship and Gig Work: Univariate Evidence

This table provides univariate evidence on entrepreneurship and gig work. The sample is at the individual-year level from 2012 to 2021. *U.S. Population* includes all individuals in the U.S. aged 25 to 65 in the year of filing taxes. *Gig Workers* are individuals in the *U.S. Population* who received gig income. *Gig Founders* are individuals in the *U.S. Population* who have received gig income prior to starting new firms. *Non-gig founders* are individuals in the *U.S. Population* who have not received gig income prior to starting new firms. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *Adjusted Gross Income* is the adjusted gross income of an individual as reported on Form 1040 in a particular year and rounded due to confidentiality reasons. *Low Income* is an indicator variable equaling one if an individual's adjusted gross income is in the bottom tercile in a particular county-year. *Receives EITC* is an indicator variable equaling one if an individual received any Earned Income Tax Credit in a particular year. *Single with Dependents* is an indicator variable equaling one if an individual's filing status on Form 1040 in a particular year is single and the individual has any dependents based on Form 1040. *Age* is the age an individual turns in a particular year. Appendix A provides additional details on variable definitions. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Sample	U.S. Population	Gig Workers	Non-gig Founders	Gig Founders
Founder	0.007	0.035***	1.000	1.000
Adjusted Gross Income	96,000	45,000***	104,000	59,000***
Low Income	0.325	0.571***	0.316	0.430***
Receives EITC	0.197	0.393***	0.214	0.313***
Single with Dependents	0.143	0.211***	0.129	0.139***
Age	44	39***	41	38***
Total Observations	1,265,172,170	10,406,449	8,167,949	262,739

Table 4: Entry into Entrepreneurship and the Gig Economy

This table studies the effect of the gig economy on entry into entrepreneurship. Panel A examines all newly created firms and Panel B focuses on first-time firm creation. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *First-time Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year and has not previously created a firm. *Gig Worker* is an indicator variable equaling one if an individual received gig income prior to year t . The controls are log adjusted gross income, gender, filing status, having any dependents, and log age. The granular fixed effects are indicators for each category of the controls. The sample includes all U.S. tax filers from 2012 to 2021 aged 25 to 65. The unit of observation is an individual-year. Appendix A provides additional details on variable definitions. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: All Newly Created Firms

	Founder			
	(1)	(2)	(3)	(4)
Gig Worker	1.034*** (0.036)	1.025*** (0.034)	0.984*** (0.033)	0.981*** (0.033)
County FE	Yes	No	No	No
Year FE	Yes	No	No	No
County \times Year FE	No	Yes	Yes	Yes
Granular FE	No	No	No	Yes
Controls	No	No	Yes	No
R ²	0.001	0.001	0.002	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Panel B: First-Time Entrepreneurship

	First-time Founder			
	(1)	(2)	(3)	(4)
Gig Worker	0.760*** (0.024)	0.752*** (0.022)	0.713*** (0.021)	0.712*** (0.021)
County FE	Yes	No	No	No
Year FE	Yes	No	No	No
County \times Year FE	No	Yes	Yes	Yes
Granular FE	No	No	No	Yes
Controls	No	No	Yes	No
R ²	0.001	0.001	0.002	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Table 5: Who Responds in the Gig Economy?

This table evaluates the role of characteristics in the effect of the gig economy on entry into entrepreneurship. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Log AGI* is log adjusted gross income. *Low Income* is an indicator variable equaling one if an individual's adjusted gross income is below tercile in a particular county-year. *Receives EITC* is an indicator variable equaling one if an individual received any Earned Income Tax Credit in a particular year. *Log Age* is the log of an individual's age in a particular year. *Has Dependents* is an indicator variable equaling one if a gig worker has any dependents based on Form 1040. *Single with Dependents* is an indicator variable equaling one if an individual's filing status in a particular year is single and the individual has any dependents based on Form 1040. Appendix A provides additional details on variable definitions. For ease of interpretation, the coefficients and standard errors are multiplied by 100. All models include county-year fixed effects. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Founder					
	(1)	(2)	(3)	(4)	(5)	(6)
Gig Worker \times Characteristic	-0.045*** (0.004)	0.054*** (0.016)	0.060** (0.028)	-0.294*** (0.035)	0.065*** (0.018)	0.233*** (0.029)
Gig Worker	1.484*** (0.072)	1.004*** (0.031)	0.994*** (0.028)	2.036*** (0.155)	0.995*** (0.028)	0.985*** (0.030)
Characteristic	-0.013*** (0.001)	-0.032*** (0.005)	0.081*** (0.006)	-0.655*** (0.010)	0.186*** (0.009)	-0.089*** (0.009)
Characteristic	Log AGI	Low Income	Receives EITC	Log Age	Has Dependents	Single with Dependents
County \times Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.001	0.001	0.001	0.001	0.001	0.001
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Table 6: Learning and the Gig Economy

This table examines learning by entrepreneurs and its relation to the gig economy. Panel A shows the transition from type of gig firm to the industry of newly created firms. Additional details are provided in Section 5.1. Panel B evaluates the relationship between prior work experience and new firm creation. The sample for this panel is individuals creating new firms from 2012 to 2021. *Repeat Sector* is an indicator variable equaling one if an entrepreneur’s newly started firm is in the same sector as any prior W-2 or 1099 experience. *Repeat Sector Gig* is an indicator variable equaling one if an entrepreneur’s newly started firm is in the same sector as any prior gig experience. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . Appendix A provides additional details on variable definitions. All models include county and year fixed effects. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Transitions from Gig Work to Newly Created Firms

	Arts & Media	Finance & Real Estate	Healthcare	Manufacturing	Personal Services	Professional Services	Resource Extraction	Trade	Transportation
Leasing	12.8	16.3	9.8	3.7	17.3	22.8	0.3	16.4	0.7
Selling	11.2	2.5	2.2	2.6	7.0	6.8	0.2	67.2	0.4
Services	8.1	5.3	12.1	8.7	27.1	22.4	0.2	14.8	1.2
Transportation	6.5	10.0	7.1	6.5	22.6	17.6	0.2	23.0	6.6

Panel B: Entrepreneurship and Previous Work Experience

	Repeat Sector	Repeat Sector Gig
	(1)	(2)
Gig Worker	4.066*** (0.283)	1.194*** (0.038)
County FE	Yes	Yes
Year FE	Yes	Yes
R ²	0.018	0.012
Observations	9,910,507	9,910,507

Table 7: Firms at Founding

This table studies the role of the gig economy on firms at founding. The sample includes all firms created by individuals in the year of founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Revenues* is the log of one plus revenues for a firm. *Employees* is a count of the number of employees at a firm. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Revenues	Employees
	(1)	(2)
Gig Worker	19.463*** (1.522)	33.392*** (5.009)
County FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
R ²	0.047	0.046
Observations	9,910,495	9,910,495

Table 8: Firm Performance

This table evaluates the performance of firms started by entrepreneurs who have received gig income prior to founding. Panel A examines firm survival and Panel B studies firm profitability. The sample tracks all firms created by individuals in the three years following founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Survival* is an indicator variable equaling one if a firm files taxes in a particular year after founding. *Profitability* is the inverse hyperbolic sine of a firm's gross profits in a particular year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Firm Survival			
	Survival After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	-2.633*** (0.133)	-3.037*** (0.178)	-3.279*** (0.197)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.012	0.013	0.013
Observations	8,694,911	7,487,494	6,387,217

Panel B: Firm Profitability			
	Profitability After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	31.465*** (2.216)	37.450*** (2.394)	34.406*** (2.649)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.067	0.064	0.061
Observations	5,458,589	3,625,446	2,557,360

Table 9: Employment at Firms

This table examines employment at firms started by entrepreneurs who have participated in the gig economy prior to founding. Panel A studies total employees and Panel B focuses on firms with relatively high employment. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Has Employees* is an indicator variable equaling one if a firm has any employees in a particular year. *At Least Five Employees* is an indicator variable equaling one if a firm has at least five employees in a particular year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Employment			
	Has Employees After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	0.859*** (0.136)	1.213*** (0.165)	2.092*** (0.206)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.057	0.057	0.059
Observations	5,458,589	3,625,446	2,557,360
Panel B: High Employment			
	At Least Five Employees After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	0.488*** (0.092)	0.708*** (0.117)	1.171*** (0.138)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.051	0.052	0.053
Observations	5,458,589	3,625,446	2,557,360

Table 10: Employment of Contractors

This table studies the employment of contractors at firms founded by entrepreneurs participating in the gig economy prior to founding. Panel A examines the extensive margin and Panel B evaluates the intensive margin. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Has Contractors* is an indicator variable if a firm employed any independent contractors in a particular year. *Number of Contractors* is the number of contractors hired by a firm in a particular year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Employment of Contractors

	Has Contractors After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	0.875*** (0.117)	1.254*** (0.153)	1.843*** (0.182)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.022	0.022	0.023
Observations	5,458,589	3,625,446	2,557,360

Panel B: Number of Contractors

	Number of Contractors After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	31.097*** (7.568)	21.859*** (3.483)	34.992*** (10.538)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.049	0.047	0.051
Observations	5,457,861	3,624,735	2,556,290

Table 11: Capital Structure

This table evaluates the use of debt at firms started by entrepreneurs who have received gig income prior to founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Has Debt* is an indicator variable if a firm has debt by a particular year after founding based on reporting interest expense. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Has Debt After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	1.205*** (0.121)	2.239*** (0.186)	3.388*** (0.265)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.036	0.042	0.046
Observations	5,458,589	3,625,446	2,557,360

Table 12: Founder Income

This table examines the role of the gig economy on the income for entrepreneurs. Panel A evaluates entrepreneurs' change in income and Panel B focuses on whether entrepreneurs rise in the income distribution. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Change in Income* is the difference in the log of an entrepreneur's adjusted gross income in a particular year relative to the firm's founding year. *Increase in Income Percentile* is an indicator variable equaling one if an entrepreneur's income percentile in a particular year increases relative to the firm's founding year. Income percentiles are based on adjusted gross income in a county-year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Income Change			
	Change in Income Relative to Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	2.954*** (0.530)	8.806*** (0.742)	11.998*** (1.041)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.002	0.002	0.003
Observations	8,070,197	6,745,459	5,626,284

Panel B: Income Distribution			
	Increase in Income Percentile After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	1.123*** (0.118)	1.777*** (0.143)	1.908*** (0.173)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.004	0.006	0.007
Observations	8,070,197	6,745,459	5,626,284

Appendix A Variable Definitions

This appendix provides variable definitions.

- *Adjusted Gross Income* is the adjusted gross income of an individual as reported on Form 1040 in a particular year and rounded due to confidentiality reasons.
- *Age* is the age an individual turns in a particular year.
- *Change in Income* is the difference in the log of an entrepreneur's adjusted gross income in a particular year relative to the firm's founding year.
- *Employees* is a count of the number of employees at a firm.
- *Female* is an indicator variable equaling one if a gig worker is female.
- *First-time Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year and has not previously created a firm.
- *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year.
- *Gig Worker* is an indicator variable equaling one if an individual received gig income prior to year t .
- *Gig Work Availability* is an indicator variable equaling one if when there are at least 30 individuals located in the county receiving gig income by a particular year.
- *Gig Worker Non-transportation* is an indicator variable equaling one if an individual received gig income in any year up to and including $t - 1$ from a gig firm classified as non-transportation.
- *Gig Worker Number of Years* is the number of years that an individual received gig income in any year up to and including $t - 1$.
- *Gig Worker Previous Year* is an indicator variable equaling one if an individual received gig income in year $t - 1$.

- *Gig Worker Transportation* is an indicator variable equaling one if an individual received gig income in any year up to and including $t - 1$ from a gig firm classified as transportation.
- *Has Contractors* is an indicator variable if a firm employed any independent contractors in a particular year.
- *Has Debt* is an indicator variable if a firm has debt by a particular year after founding based on reporting interest expense.
- *Has Dependents* is an indicator variable equaling one if a gig worker has any dependents based on Form 1040.
- *Increase in Income Percentile* is an indicator variable equaling one if an entrepreneur's income percentile in a particular year increases relative to the firm's founding year. Income percentiles are based on adjusted gross income in a county-year.
- *Low Income* is an indicator variable equaling one if an individual's adjusted gross income is in the bottom tercile in a particular county-year.
- *Number of Contractors* is the number of contractors hired by a firm in a particular year.
- *Profitability* is the inverse hyperbolic sine of a firm's gross profits in a particular year.
- *Receives EITC* is an indicator variable equaling one if an individual received any Earned Income Tax Credit in a particular year.
- *Repeat Sector* is an indicator variable equaling one if an entrepreneur's newly started firm is in the same sector as any prior W-2 or 1099 experience.
- *Repeat Sector Gig* is an indicator variable equaling one if an entrepreneur's newly started firm is in the same sector as any prior gig experience.
- *Revenues* is the log of one plus revenues for a firm in a particular year.
- *Single* is a gig worker's filing status.

- *Single with Dependents* is an indicator variable equaling one if an individual's filing status on Form 1040 in a particular year is single and the individual has any dependents based on Form 1040.
- *Survival* is an indicator variable equaling one if a firm files taxes in a particular year after founding.

Figure A1: Type of Gig Firms

This figure provides the distribution of gig firms in the United States from 2012 to 2021. Each gig firm is classified into one of the following categories: leasing, selling, services, and transportation. The bars show the count of gig firms in a particular category.

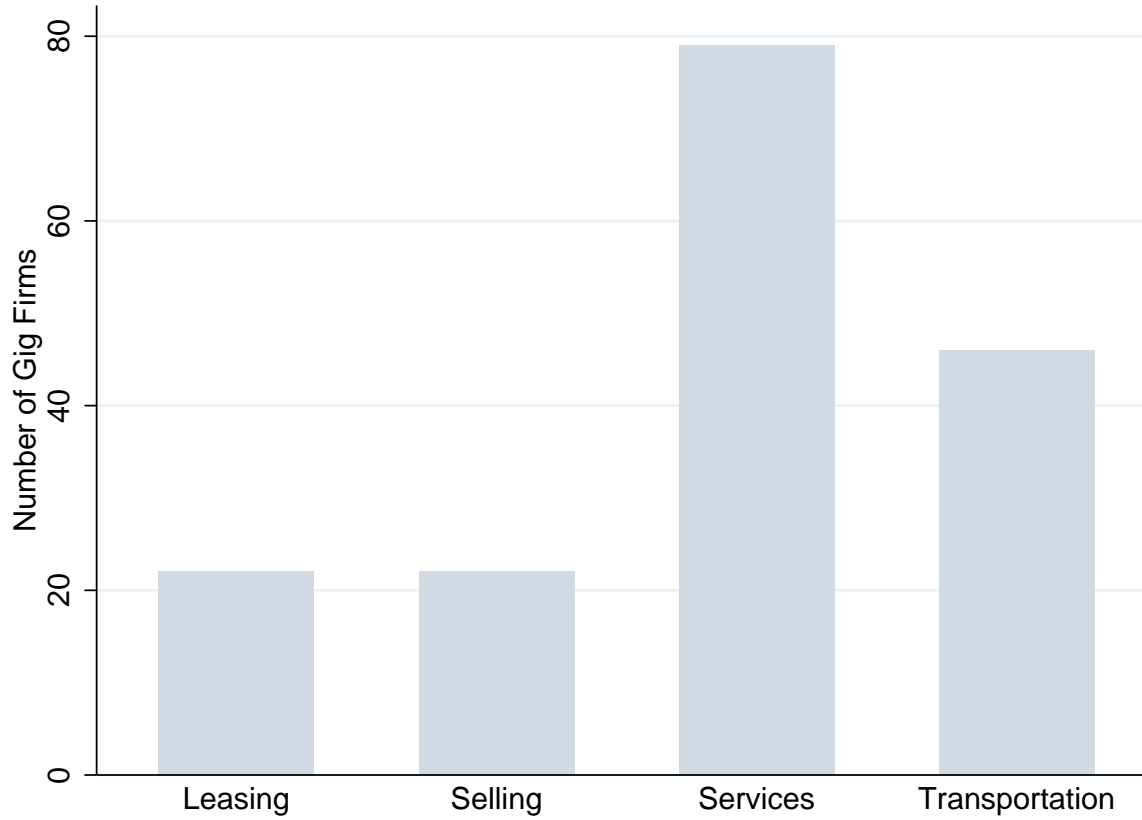
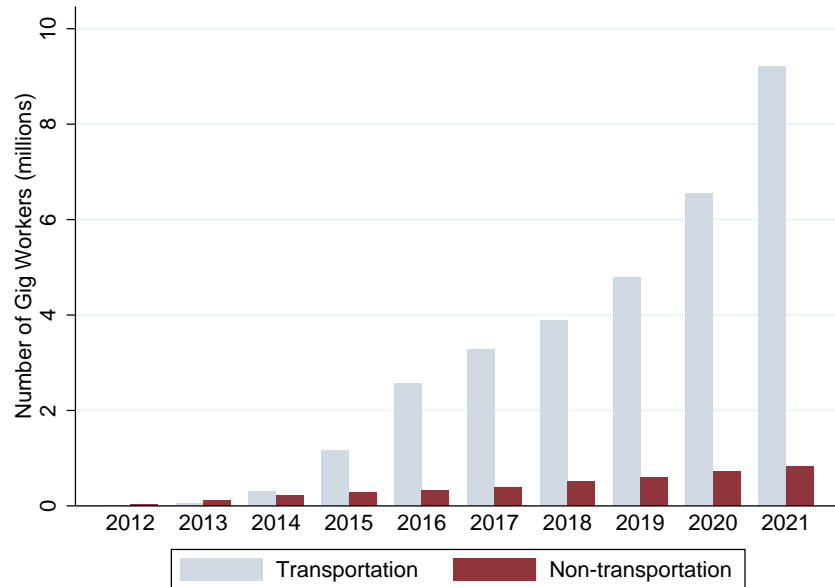


Figure A2: Gig Economy: Transportation and Non-Transportation

This figure plots the U.S. participation in the gig economy from 2012 to 2021 based on the type of gig firm. Panel A shows the cumulative number of individuals working in the gig economy. Panel B provides the total amount of income in billions of dollars received by gig workers in a particular year, which is converted to dollars in 2012. The gray bars show participation in the gig economy for gig firms categorized as transportation. The red bars indicate participation in the gig economy for gig firms categorized as non-transportation, which includes leasing, selling, and services as described in Section 2.2 and shown in Figure A1.

Panel A: Cumulative Number of Gig Workers



Panel B: Gig Income (\$ 2012)

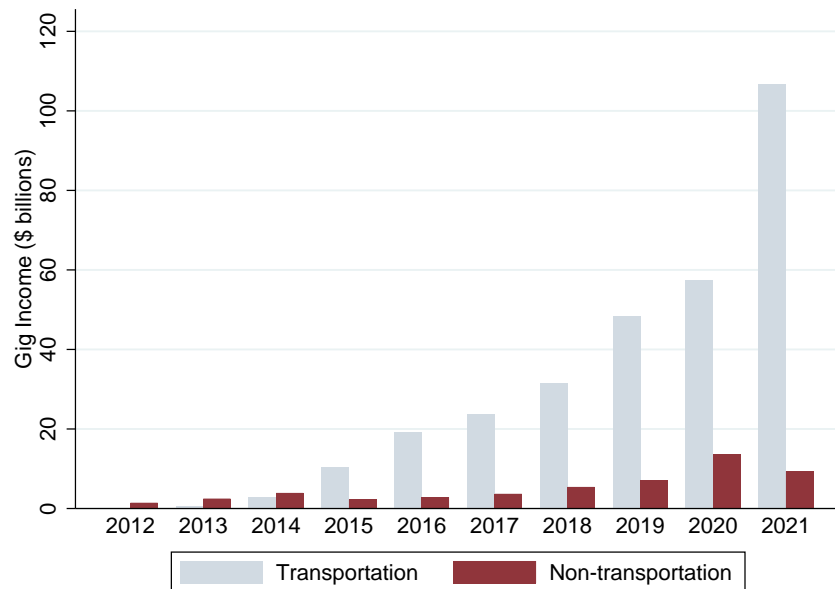


Figure A3: Mechanisms: Who Responds in the Gig Economy

This figure provides the coefficients and 95% confidence intervals for subsamples based on founders' characteristics. Panels A and B plot the estimates for revenues and employees at founding, respectively. Panels C and D show the estimates for survival and profitability three years after founding, respectively. The characteristics are income, flexibility, and age. *Low (High) Income* is based on below (above) bottom tercile income in a particular county-year. *More Time Constrained* is defined as individuals who are single with dependents. *Less Time Constrained* are individuals who are not single with dependents. *Young (Old)* is constructed as below (above) median age.

66

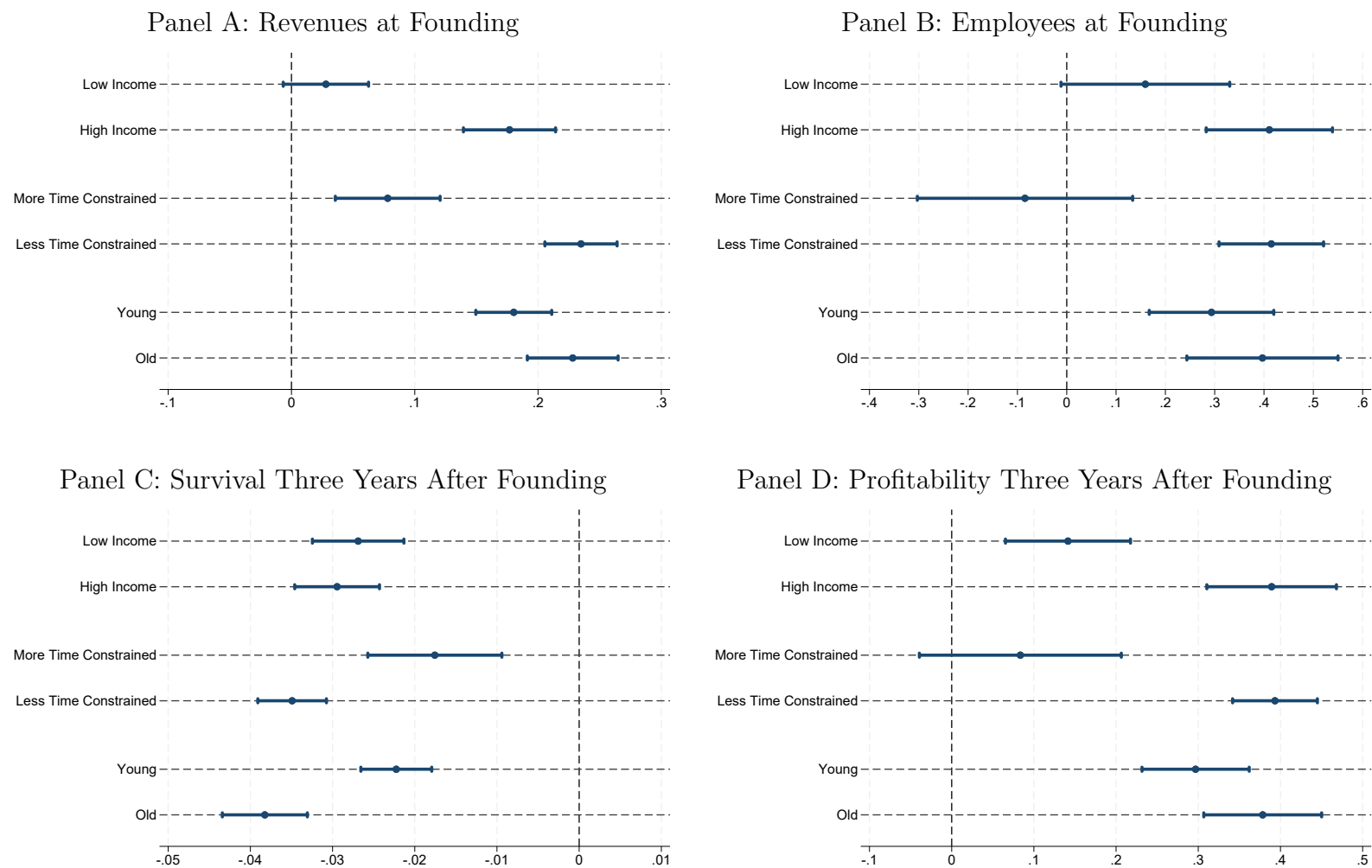


Table A1: Entry into Entrepreneurship and the Gig Economy: Robustness to Measure of Gig Work

This table evaluates robustness of the baseline estimates for the effect of the gig economy on entry into entrepreneurship using different measures of gig work. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *Gig Worker Previous Year* is an indicator variable equaling one if an individual received gig income in year $t - 1$. *Gig Worker Number of Years* is the number of years that an individual received gig income in any year up to and including $t - 1$. The controls are log adjusted gross income, gender, filing status, dependents, and log age. The granular fixed effects are indicators for each category of the controls. The sample includes all U.S. tax filers from 2012 to 2021 aged 25 to 65. The unit of observation is an individual-year. Appendix A provides additional details on variable definitions. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Gig Work in Previous Year				
	Founder			
	(1)	(2)	(3)	(4)
Gig Worker Previous Year	0.938*** (0.034)	0.934*** (0.033)	0.883*** (0.032)	0.881*** (0.031)
County FE	Yes	No	No	No
Year FE	Yes	No	No	No
County \times Year FE	No	Yes	Yes	Yes
Granular FE	No	No	No	Yes
Controls	No	No	Yes	No
R ²	0.001	0.001	0.002	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170
Panel B: Number of Years of Gig Work				
	Founder			
	(1)	(2)	(3)	(4)
Gig Worker Number of Years	0.482*** (0.023)	0.478*** (0.022)	0.463*** (0.021)	0.461*** (0.021)
County FE	Yes	No	No	No
Year FE	Yes	No	No	No
County \times Year FE	No	Yes	Yes	Yes
Granular FE	No	No	No	Yes
Controls	No	No	Yes	No
R ²	0.001	0.001	0.002	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Table A2: Entry into Entrepreneurship and the Gig Economy: Robustness for Type of Gig Firm

This table provides robustness of the baseline estimates for the effect of the gig economy on entry into entrepreneurship using variation in type of gig work. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *Gig Worker Transportation* is an indicator variable equaling one if an individual received gig income in any year up to and including $t - 1$ from a gig firm classified as transportation. *Gig Worker Non-transportation* is an indicator variable equaling one if an individual received gig income in any year up to and including $t - 1$ from a gig firm classified as non-transportation. The controls are log adjusted gross income, gender, filing status, dependents, and log age. The granular fixed effects are indicators for each category of the controls. The sample includes all U.S. tax filers from 2012 to 2021 aged 25 to 65. The unit of observation is an individual-year. Appendix A provides additional details on variable definitions. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Founder			
	(1)	(2)	(3)	(4)
Gig Worker Transportation	0.980*** (0.040)	0.969*** (0.037)	0.932*** (0.037)	0.934*** (0.036)
Gig Worker Non-transportation	1.292*** (0.023)	1.291*** (0.022)	1.229*** (0.020)	1.198*** (0.021)
County FE	Yes	No	No	No
Year FE	Yes	No	No	No
County \times Year FE	No	Yes	Yes	Yes
Granular FE	No	No	No	Yes
Controls	No	No	Yes	No
R ²	0.001	0.001	0.002	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Table A3: Entry into Entrepreneurship and the Gig Economy: Staggered Gig Work Availability

This table examines robustness of the baseline estimates for the effect of the gig economy on entry into entrepreneurship using the staggered availability of gig work. *Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year. *First-time Founder* is an indicator variable equaling one if an individual starts any new firms in a particular year and has not previously created a firm. *Gig Worker* is an indicator variable equaling one if an individual received gig income prior to year t and if there are at least 30 individuals located in the county receiving gig income prior to year t . The controls are log adjusted gross income, gender, filing status, having any dependents, and log age. The sample includes all U.S. tax filers from 2012 to 2021 aged 25 to 65. The unit of observation is an individual-year. Appendix A provides additional details on variable definitions. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Founder		First-time Founder	
	(1)	(2)	(3)	(4)
Gig Worker	1.024*** (0.034)	0.983*** (0.033)	0.752*** (0.022)	0.714*** (0.021)
County \times Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
R ²	0.001	0.002	0.001	0.002
Observations	1,265,172,170	1,265,172,170	1,265,172,170	1,265,172,170

Table A4: Firms at Founding: Controls

This table examines robustness about the role of the gig economy on firms at founding. The sample includes all firms created by individuals in the year of founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Revenues* is the log of one plus revenues for a firm. *Employees* is a count of the number of employees at a firm. The controls are log adjusted gross income, gender, filing status, dependents, and log age. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Revenues	Employees
	(1)	(2)
Gig Worker	12.167*** (1.525)	18.157*** (4.898)
County FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Controls	Yes	Yes
R ²	0.057	0.070
Observations	9,294,788	9,294,491

Table A5: Firms at Founding: Staggered Gig Work Availability

This table provides robustness about the role of the gig economy on firms at founding using the staggered availability of gig work. The sample includes all firms created by individuals in the year of founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Gig Work Availability* is an indicator variable equaling one if when there are at least 30 individuals located in the county receiving gig income by a particular year. *Revenues* is the log of one plus revenues for a firm. *Employees* is a count of the number of employees at a firm. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Revenues	Employees
	(1)	(2)
Gig Worker	19.658*** (1.521)	33.206*** (5.065)
Gig Work Availability	8.383*** (1.094)	-5.220 (4.163)
County FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
R ²	0.047	0.046
Observations	9,910,495	9,910,178

Table A6: Firms at Founding: At Least One Employee

This table studies the role of the gig economy on firms at founding. The sample includes all firms created by individuals in the year of founding and having at least one employee within the first five years of founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Revenues* is the log of one plus revenues for a firm. *Employees* is a count of the number of employees at a firm. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	Revenues	Employees
	(1)	(2)
Gig Worker	2.584 (1.690)	22.298*** (4.955)
County FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
R ²	0.050	0.054
Observations	1,799,656	1,799,647

Table A7: Firm Performance: Controls

This table evaluates the performance of firms started by entrepreneurs who have received gig income prior to founding. Panel A examines firm survival and Panel B studies firm profitability. The sample tracks all firms created by individuals in the three years following founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Survival* is an indicator variable equaling one if a firm files taxes in a particular year after founding. *Profitability* is the inverse hyperbolic sine of a firm's gross profits in a particular year. The controls are log adjusted gross income, gender, filing status, dependents, and log age. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Firm Survival			
	Survival After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	-1.969*** (0.121)	-2.161*** (0.182)	-2.446*** (0.202)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
R ²	0.014	0.016	0.016
Observations	8,140,370	6,997,132	5,978,124

Panel B: Firm Profitability			
	Profitability After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	11.094*** (2.263)	15.683*** (2.532)	12.690*** (2.811)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
R ²	0.085	0.083	0.080
Observations	5,172,984	3,433,575	2,422,141

Table A8: Firm Performance: Staggered Gig Work Availability

This table provides robustness for the performance of firms started by entrepreneurs who have received gig income prior to founding. Panel A examines firm survival and Panel B studies firm profitability. The sample tracks all firms created by individuals in the three years following founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Gig Work Availability* is an indicator variable equaling one if when there are at least 30 individuals located in the county receiving gig income by a particular year. *Survival* is an indicator variable equaling one if a firm files taxes in a particular year after founding. *Profitability* is the inverse hyperbolic sine of a firm's gross profits in a particular year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Firm Survival

	Survival After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	-2.633*** (0.00134)	-3.029*** (0.00179)	-3.280*** (0.00198)
Gig Work Availability	0.401*** (0.100)	0.442*** (0.115)	0.431*** (0.121)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.012	0.013	0.013
Observations	8,694,911	7,487,494	6,387,217

Panel B: Firm Profitability

	Profitability After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	31.294*** (2.227)	37.407*** (2.414)	34.102*** (2.681)
Gig Work Availability	6.321*** (1.551)	5.592*** (1.8940)	4.811** (2.078)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.067	0.064	0.061
Observations	5,458,589	3,625,446	2,557,360

Table A9: Firm Performance: At Least One Employee

This table evaluates the performance of firms started by entrepreneurs who have received gig income prior to founding. Panel A examines firm survival and Panel B studies firm profitability. The sample tracks all firms created by individuals in the three years following founding and having at least one employee within the first five years of founding. *Gig Worker* is an indicator variable equaling one if an individual received gig income in any year prior to year t . *Survival* is an indicator variable equaling one if a firm files taxes in a particular year after founding. *Profitability* is the inverse hyperbolic sine of a firm's gross profits in a particular year. Appendix A provides additional details on variable definitions. All models include county, year, and industry fixed effects. Industries are defined at the four-digit NAICS code level. For ease of interpretation, the coefficients and standard errors are multiplied by 100. Standard errors are reported in parentheses and clustered at the county level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Panel A: Firm Survival

	Survival After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	-2.790*** (0.280)	-3.597*** (0.328)	-3.754*** (0.379)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.027	0.029	0.031
Observations	1,671,482	1,493,112	1,300,108

Panel B: Firm Profitability

	Profitability After Founding		
	One Year (1)	Two Years (2)	Three Years (3)
Gig Worker	8.953*** (2.649)	8.954*** (2.891)	8.606** (4.153)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
R ²	0.045	0.040	0.039
Observations	1,165,900	861,151	638,995