More Cash Flows, More Options? The Effect of Cash Windfalls on Small Firms*

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Abstract

We study how shocks to firms' internal resources affect firms' business success and owners' economic behaviors. We use a new source of variation in cash flows by exploiting the bonus that retailers earn when selling winning jackpot lottery tickets. Increases in a retailer's internal resources reduce the probability the company will survive. Evidence is not consistent with deteriorating credit behavior or owner retirement but instead suggests that small business owners who receive large cash windfalls are more likely to start new businesses in non-retail industries. This effect becomes stronger when owners reside in low-income ZIP codes or do not own real estate assets. Finally, the bonus amount positively affects revenue and the number of employees for those retailers that remain open. Overall, our results suggest that small business owners may face financial constraints in their attempts to grow both internally and externally, constraints that may result in both resource and talent misallocations.

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Small firms play a vital role in creating jobs and are often considered to be the engines of economic growth (e.g., Neumark et al., 2011). However, financial constraints impede the growth of small businesses and inhibit their survival. To relax financial constraints, policy makers can provide direct subsidies to small businesses in the form of increased access to capital (e.g., subsidized or guaranteed loans, access to special lending programs). These subsidies have been shown to positively affect economic outcomes (e.g., revenue growth, number of employees) and survival rates among small businesses (e.g., Kerr and Nanda, 2009; Krishnan et al., 2014; Fracassi et al., 2016). Alternatively, policymakers could provide subsidies in the form of cash windfalls (e.g., preferential treatment through the tax code). However, recent evidence questions whether small firms want to grow and shows that not only financial constraints but also non-pecuniary benefits are important for small businesses (Hurst and Pugsley, 2011).

This paper asks several questions: How do shocks to firms' internal resources affect firms' survival? Would the effect of a cash windfall be similar to the impact of increasing access to credit? How do these shocks affect firm owners' economic decisions? Surveys that investigated how small businesses respond to savings from the recent tax reform suggest mixed behavior. For example, a nationally representative survey by WalletHub of more than 150 business owners reports that 40% of owners plan to spend their tax savings on business development; 28% plan to pay executive/investor bonuses; and 23% plan to add the savings to their cash reserves. In contrast, an online survey of 1,000 small business owners by LendingTree reports that 35% of owners plan to pay down debt; 34% have not changed their plans as a result of the savings; and 15% intend to use the savings for employee compensation.

A main challenge of testing the impact of shocks to firms' internal resources is finding cash windfalls that are unrelated to investment opportunities (e.g., Lamont, 1997; Erickson and Whited, 2000; Rauh, 2006).[1] Blanchard et al. (1994) exploit windfalls in the form of a won or settled lawsuit but use a small sample of 11 firms. Holtz-Eakin et al. (1994) study entrepreneurial activity using the individual income tax returns of people receiving an inheritance. However, these people also may have greater access to business opportunities for reasons unrelated to their wealth (Hurst and

[1]Most of the past literature focused on the effects of cash windfalls on individuals' economic behavior, for example, Lindh and Ohlsson (1996); Kuhn et al. (2011), not on small businesses' economic behavior.

Lusardi, 2004).

In this paper, we exploit a unique setting that provides a randomized assignment of cash windfalls to small businesses that sell lottery tickets. To incentivize retailers' sales of lottery tickets, state lottery programs provide bonuses for retailers that sell jackpot tickets (i.e., prizes of at least $40 million), usually as a percentage of the jackpot prize.[2] The empirical design exploits the fact that, conditional on selling a winning jackpot, the amount of the winning ticket bonus to the retailer is randomly assigned.

To conduct our analysis, we hand-collect a dataset containing information on all retailers that sold winning Powerball (PB) and Mega Millions (MM) tickets from 2002 to 2016. PB and MM are the two most important shared jackpot games in the United States, being offered in 44 states. We then merge this dataset with information on states in which retailers with a winning ticket bonus are located. We complement this dataset with information on firms' survival and business activities, such as revenue, number of employees, secured lending, real property investment, delinquency, and corporate bankruptcy. For a subset of retailers, we collect owner information, such as gender, age, secured lending, real property, delinquency, personal bankruptcy, and personal business activity. This novel dataset allows us to study not only a firm's behavior but also the owner's behavior following a positive shock to the business.

This empirical setting provides us a geographically diverse sample in the retail trade industry, which is a non-trivial proportion of the small businesses in the United States.[3] Our sample covers various types of retailers (e.g., convenience stores, grocery stores, gift shops), and the distribution of employment size in our sample is quite comparable to the nationally representative sample of retailers in the United States. More importantly, given the randomness of the lottery in terms of the jackpot amount and that the bonus award rules vary geographically, we obtain a large dispersion in the intensity of the treatment at the firm level. Our identifying assumption is supported by the data: we find that the magnitude of the bonus is not correlated with retailers' pre-treatment or local and state characteristics (e.g., population, income, education); we also show that the retailers' outcomes in the years prior to selling the winning ticket are unexplained by the amount of the

[2]The mean winning ticket bonus is $151,703 in 2016 dollars.

[3]According to the Statistics of U.S. Businesses (SUSB), retailers trade industry accounts for around 13% of the total small businesses in the United States.

bonus.

We begin our analysis by examining how a cash windfall affects a firm's likelihood of surviving. A large amount of literature has focused on entry into entrepreneurship, but less attention has been paid to departure from entrepreneurship. As Holtz-Eakin et al. (1994) point out, "the net quantity of entrepreneurs is just as dependent on departures from entrepreneurship as on the flows into entrepreneurship." On the one hand, firms may have financial constraints and positive net present value (NPV) projects but fail to obtain funds to undertake those projects. These constraints would be relaxed by a cash windfall. Firms could then invest in these positive NPV projects and thus be more likely to survive (Holtz-Eakin et al., 1994).

On the other hand, with a lumpy cash windfall, firms may behave differently. Hvide and Møen (2010) find that startup profitability increases with an entrepreneur's wealth in the first three wealth quartiles but drops in the top quartile. The authors conjecture that higher wealth may induce a less alert or less dedicated management. At the individual level, Agarwal et al. (2007) find that consumers who are initially most likely to be liquidity constrained show the largest increase in credit card spending after getting a tax rebate check. Similarly, following a cash windfall, firms' management may become lax and increase debt significantly without having sufficient positive NPV projects and hence become more prone to credit risk and less likely to survive. In contrast, we find that the amount of the winning bonus negatively affects a firm's survival following a jackpot shock. Results are robust when we control for retailer and local characteristics. The negative impact of a winning bonus on a firm's survival is inconsistent with the findings of Holtz-Eakin et al. (1994).

Next, we explore potential interpretations for the negative effect of bonus size on a firm's survival. One interpretation is that firms that receive a larger winning ticket bonus may overinvest and exhibit deteriorating credit behavior after winning, leading to financial distress and a lower probability of survival. For example, previous research at the household level has documented that after receiving a cash windfall, individuals later file for bankruptcy (Hankins et al., 2011; Carlson et al., 2015). To test this hypothesis, we examine the pattern of UCC loans (i.e., secured loans to small businesses) and new tax liens (as a proxy for post-winning delinquency) at the retailer level. The results, which are inconsistent with deteriorating credit behavior, show that

the probability of retailers obtaining UCC loans and having a new tax lien decreases with the amount of the winning bonus. In addition, that winning bonuses do not generate UCC loans, tax liens, or personal bankruptcy at the owner's level likewise does not support the deteriorating credit behavior channel.

A second potential interpretation is that a retail owner may be more likely to retire and close the business after receiving a larger winning ticket bonus. However, when we estimate the effect on owners who are near to retirement age, we find their businesses are actually more likely to survive, which is inconsistent with this interpretation.

We then consider retail owners' other economic behavior that may result in business closure. We focus on how the winning ticket bonus affects the owners' likelihood of starting a new business. The results show that owners are, in fact, more likely to start new businesses after receiving a larger winning ticket bonus. Among the owners who start new businesses, 52% close their previous retail operations. To closely look at how the winning bonus affects owners' decision to start a new business and close their previous firms, we break down retail owners' choices along two dimensions: (1) whether the owner keeps the previous retail establishment open and (2) whether the owner starts a new business. We find that, as the amount of the winning ticket bonus increases, owners are more likely to start a new business *and* close their previous store than they are to only close the previous store. Therefore, we argue that the positive impact of a winning bonus on starting new businesses can, at least partially, explain the negative effect of the amount of the winning ticket bonus on retailer survival.

New businesses do not seem to simply substitute for the current businesses at a different location or another form of business expansion, such as an increase in the number of stores owned. There is substantial heterogeneity in the types of new businesses started by owners who receive a winning ticket bonus, including eateries (27%), repair services (18%), and real estate (14%), among others. In general, these new ventures are in industries that have higher net profit margins than do retail stores and that require higher startup capital. In addition, most of these new ventures are currently open.

To explain what prevented these owners from starting new businesses prior to receiving the

winning bonus, we explore the channel of financial constraints. Small business owners may have restricted access to capital, which limits the types of businesses they can start in the first place. We use the income level of the ZIP code where the retailer's owner resides and the owner's pre-treatment homeownership status as proxies for financial constraints. Results show that the impact of the size of a cash windfall on the likelihood of starting a new business is greater for owners with higher financial constraints, a finding that supports the financial constraint interpretation.

Another interpretation of our results could be mental accounting. Small business owners may value a dollar differently when it is earned through work, financed through credit, or given to them (e.g., as a cash windfall). Even though they have access to credit or other types of external funding, owners may be more risk averse with borrowed capital than with a cash windfall. However, the fact that the documented effect on the likelihood of starting a new business is not present for owners with fewer financial constraints does not support this interpretation.

Finally, we analyze the impact of the winning ticket bonus on subsequent revenues and employment as proxies for internal growth. We find that, for the retailers that remain open, a larger bonus leads to a positive increase in both revenue and the number of employees. In particular, we find that revenues increase by $36,561 on average and the number of employees increases by 0.87 for every $100,000 of firms' additional internal resources, a positive effect that is economically significant at least 5 years following the shock. This evidence suggests that financial constraints may have been restricting the internal growth of these retail stores prior to the shock.

A potential concern is that the effect on revenues comes from the "lucky store effect" (Guryan and Kearney, 2008), instead of the winning ticket bonus. However, the empirical strategy exploits the intensity of treatment, conditional on selling a winning ticket. Thus, all the retailers in the sample are literally "lucky." In addition, the estimated effects are persistent several years after the jackpot shock, whereas the lucky store effect dissipates in less than a year. We also show that our estimates remain unchanged when we control for the size of the jackpot prize in order to account for the possibility that the lucky store effect could be more important for larger prizes.

This paper is related to several strands of the literature. Broadly speaking, it contributes to the literature that studies the role of liquidity constraints in small business growth and survival.

Holtz-Eakin et al. (1994) find that an inheritance-induced increase in liquidity raises entrepreneurial survival. Fracassi et al. (2016) exploit a regression discontinuity setting and show that startups that receive microloans are more likely to survive, generate higher revenues, and create more jobs. These findings suggest that increasing access to capital improves firms' growth and chance of survival. In contrast, using Danish data, Andersen and Nielsen (2012) identify constrained entrepreneurs who start a business after receiving a large inheritance and find that these entrepreneurs have significantly lower survival rates than do unconstrained entrepreneurs. Hvide and Møen (2010) find that startup profitability drops when founders are in the top quartile of wealth. These findings suggest that business ownership may have a luxury goods component (Hurst and Pugsley, 2011). Our paper offers a different perspective on survival. Though we find retailers are less likely to survive after receiving a larger winning ticket bonus, business closures do not seem to come from deteriorating credit behavior at the retailer level, the owner level, or from the owners' retirement motive, but rather from owners starting new businesses. Our findings also highlight the importance of considering internal (revenues and employees) and external (starting a new firm) growth for small firms and their owners. These results suggest that small business owners indeed want to grow (Hurst and Pugsley, 2011), and they may face financial constraints in their attempts to grow both internally and externally.

Another related strand of the literature focuses on the impact a cash windfall has on a firm's economic behavior. Blanchard et al. (1994) examine a variety of decisions by each firm, such as cash distributions (in the form of a dividend, share repurchases, or debt reduction), borrowing behavior, and acquiring new lines of business. In emerging markets, De Mel et al. (2008), Karlan et al. (2015), and McKenzie (2017) use randomized cash grants to generate a cash windfall for microenterprises and study the impact on the return of capital, the firm's profits, and employment. It is worth stressing that the small business environment in the United States significantly differs from that in most emerging markets. We contribute to this literature by exploiting a unique identification from a quasi-natural experiment. The nature of our data repository allows us to observe the credit behavior and real property investment on both the retailer and the owner levels. It also allows us to follow other entrepreneurial activities conducted by the owners, facilitating a holistic view of a

firm's survival and the owner's exit route.

An emerging literature also exploits lottery prizes as an exogenous liquidity shock. Most of these papers focus on the impact of liquidity shocks on individual outcomes, for example, stock market participation (Briggs et al., 2015), financial distress (Hankins et al., 2011), labor earnings (Imbens et al., 2001), health (Lindahl, 2005; Cesarini et al., 2016), and entry into entrepreneurship (Lindh and Ohlsson, 1996). Some recent papers use lottery wins to create quasi-experimental variation in government fiscal policy (Da et al., 2015), bank funding (Parra, 2018), or local economic conditions (Bermejo et al., 2018). In contrast, our paper exploits the random assignment (achieved by the lottery setting) of cash on the firm level, allowing us to study the impact of a cash windfall on small business decisions.

1 Background of the Winning Ticket Bonuses

Lotteries have been established in 44 states, the District of Columbia, and Puerto Rico. State lotteries have programs to incentivize retailers' ticket sales. Depending on the state, lottery programs usually have a bonus for retailers that sell winning jackpot tickets.[4]

Winning ticket bonuses, which are exploited by the research design, vary by state and even within states. First, one set of states provides the retailer a bonus that is a percentage of the prize, usually with a cap on the bonus. For example, Texas pays retailers a bonus of 1% of the prize up to $1 million; California pays 0.5% of the prize up to $1 million; and Illinois also pays 1%, but the maximum bonus is $500,000. Second, another set of states pays a flat bonus. For example, Colorado pays a bonus of $50,000 regardless of the size of the jackpot prize. Third, a few states do not provide a winning ticket bonus. For example, retailers in Maine do not earn bonuses for selling large-prize winning tickets. Finally, 63% of the retailers treated in our sample period are located in states that offer a percentage of the jackpot price, and 37% are in states that pay a flat bonus.

[4]State lotteries also offer sales incentives for retailers that are a percentage of the ticket sales. However, these sales incentives vary little across states, and the amount of the incentive is substantially lower than the winning ticket bonus. In addition, the point estimates are unaffected when we include as controls the average income of the retailer's ZIP code, as a proxy for the sales incentives, and the size of the prize. The latter control accounts for the potential hypothesis that sales incentives are greater for the larger jackpots.

Most state lotteries pay retailers the winning ticket bonus on unclaimed prizes. One of the few exceptions is Michigan. Jackpot winners have between 90 days to 1 year to claim the prize, depending on the state lottery's rules. After that period, the prize becomes unclaimed. Finally, because the bonus, in most instances, is a percentage of the jackpot prize and because the empirical design exploits the intensity of treatment, we focus on retailers' bonuses from the most important U.S. jackpot games: Powerball (PB) and Mega Millions (MM).

PB and MM are two U.S. jointly shared jackpot games offered in 44 states.[5] Currently, the minimum jackpot for PB and MM is $40 million. However, during the sample period, the minimum jackpot changed overtime for both games. In particular, for MM, the minimum was between $5 and $40 million, and, for PB, the minimum jackpot varied between $10 and $40 million. The odds of winning the jackpot are 1 in 292,201,338 for PB and 1 in 302,575,350 for MM. The jackpot can be paid to the winner as an annuity or a lump sum payment. In the case of the retailer, the bonus is paid regardless of whether the jackpot winner chooses the lump sum or the annuity.[6]

The advertised jackpot comes from the funds accumulated in the jackpot pool that are rolled over from prior drawings and the expected sales from all the state members for the next drawing.[7] If the jackpot is not won in a particular drawing, the jackpot pool carries over to the next drawing, accumulating until there is a jackpot winner. When there is a top-prize winner, the next jackpot resets to the minimum jackpot (e.g., $40 million). In addition, both games have two draws per week. In the case of PB, drawings are held every Wednesday and Saturday evenings. For MM, drawings are conducted on Tuesday and Friday evenings.

The following provides an example of the dynamics of a winning ticket bonus: In the drawing that occurred on January 29, 2010, a $144 million MM winning jackpot ticket was sold in Texas. Short Stop Market at Katy, the retailer, accordingly received a $1 million retailer bonus (top

[5]For further details on PB and MM, see Parra (2018).

[6]A particular example of this shock is Dehoff's Key Market, located at 500 South Norfolk Street in San Mateo, which sold a $228.4 million PB jackpot in 2014. In this case, the retailer received a bonus of $1 million. At the time of winning, the President of Dehoff's Key Markets, Chris Dehoff, stated the following: "We don't have final plans for the money. We have all kinds of improvements for the store that we are always working on, and we are discussing other things. This is a nice windfall since the margins in our business are so thin."

[7]The cost to fund the annuity is another factor that determines the prize. This component comprises interest rates for securities purchased to fund prize payments. However, in our case, most of the variation that we exploit comes from the changes in the jackpot pool between jackpot winners, changes that are mostly a function of the sales from the 44 states members.

winning ticket bonus). In this case, 10 drawings were taken from the previous jackpot winner (December 25, 2009) to get a new winner. The next jackpot winning ticket for $133 million was sold on March 5, 2010, in California. Country Donuts at Long Beach, the retailer in this case, collected a bonus of $670,000 (0.5% of the prize). Coincidentally, 10 drawings were also required to get a new top-prize winner. The subsequent top-prize of $20 million was sold on March 12, 2010, in Illinois.[8] This time the retailer, Hennepin Food Market in Hennepin, obtained $200,000 for selling the winning ticket (1% of the prize). In this case, it took only two drawings to sell the winning jackpot ticket.

2 Research Design

To estimate the causal effect of cash flow shocks to the firm's outcomes (e.g., survival), we exploit the variation in the intensity of treatment from the winning ticket bonuses. This empirical design is similar to those employed in other papers that examine the effect of income shocks at the individual level on labor earnings (Imbens et al., 2001; Cesarini et al., 2017), health (Lindahl, 2005; Cesarini et al., 2016), and personal bankruptcy (Hankins et al., 2011).

In addition, the empirical design of this paper differs from that of Guryan and Kearney (2008), who exploit the shock of selling a large-prize winning ticket on lottery sales to document the lucky store effect. First, the authors do not exploit the fact that the retailers earn a bonus for selling the winning ticket, which is the novel focus of our paper.[9] Second, they focus their analysis on the effect of selling a winning jackpot ticket on sales.

The identifying assumption of the research design is that conditional on selling a winning jackpot ticket and receiving the respective bonus, the amount of the commission that the retailer earns is independent of all the other variables that affect the firm's outcomes. If this assumption holds, then the residual of the regression model is uncorrelated with the winning ticket bonus, and, thus, the empirical analysis offers an unbiased estimator.[10]

[8] During this period the minimum MM jackpot was $12 million.

[9] Their treatment variable is a winner dummy that assumes equal intensity of treatment following the shock.

[10] An alternative empirical strategy would be to exploit the fact that conditional on lottery sales, the winning shock is randomly assigned. In this case, the strategy needs to control for the sales of each store, because the probability of selling a winning ticket is a positive function of the lottery sales; otherwise, the estimates are biased

The assumption can be empirically tested. Section 4 shows that the magnitude of the bonus is not correlated with retailers' pre-treatment or local characteristics. As an additional test, we also show that the amount of the bonus does not explain the retailers' outcomes before selling a winning ticket, and, thus, these tests suggest that the post-winning impact of the bonus can be interpreted as the causal effect of the winning ticket bonus.

Our empirical specification is similar to that of the individual level studies that exploit lottery prizes (e.g., Imbens et al., 2001; Hankins et al., 2011). Formally, we estimate the causal impact of receiving a winning ticket bonus through the following equation:

$$y_i = \alpha_t + \tau_g + \beta\, ln\,(Bonus_i) + \gamma' \mathrm{X_i} + \epsilon_\mathrm{i}, \tag{1}$$

where y_i is the outcome variable for retailer i within a given number of years after selling the winning ticket (e.g., an indicator variable for the retailer remaining open in or before the specified year); α_t is a set of fixed effects for the year in which the retailer sold the jackpot ticket; τ_g is a Powerball dummy variable; $Bonus_i$ is the log of one plus the winning ticket bonus that retailer i receives after taxes; and X_i is a set of retailers' pre-treatment covariates, such as years in business and a dummy variable for whether the retailer has a UCC loan, tax lien, etc.[11] If these covariates are independent of the winning bonus, their inclusion should only affect the precision of the estimates. To account for any potential serial correlation across states, we report the standard errors clustered at the state level.

A potential concern of the estimated effect from Equation (1) is whether the effect comes from the lucky store effect (Guryan and Kearney, 2008), rather than the winning ticket bonus. Recall however that the empirical strategy exploits the intensity of treatment, conditional on selling a winning jackpot ticket. Thus, all the retailers in the sample are lucky. In addition, the estimated effects in most cases are persistent several years after the jackpot shock, whereas the lucky store effect dissipates in less than a year (i.e., up to 40 weeks). In addition, we show, in Section 4, that the point estimates remain unchanged when we control for the size of the prize to account for the

(Guryan and Kearney, 2008). However, the PB and MM sales for all retailers that sell these games nationwide between 2002 and 2016 are not available. In addition, the estimated effect with this alternative approach might be cofounded by the lucky store effect.

[11] Our estimates are similar if we include a flat fee fixed effect in our specification.

possibility that the lucky store effect could be more important for larger jackpot prizes. Thus, it seems unlikely that the lucky store effect drives our findings.

Finally, for a subset of retailers, we estimate the effect of the winning ticket bonus on the retail owners' outcomes. Specifically, we estimate

$$y_i = \alpha_t + \tau_g + \beta\, ln\,(Avg\, bonus_j) + \gamma' \mathrm{X_i} + \epsilon_\mathrm{i}, \tag{2}$$

where y_i is the outcome variable for owner i within a given number of years after the retailer sold the winning ticket (e.g., a dummy variable for filing for personal bankruptcy in or before the specified year); α_t is a set of fixed effects for the year in which the retailer sold the jackpot ticket; τ_g is a Powerball indicator; $Avg\, bonus_j$ is the log of one plus the average winning ticket bonus after taxes per owner for retailer j (i.e., the winning bonus divided by the number of owners); and X_i is a set of owners' pre-treatment covariates, such as an indicator for whether the owner took out a UCC loan or filed for personal bankruptcy, etc. Finally, we cluster standard errors at the retailer level.

3 Data and Summary Statistics

To assess the impact of retailers' cash flow on the business success, we assemble a data repository merging several data sets obtained from different sources. The first dataset, which was hand-collected from public sources, comprises all the retailers that sold winning PB and MM tickets from 2002 to 2016 (376 retailers in 41 states). Subsequently, we merge this dataset with information on the states' winning ticket bonuses to the retailers. These data are supplemented with discussions from state lottery representatives. We drop retailers (26) located in states for which bonus information is unavailable (i.e., Georgia after 2011, Oklahoma, and Wyoming).

In addition, we use retailer information, such as their names and addresses, to manually match them with the Lexis Nexis Public Records Comprehensive Business Report (LN) database to obtain information on owners' business activity and financial distress before and after a jackpot shock. In particular, this database provides information on Uniform Commercial Code (UCC)-secured loans,

real properties, tax liens, bankruptcy filings, and owners' data (e.g., name, address).[12] LN is one of the largest databases of public and proprietary information available, and it aggregates data from multiple public record sources and private data sources at the business and individual levels on variables such as property tax assessment records, bankruptcy records, liens records, business contact records, UCC filings, voter registrations, criminal records, and driver's license records, etc. (for more details, see Data Appendix). Finally, in the last restriction to our estimation sample, we drop retailers for which we can find no information from public records (58 stores that are part of large chains for which store level data are unavailable). After imposing this filter, we arrive at our main sample that comprises 292 firms. Table IA.1 reports the number of retailers per year.

For a subset of retailers (96), Lexis Nexis Public Records Comprehensive Person Report provides owner information (196 owners). We collect personal information, such as gender, tax liens, personal bankruptcy, real property information, and personal business, etc. Prior work has used LN to obtain data on small businesses (Fracassi et al., 2016), executives (Cronqvist et al., 2012; Yermack, 2014; Chuprinin and Sosyura, 2018), fund managers (Pool et al., 2012), and financial journalists (Ahern and Sosyura, 2015).

The retailer survival data were collected from the Dun and Bradstreet (D&B) database, which provides a regularly updated registry of existing businesses. We supplement D&B survival data with hand-collected data from Lexis Nexis Public Records and web searches on Yelp, Google Reviews, and Google Street View. First, we use D&B's matching procedure to determine the status of the retailers that sold a winning ticket as of September 2018. Firms successfully matched to D&B's database are considered to have survived. Subsequently, these data are complemented with hand-collected information from other sources (e.g., LN, Yelp) to determine whether the businesses indeed survived and, if not, the year in which retailers closed. In particular, LN allows us to account for any change in location or ownership. D&B data have been previously used, for example, to study small businesses (Fracassi et al., 2016) and public and private firms (Kapadia, 2011; Alfaro and Chen, 2012).

[12]UCC is a state level filing registry that records loans secured by fixed assets. In addition, liens are court rulings that provide a creditor the right to take possession of a debtor's real property if the debtor fails to fulfill contractual obligations. Liens are usually attached to real estate, but they also can be attached to personal property, and they can be recorded in the county land records office even if the individual or the firm does not own any real estate.

Finally, D&B provides revenue and employment data. Even though D&B can provide the business status of each retailer in our sample, unfortunately, they do not collect revenue and employment data for all the years for the business sampled. Thus, we have pre-treatment data on revenues for 191 retailers and on employment for 210 businesses.

3.1 Summary Statistics

Our sample covers a diverse group of retailers, both geographically and across multiple types of businesses. The shaded areas in Figure 1 highlight the counties with a jackpot winner over the sample period and the size of the winning ticket bonus. As the figure shows, the retailers who receive the winning ticket bonus are geographically dispersed, and the size of the winning ticket bonus is largely varied.

[INSERT FIGURE 1 HERE]

Figure 2 presents the distribution of the type of retailers that received the bonus shock, following the Standard Industrial Classification (SIC) 8-digit codes provided by D&B. Nearly 40% of retailers are convenience stores (also known as corner stores), which are small retail businesses that stock a range of everyday items, such as groceries, snack foods, tobacco products, over-the-counter drugs, and toiletries. Twenty percent corresponds to convenience stores that are part of gas stations. Approximately 18% are grocery stores and supermarkets, which are larger and carry a wider variety of products and inventories than do convenience stores. Around 10% are liquor stores that predominantly sell pre-packaged alcoholic beverages and tobacco. In addition, a small fraction classified as "Others" includes gift shops, stationery stores, videotape rentals, etc. Only two establishments are newsstands, which are stalls that hold books, magazines, newspapers, a small selection of snacks, and beverages.

[INSERT FIGURE 2 HERE]

The nature of the random assignment of the winning tickets also provides us a representative sample of small firms in the retail trade industry. Figure 3 compares the distribution of employment size of the establishments between our sample and the national sample. The establishments in our

sample have on average 5.84 employees before the shock and a median of five. Panel A of Figure 3 shows the employment distribution for our sample, in which most of the retailers are concentrated in the first two categories (i.e., fewer than nine employees). Our sample's distribution is comparable to that in a national sample of small firms in the retail trade industry in 2016 (Panel B), based on the Statistics of U.S. Businesses (SUSB) provided by the U.S. Census Bureau, in which small businesses are defined as establishments with fewer than 500 employees. Overall, the setting provides us a sample of geographically well-dispersed retailers with various types of business formats and similar employment-size distribution to the nationally representative sample from SUSB.

[INSERT FIGURE 3 HERE]

Table 1 reports additional summary statistics for our sample firms. The average (median) jackpot prize in our sample is \$155 (105) million (in 2016 dollars). The average (median) winning ticket bonus after taxes (in 2016 dollars) is \$151,703 (55,670). The sampled retailers are located across 39 states and 200 counties. The average (median) retailer has 9.98 (10) years in business before the jackpot shock and has 0.7 (0) establishments connected (i.e., stores in other locations). In addition, 29% of the retailers in our sample have UCC loans, 11% own real properties, and 8% have tax liens. The average survival retailer rate after 3 years post-treatment is 94%.

[INSERT TABLE 1 HERE]

In addition, the average revenue 3 years after the shock is \$505 thousand, and the average number of employees is close to 7. Moreover, 9% of owners contract at least one UCC loan 3 years after the jackpot shock, 3% buy new real properties, 3% receive tax liens, and none of the retailers file for corporate bankruptcy.[13]

For the set of retailers for which owners' data are available, we find information on 196 owners. On average, most of the owners are male (75%); they are 49.52 years old; and they have an ownership tenure of 9.44 years at the time of the shock. In addition, 32% have UCC loans; 34% own at least one real property; and 9% have tax liens. Three years after the jackpot shock, 10%

[13]Twelve retailers received the bonus in 2016 (Table IA.1). Thus, we do not have 3-year post-winning outcomes for these retailers.

of owners acquire at least one UCC loan; 9% buy a real property; 12% start a new business; 4% are subject to tax liens; and 2% file for personal bankruptcy.

In addition, we test whether the sub-sample of retailers for which owners' data are available is different from the rest of the sample in pre-treatment characteristics and outcome variables. Table IA.2 shows that retailers in both samples are statistically indistinguishable in the amount of bonus received, pre-treatment covariates, and post-winning outcomes.

4 Results

4.1 Tests of the Identification Strategy

To show that the size of the winning ticket bonus shock is randomly assigned and thus uncorrelated with all the other variables that could affect the firm's outcomes, we provide two tests. First, we present a series of randomization tests to check whether the bonus is explained by retailers' pre-treatment or local characteristics. Specifically, we regress the winning bonus on the number of years in business at the time of the shock, the number of connected establishments, indicator variables for whether the retailer has UCC loans, real properties, tax liens, and neighborhood characteristics, such as level income, population, and the fraction of the population with college degrees, measured at the ZIP code and the state levels. We control for the year of winning and game fixed effects and cluster standard errors at the state level. Column 1 of Table 2 reports results with retailers' characteristics. None of the variables are significantly related to the winning ticket bonus, and a joint F-test of the hypothesis that all coefficients are equal to zero has a p-value of 0.681. Columns 2 and 3 include ZIP code and state level controls, respectively. We also find that none of the covariates, in both columns, are significantly related to the bonus, and the joint F-test has a p-value of 0.354 in Column 2 and 0.279 in Column 3.

[INSERT TABLE 2 HERE]

Second, we examine a series of falsification tests to check whether retailers' outcomes prior to a jackpot shock are related to the amount of the bonus later won. Figure 4 reports the estimates

before and after the shock on an indicator for the retailer having a UCC loan in or before the indicated year using Equation (1). We estimate the impact of the bonus for each year separately, and standard errors are clustered at the state level. Similarly, we also perform the same test for real properties and tax liens. Figure 4 shows that all the estimates prior to the jackpot shock for all the variables show no relation between retailers' outcomes before winning and the amount of the bonus won. Overall, the results support the identifying assumption that the bonus won is randomly assigned.

[INSERT FIGURE 4 HERE]

4.2 Effect of the Winning Ticket Bonus on Firms' Survival

We now turn to the first question of the paper: what is the impact of internal resources on a small firm's success? The most basic measure of firm success is survival.

To determine survival rates, we first match retailers in the sample with the D&B private company database using the Optimizer matching program. We complement this information with LN records, Yelp, Google Reviews, and Google Street View.[14] For single establishment firms, which are 72% of the sample, we identify a retailer as surviving if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. We also verify whether the establishment remains open using Yelp and Google (Reviews and Maps).[15] For multiple establishment firms, we identify a firm as surviving if the firm is reported as active by LN.[16] However, D&B does not provide an establishment's closure date. To estimate closing dates, we rely on the dissolution date or the date when the firm became inactive based on LN. In addition, we use Google Street View to check approximately when the establishment closes. In particular, we compare street views around the dates when the business is reported closed. We also check when the last review was recorded in Yelp or Google.

Using this procedure, we find that 93.9% of all retailers survived 3 years following the jackpot

[14]Google Maps, which provides panoramic views from positions along many streets in the world, was launched in 2007 in several cities in the United States and has since expanded to include rural areas.

[15]Users utilizing either local research services can report a business as closed.

[16]Following these criteria, moving the establishment to a different location is classified as the establishment surviving.

shock, a percentage that corresponds to a 97.9% annual survival rate. This number is comparable to the statistics from other existing data sources. For example, according to Business Employment Dynamics data from the Bureau of Labor Statistics (BLS), the annual survival rate for private sector establishment in the retail trade industry is about 95% for 10-year-old establishments (the average age of retailers in our sample). The survival rate in our sample is slightly higher than the average survival rate documented in other data sources, because the retailers covered in our sample have gained cash windfalls from the winning bonus.

Figure 5 presents the corresponding results from Equation (1) measuring the causal effect of the winning ticket bonus on firm survival. The dependent variable for each regression is an indicator for survival in or before the specified year. To ease the interpretation, we standardize the winning bonus variable. We control for the following characteristics at the time of the shock: the number of years in business, the number of connected establishments, dummies for UCC loans, real properties, tax liens, the percentage of the population with a college degree, ln(Population), and ln(Median income) per capita. We also include the year of winning and game fixed effects. Standard errors are clustered at the state level. We estimate the impact of the bonus for each year separately. Table 3 presents the survival estimates across the first 3 post-winning years.

Figure 5 shows a negative and significant impact of the winning bonus 2 years following the jackpot shock. The impact of the bonus remains both economically and statistically significant for the first 5 post-winning years.

[INSERT FIGURE 5 HERE]

Turning to Table 3 for the estimates 3 years following the jackpot shock, Column 1 presents estimates from the specification without any control or fixed effects. A one standard deviation increase in the winning bonus reduces the probability of survival by 4 percentage points, or a change of 66% from the mean closure rate (0.06) in our sample. We first include the year of winning and game fixed effects in Column 2, both of which do not affect the estimate. Adding a PB indicator does not lead to an important change in the point estimate because both games are very similar (e.g., similar jackpot size, odds of winnings). Columns 3, 4 and 5 include control variables to study the extent to which the estimates of the bonus are sensitive to the inclusion

of other variables. In particular, Column 3 and 4 include controls at the retailer and at the ZIP code levels, respectively, and the estimates do not change. Finally, Column 5 includes state level controls. Again, the coefficient is quite similar, although more precisely estimated.

[INSERT TABLE 3 HERE]

As previously discussed, a potential threat to our estimates is the lucky store effect. Albeit all retailers in the sample are winning' stores, this effect could be potentially greater for a larger prize (even though it is very likely that all the winning retailers receive local media attention and hang the "Winning Ticket Sold Here" sign). Thus, we include ln(Prize) to account for the possibility that this effect could be greater as the jackpot amount increases. It is therefore reassuring to see that our estimate does not change when we control for the size of the prize, a finding that provides further support that the effects documented in this paper are not driven by the lucky store effect.

The findings show that, surprisingly, exogenous shocks to the firms' internal resources reduce the probability of survival. Existing literature documents a strong correlation between entrepreneurial wealth and the propensity to maintain a business (Holtz-Eakin et al., 1994). Why does the winning bonus reduce the probability of survival? In the next section, we explore potential channels to explain this finding.

4.3 Potential Channels of Firm Survival

4.3.1 Deteriorating Credit Behavior after Receiving the Winning Ticket Bonus

One explanation for our survival results, which show that lower survival rates accompany greater winning ticket bonuses, is that the effect comes from post-winning financial distress due to deteriorating credit behavior. Previous research has documented, at the individual level, that following income from lotteries (or earnings from professional athletes), individuals find themselves filing for bankruptcy later (Hankins et al., 2011; Carlson et al., 2015). To test for this hypothesis, we first estimate the impact of the winning bonus on UCC loans, which are secured loans to smalls business, as proxy for firm leverage. Figure 4 reports the bonus effect on a dummy equal to one for the retailer having a UCC loan in or before the indicated year. The bonus negatively affects the probability of contracting a UCC loan in the first year following the jackpot shock.

Figure 4 also shows that the impact of the bonus remains statistically significant for the first 5 post-winning years. Panel A of Table 4 reports the estimates 3 years following the shock. Column 1 shows that a one standard deviation increase in the winning bonus reduces the probability of UCC loans by 3.7 percentage points, a change of 41% from the mean (0.09). We find similar estimates if we condition on firm survival (Table IA.3). The negative effect, beginning in the first post-winning year, suggests that retailers are less likely to contract new secured financing with increasing amounts of winning ticket bonuses.

[INSERT TABLE 4 HERE]

Next, we estimate the effect on new tax liens, a proxy for post-winning firm delinquency (Data Appendix defines the variables). Figure 4 shows that the greater the bonus the larger the negative impact on the probability of receiving a tax lien. Like before, the shock effect remains significant 5 years post-winning. Column 2 in Panel A of Table 4 reports the estimates 3 years following the shock. A one standard deviation increase in the winning ticket bonus leads to a reduction of 2 percentage points in the probability of getting a tax lien, a change of 66% relative to the mean (0.03). In addition, Column 3 shows no effect on the winning bonus on corporate bankruptcy, because none of the retailers file for corporate bankruptcy during the sample period. These findings, beginning in the first post-winning year, provide suggestive evidence that the greater the winning bonus the lower the probability of post-winning delinquency. Finally, we consider the effects on real properties, as a proxy for firms' real investment. Figure 4 and the estimates in Column 4 of Table 4 do not show evidence that the winning ticket bonus exerts an effect on real property purchases.

The evidence so far is inconsistent with the hypothesis of deteriorating credit behavior. However, owners of these businesses, not the retailers themselves, could be the ones facing financial distress following the jackpot shock. For example, if the business is in distress and the owner is a sole proprietor, the individual can file for personal bankruptcy (either for Chapter 13 or Chapter 7 bankruptcy protection). Thus, we now look at the impact of the winning ticket bonus on the potentially deteriorating credit behavior at the owners' level. We start by estimating Equation (2), that is, the effect of the average winning bonus (i.e., the winning ticket bonus divided by the

number of owners) on UCC loans. Column 1 in Panel B of Table 4 shows that the impact of the bonus is small and imprecise for UCC loans. Columns 2 and 3 show similar results for tax liens and personal bankruptcy, respectively. Interestingly, Column 4 reports that the bonus positively affects the likelihood of owners' acquiring a real property. Importantly, these are residential properties and not for commercial use. A potential concern is that the power of the tests is insufficient to find a significant effect of the winning bonus on owners' outcomes. However, the positive and significant effect on real properties shows that the tests on owners' outcomes do have power.

Overall, the evidence at the retailer and the owner levels does not support the deteriorating credit behavior channel.

4.3.2 Retiring after Receiving a Winning Ticket Bonus

A second explanation for the estimated effects is that the larger winning ticket bonus leads retailer owners to retire, and, thus, this translates into negative effects on survival rates. For example, Imbens et al. (2001) find at the individual level that unearned income reduces labor earnings. To test for this hypothesis, we exploit the cross-sectional difference in age at the time of the jackpot shock for those owners for whom age data from LN are available. In particular, we augment Equation (2) with additional explanatory variables.

First, we consider age by including an indicator for whether the owner's age is above the sample median (50 years), and we also interact the age dummy with the treatment variable ($ln(Avg\,bonus)$). The coefficient of interest is the one from the interaction term. Under this hypothesis, the retirement motive should be greater for individuals near retirement age. Table 5 reports the results. Column 1 shows that for owners with ages above the sample median, the winning bonus increases the probability of their business surviving. Next, we test the interaction effect with a dummy for owners older than 60 years old. Column 2 shows that the coefficient of the interaction term is even larger. Consistent with the previous estimates, in Column 3, we find similar results if the indicator variable is equal to one for owners with ages greater than 65 (i.e., retirement age). Thus, the evidence is inconsistent with the hypothesis that retirement drives the negative effects on firms' survival.

[INSERT TABLE 5 HERE]

4.3.3 Underperforming before Receiving the Winning Ticket Bonus

An alternative hypothesis to the survival results is that receiving a large winning ticket bonus may provide owners with sufficient economic resources allowing them to close their underperforming businesses.

First, we explore this hypothesis for a subset of firms for which we can measure pre-treatment revenues, as a proxy for underperformance. Table 6 reports the results. Column 1 shows the effect of the size of the bonus on survival for this subset of firms, and the estimates are similar to the baseline results in Table 3. Column 2 reports the estimates when pre-treatment revenues are included. As we would expect, there is a positive relationship between revenues and survival: underperforming firms are more likely to be closed. Most importantly, the point estimate of the winning ticket bonus is unaffected when controlling for pre-treatment revenues.

[INSERT TABLE 6 HERE]

Moreover, we interact pre-treatment revenues with bonus size to study whether pre-treatment revenues affect how sensitive the owners' choices to close their businesses are to the bonus size. As Column 3 shows, the interaction term is statistically insignificant. This finding suggests that there is no evidence of any differential effect of the bonus size on survival for retailers with different levels of (pre-treatment) revenues.

Overall, the evidence in Section 4.3 does not support the explanation that the greater the winning ticket bonus the more financial distress (both at the retailer and at the owner levels), that owners are more likely to retire, or that owners close their businesses because of pre-shock underperformance. What then is the explanation for the documented findings? In the next section, we test for a newly proposed hypothesis: small business owners are more likely to start a new business with larger amounts of the firms' cash flow windfalls.

5 Winning Ticket Bonus and Starting New Businesses

To explore other interpretations that could explain the negative relationship between firm survival and the cash windfall, we next consider the other economic behaviors of retail owners that may result in retail closures. We start by looking at how the winning ticket bonus affects the likelihood of starting new businesses. New businesses may be more profitable than are convenience stores, may be where the owners' true passions reside (Hurst and Pugsley, 2011), or may require the (busy) owners' full attention, all of which could lead owners who start new ventures to close (or sell) their prior business. If the owners are more likely to start new businesses after receiving a larger winning ticket bonus and subsequently to close their current business, we would observe a negative relationship between a firms' survival and the amount of the winning ticket bonus.

To determine new business creation, we identify which owners file for a "doing business as" (DBA), apply for a business license, form a limited liability company (LLC), or register a corporation following the winning ticket bonus shock. Business creation data are obtained from LN. Using this procedure, we find that 12.43% of owners create a new business within 3 years of the jackpot shock. Moreover, 91% of these new businesses are currently open.

Figure 6 shows the results for the likelihood of starting new businesses 5 years following a jackpot shock. This figure depicts that the effect becomes significant 2 years after the cash windfall and remains large and significant for at least 5 years post-winning.

[INSERT FIGURE 6 HERE]

Table 7 presents the estimates after 3 years following a bonus shock. Recall that the average winning bonus variable is standardized. Column 1 presents estimates from the specification without any control or fixed effects. As Column 1 shows, a one standard deviation increase in the average bonus increases the probability of owners' starting new businesses by 4.4 percentage points, a change of 36.67% from the mean business creation (0.12). Column 2 includes fixed effects for the game and the year of winning. The results are similar to Column 1. Column 3 adds controls for retailers and neighborhood characteristics. Again, the point estimate is quite similar to the baseline results.

[INSERT TABLE 7 HERE]

The new businesses do not seem to simply substitute for the current businesses at a different location or be another form of business expansion, such as increasing the number of stores owned rather than store sizes. Figure 7 reports the types of businesses started 3 years after receiving the winning ticket bonuses. First, we see that only a small percentage of all new businesses are in the same category: 12% if we consider convenience stores as being in the same category, and 30% if we consider a broader category that includes both convenience stores and grocery stores. More importantly, we see a wide variety in the types of new businesses started, ranging from eateries (29%) and repair services (14%) to transportation services (5%), among others. The choice of the types of new businesses could be driven by a combination of factors, such as diversification within entrepreneurial portfolios, expertise in specific fields (e.g., automotive repair, home maintenance), non-pecuniary preferences for specific lines of business (e.g., opening a restaurant to follow a passion for cooking), or greater economic profits. Finally, 52% of new businesses correspond to a retail closure.

[INSERT FIGURE 7 HERE]

Given that not all new businesses were from owners who closed their retail outlet, we estimate a multinomial model to study the choices of owners maintaining their firm open (or exiting) and those starting a new firm (or not starting one). In particular, we estimate a multinomial response model in which the choices are between the following: (1) close business and do not start a new business, (2) close business and start a new business, (3) keep current business open and start a new business, and (4) keep current business open and do not start a new business. Assuming that the error term in the model is type I extreme value distributed, this assumption yields a multinomial logit model, which can be estimated by maximum likelihood.

We regress the described choices on the average of the winning ticket bonus per owner and other controls. The standard errors are clustered at the retailer level. The first category (close business and do not open a new business) is the base category. Panel A of Table IA.4 reports the results. All the coefficients of the winning bonus are significant. However, we perform a joint test

of the significance of the winning ticket bonus, because the individual test results depend on the omitted category; through a Wald test, we find that the bonus is statistically significant (p-value = 0.0003 using the Wald test). In terms of the coefficient interpretation, Column 1 shows that an increase in the average bonus leads to an increase in the probability of owners' closing their current business and opening a new business, relative to the base category. We also report the marginal effects at the mean of a change in the winning bonus on the probability that a specific alternative is the outcome. Panel B of Table IA.4 reports the estimates. Column 1 shows that a one standard deviation increase in the average winning bonus increases the probability of closing the current business and opening a new business by 0.078, compared with closing and doing nothing else, remaining open and starting a new business, and remaining open and not beginning a new business. Column 2 shows that with an increase in the bonus, owners are more likely to keep the business open and start a new firm relative to the other options. Finally, Column 3 shows that with an increase in the bonus, owners are less likely to remain open and not start new businesses, compared with the other choices.

5.1 Potential Interpretation

If the substantial heterogeneity of new businesses is driven by expertise in specific fields or non-pecuniary preferences for specific types of businesses, a natural question would be "What has prevented these owners from starting new businesses in the past?"

One interpretation relates to financial constraints. Blanchflower and Oswald (1998) provide survey evidence that aspiring and current entrepreneurs consider the lack of capital, or money, to be the principal reason preventing them from starting and growing their business. Past literature also shows that liquidity constraints or insufficient funds reduce the probability of individuals becoming entrepreneurs (Evans and Jovanovic, 1989; Evans and Leighton, 1989). In our setting, small business owners may be financially constrained and only have restricted access to capital, which may put constraints on the opportunity set of the types of businesses they can start or develop and prevent them from entering businesses in which they have expertise or non-pecuniary preferences.

Another interpretation relates to mental accounting. Owners' investment choices or decisions about whether to start a new business may vary with their sources of funding. In other words, small business owners may value a dollar differently when it is earned through work, financed through credit, or given to them (as a cash windfall). Even though small business owners have access to credit or other types of external funding, they may be more risk averse with borrowed capital than with a cash windfall. In a survey by the NFIB Research Foundation in 2003, when small business owners were asked what they would do supposing they had a high-growth opportunity to make an investment that allows earnings to rise 25% within the next 2 years with minimal risk, 48% of respondents chose to borrow the money and make the investment, whereas a large group of respondents (42%) would wait until they had accumulated enough cash to make the investment.

To examine these hypotheses, we construct two proxies for financial constraints: (1) the income level of the ZIP code where the retail owner resides and (2) whether or not the retail owner is a homeowner before the shock (Adelino et al., 2015; Schmalz et al., 2017).[17] We interact the treatment intensity (log of the average winning ticket bonus after taxes per owner) with two indicators for owners with fewer financial constraints: (1) the owner resides in a ZIP code with an income above the sample median and (2) the owner is a homeowner before the shock. The results in Table 8 support the financial constraint interpretation. As Columns 1 and 2 show, the interaction term is negative and statistically significant, and the relationship between starting a new business and the amount of the cash windfall is much weaker for retail owners with fewer financial constraints. In addition, if we add the interaction term and the main effect on the log of the average winning ticket bonus, the relationship between starting a new business and the amount of cash windfall is close to zero for owners with fewer financial constraints, a finding that suggests that the mental accounting interpretation might not be present here; otherwise, we would expect a weaker but still positive relationship for retail owners with fewer financial constraints. Finally, we test whether age affects owners' decisions about starting a new business. As Column 3 shows, the interaction term between age and the bonus is statistically indistinguishable from zero.

[INSERT TABLE 8 HERE]

[17] Owners' income data are not available, so we use the median income of the ZIP code where the owner resides.

6 Internal Growth: Revenues and Employment

In this section, we estimate the effect of shocks to internal resources on revenue and employment. To this end, we calculate the revenue and employment growth for surviving firms in the sample by subtracting the log of one plus revenue (number of employees) in the year before selling the winning jackpot ticket from the log of one plus the revenue (number of employees) in the respective year. We regress revenue growth and employment on the winning ticket bonuses with firm controls. Figure 8 and Table 9 present the estimates.

Figure 8 shows that a greater winning bonus leads to a positive and significant increase in revenue and the number of employees following 1 year after the jackpot shock. Interestingly, the fact that a winning bonus leads to an increase in sales and employees after the second post-winning year further supports the notion that our estimates are from the winning bonus, not the lucky store effect. This is because the lucky store effect dissipates in less than a year and because we exploit the intensity of treatment. Finally, Figure 8 shows that employment and sales have an economically significant effect for the first 5 post-winning years.

[INSERT FIGURE 8 HERE]

Table 9 reports the estimates 3 years following the jackpot shock. Column 1 of Panel A presents the estimates from Specification (1) on sales. A one standard deviation increase in the winning bonus leads to an increase in revenue of 27.9 percentage points. Column 1 of Panel B reports the results for employment growth. A one standard deviation increase in the winning bonus increases employment by 14.4 percentage points. We also regress the log of one plus the current revenues on the log of one plus the bonus. Column 3 of Panel A presents the standardized results, whereas Column 4 includes pre-treatment characteristics. A one standard deviation increase in the winning bonus increases revenue by 14.9%, which implies an elasticity of 0.109 (i.e., a point estimate without the standardization). This suggests that revenues increase by $36,561 for every $100,000 of additional internal firm resources, calculated at the sample averages.

[INSERT TABLE 9 HERE]

For employment, Column 2 of Panel B shows that a one standard deviation increase in the winning bonus raises the number of employees by 17.1%. Moreover, the effect without the standardization is 0.128. This elasticity implies that the number of employees increases by 0.87 for every $100,000 of additional internal firm resources.

Overall, these findings suggest that financial constraints may have restricted the internal growth of these firms.

7 Discussion

Our findings in this paper raise an interesting question of whether non-survival of an owner's current business implies failure. Our results may point out an alternative interpretation: it seems that many owners, upon receiving a cash windfall, may have executed a planned exit strategy (either closing a business without excessive debt or selling a viable business), rather than simply facing financial distress. As partial support for this alternative interpretation, we find (1) the effect of a winning bonus on closure appears 2 years following the jackpot shock, which coincides with the average time that small business owners need to sell their business; (2) a large winning bonus negatively affects a firm's secured debt; and (3) in untabulated results for the subset of retailers with ownership information, we find that the amount of winning bonus has a positive effect on the probability of a change of ownership, as a proxy for a business sale. Thus, our findings suggest that business closure, not business failure, is more likely to be an exit route for owners.

Another interesting result is the wide variety in the new types of businesses. This diversity begs the question of why owners choose a new industry instead of staying within their existing industry. Their choices could be driven by various motives. For example, new firms may enable higher profits, or the new business type may better fit the owners' preferences (i.e., providing higher non-pecuniary benefits). To further explore the motives underlying owners' choices for new business, we look at the potential profitability of the new industries relative to the retail industry. In general, new business industries have higher net profit margins than retail stores. According to statistics collected by Sageworks, the net profit margin for convenience stores is 2.85%, which is among the 10 lowest profitable industries in the United States. In contrast, the net profit margins

for the new business industries identified in our sample are much higher, for example, 6.1% for eateries, 6.74% for transportation services, 7.19% for house construction, and 15.2% for real estate services. This evidence does not rule out the non-pecuniary benefits hypothesis, but it seems to suggest that profitability is a strong driver for a retail owner's decisions regarding new business.

If the new business is more profitable, then why did the owner open a convenience stores rather than starting with the new business in the first place? Our results suggest that financial constraints appear to have prevented the owners from starting new businesses earlier. As Table 8 shows, the relationship between starting a new business and the amount of the cash windfall is stronger for the owners with higher financial constraints. In addition, the new business industries in our sample tend to have higher barriers to entry than do convenience stores. According to Kauffman Firm Survey Data, the startup capital required for the new business industries are much higher than for convenience stores. For example, the startup capital required for real estate services is about 2.5 times as much as for convenience stores, and, for eateries and transportation services, the startup capital is twice that ratio, at 5 times higher than for convenience stores; the only exception is construction, which requires about 70% of the startup capital needed to startup convenience stores.

CreditDonkey.com also considers other dimensions related to the barrier to entry, such as tax complexity and government regulation, market competition, and employment challenges. For these dimensions, construction is the only industry among all new businesses with lower barriers to entry than convenience stores.

An implication of these findings is that liquidity constraints may limit the set of new business choices available to an entrepreneur, thus potentially resulting in a misallocation of human capital. In contrast, the literature has mostly highlighted the importance of capital for aspiring entrepreneurs to start a business or for the growth of an existing business, rather than the choice of industry.

Whereas the natural experiment provided by the winning ticket commission significantly enhances the internal validity of our results, the set of small businesses in our sample raises potential concerns about the external validity of the estimates. How likely can our results be generalized to

the typical small business in the United States? As already mentioned, Figure 3 shows the close similarities between the employment distribution of our sample and that of U.S. small businesses. Undoubtedly, there still might be differences in other business characteristics (e.g., profit margins, required capital) between our sample and other small businesses in the United States. Although our estimates cannot speak to the behaviors of the entire universe of small business, we believe that our estimates shed light on small businesses in other industries with low profit margins. Nevertheless, estimating these effects for the retail industry in the United States itself still can be of interest, because this industry accounts for, according to the SUSB, around one-seventh of the total small business in terms of the number of firms, the number of establishments, or employees.

8 Conclusion

In this paper, we provide evidence on the impact of firms' internal resources on the survival and other economic behaviors of small businesses and their owners. To this end, we use a novel source of variation in firms' cash flow, exploiting the amount of the bonus that retailers earn when they sell winning jackpot tickets. We find support for the identifying assumption of the empirical design, where conditional on selling a winning jackpot ticket, the winning bonus is randomly assigned. The estimates show that increases in internal firm resources reduce the probability of firm survival. This evidence is inconsistent with theories about deteriorating credit behavior or owner retirement after receiving a bonus.

Our paper highlights a new channel to explain the negative impact of firms' cash flows on business survival: small business owners are more likely to start a new business when they receive larger cash windfalls. These new firms are generally in industries different from their current business, with higher profit margins and requiring larger startup capital. The results also show that reduced financial constraints appear to drive new business creation following a jackpot shock.

The findings in this paper raise the question of whether firm closure (i.e., a firm not surviving) truly implies failure. One interpretation of our findings is that subsequent to a winning bonus, retailer owners closed (or sold) their viable business, and that this closure allowed an exit route for the owners to enter other industries and create new firms.

Our results also suggest that, business owners might have entered the retail industry as an optimal choice given their initial financial constraints, and that they were deterred from entering other businesses that could have produced higher net profit margins and have been potentially better suited to their expertise or personal interests. Once the financial constraints are relaxed, business owners choose to start new ventures and move toward their new optimal choice, which results in great variability in the types of new businesses established. Prior literature has emphasized how financial constraints deter individuals from becoming entrepreneurs; we contribute to the literature by providing evidence that financial constraints may also affect business owners' choice of the types of businesses they open and might also have implications for the (mis)allocation of talent.

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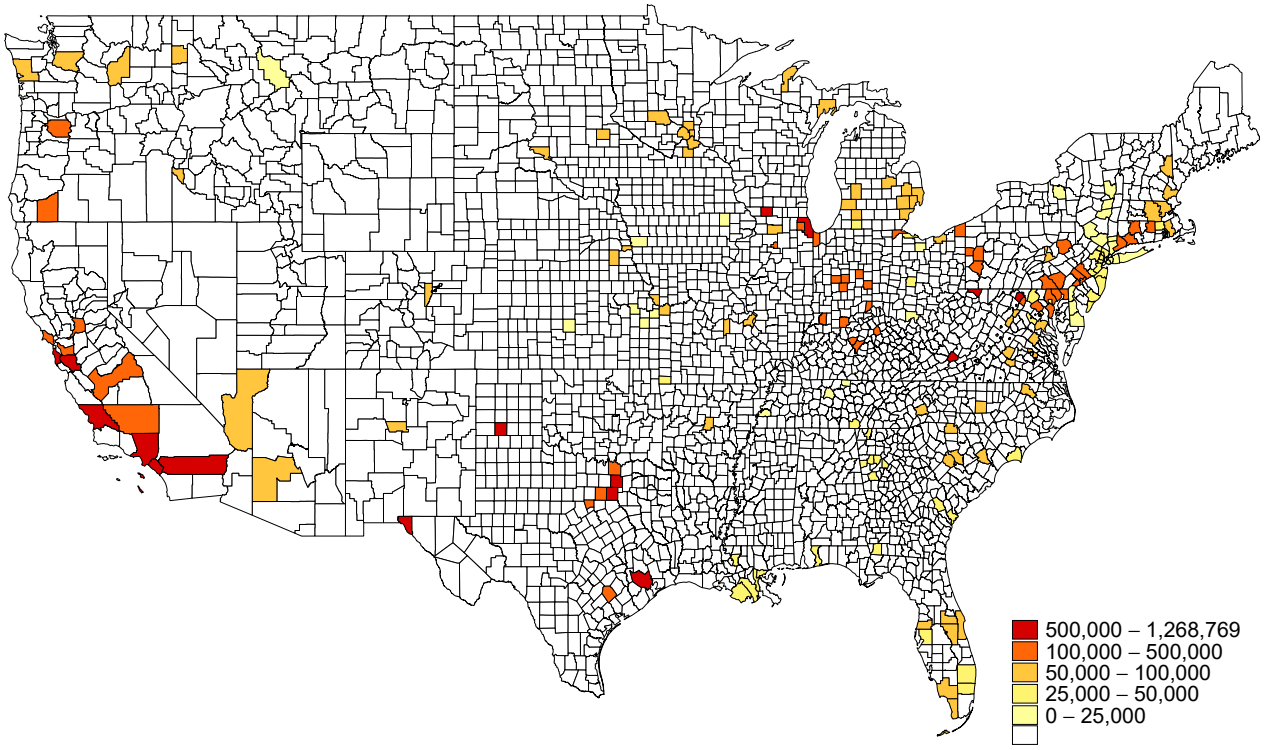


Figure 1. Retailers That Sold Winning Mega Millions and Powerball Jackpot Tickets by County, 2002-2016

This figure depicts the counties in which retailers sold winning Mega Millions or Powerball jackpot tickets during the period 2002–2016. Lotteries are established in 44 states. The retailers in the sample are located across 39 states and 200 counties. Highlighted areas represent the treated counties where at least one retailer received a bonus for selling a winning jackpot ticket in the sample period. In the instances in which a county had more than one jackpot winner, the figure shows the maximum winning ticket bonus. State lotteries offer bonuses to retailers that sell winning jackpot tickets, which can be a percentage of the prize, usually with a cap on the bonus. For example, Texas pays retailers a bonus of 1% of the prize up to $1 million, some states pay a flat bonus (e.g., $50,000), and a few states, such as Maine, do not provide a bonus for selling a winning ticket. All monetary values are expressed in real 2016 dollars.

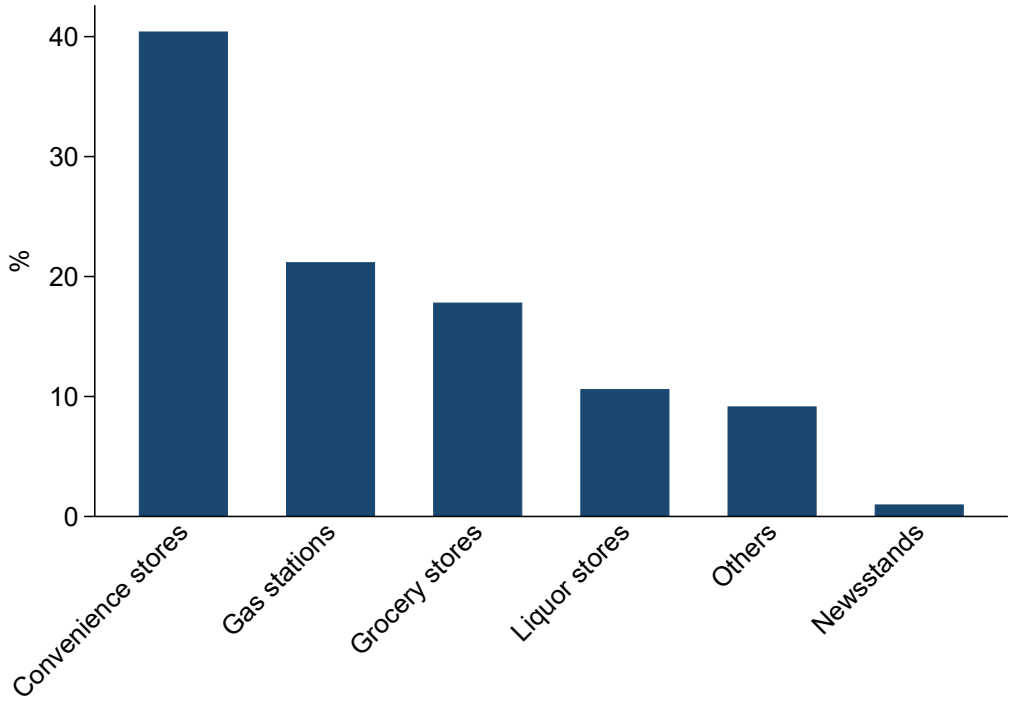
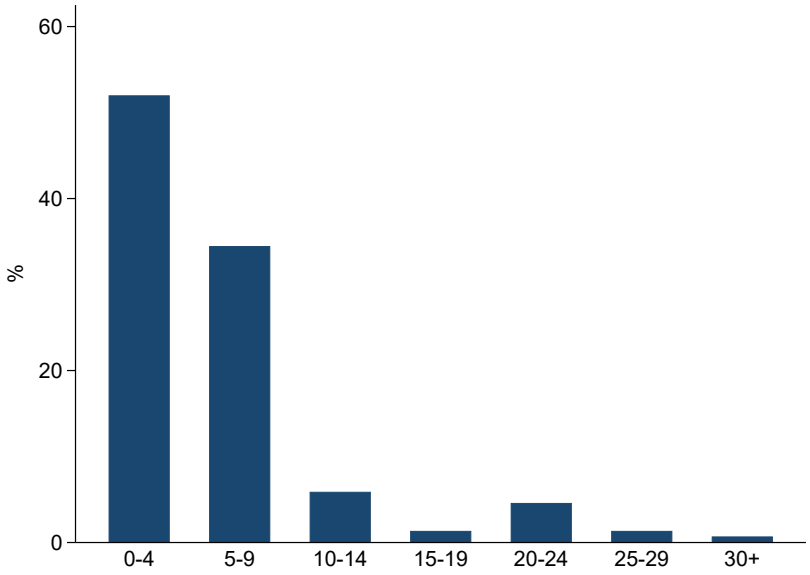


Figure 2. Types of Businesses That Sold Winning Mega Millions and Powerball Jackpot Tickets, 2002-2016

This graph shows the types of establishments that sold winning Mega Millions or Powerball jackpot tickets. The types of establishments are characterized following the Standard Industrial Classification (SIC) 8-digit codes. In the sample, convenience stores (also known as corner stores) are small retail businesses that stock a range of everyday items, such as groceries, snack foods, tobacco products, over-the-counter drugs, and toiletries. Gas stations correspond to convenience stores that are part of gas stations. Grocery stores or supermarkets are larger than convenience stores and offer a wider variety of products. Liquor stores are retailers that predominantly sell pre-packaged alcoholic beverages and tobacco. Others refers to gift shops, stationery stores, videotape rentals, etc. Newsstands are stalls that hold books, magazines, newspapers, and a small selection of snacks and beverages.

Panel A. Employment size of retailers that sold a winning jackpot ticket



Panel B. Employment size of U.S. small businesses

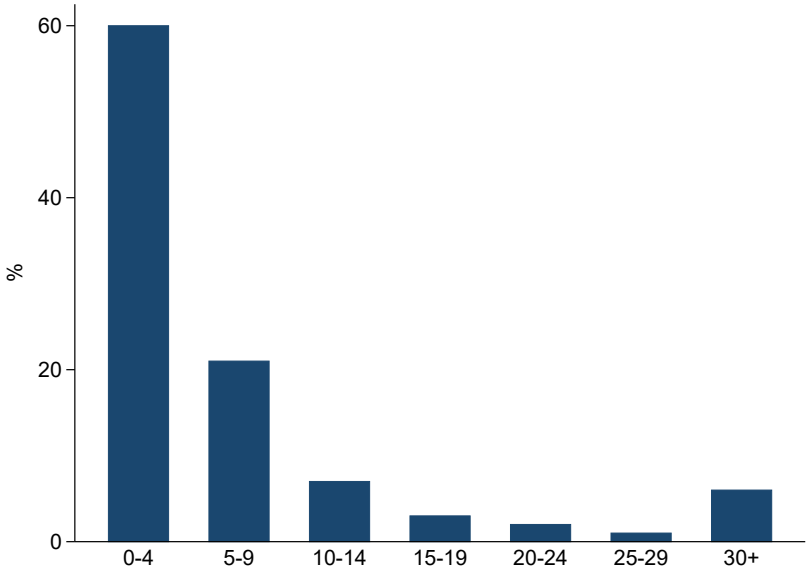
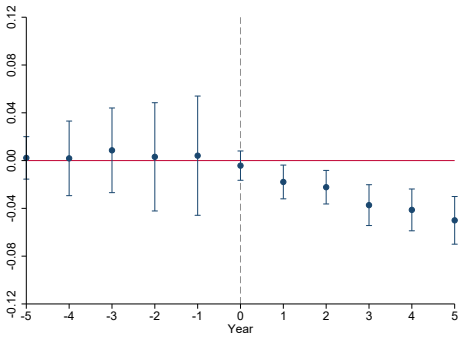


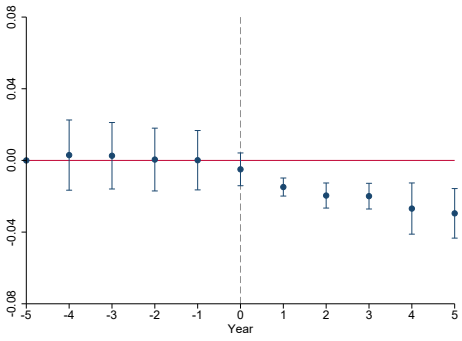
Figure 3. Employment Size in Small Firms

This figure shows the distribution of employment size. Panel A presents the distribution of employment size of retailers in our sample 1 year before they sold winning jackpot tickets. Panel B depicts the employment size distribution of small businesses (i.e., establishments with fewer than 500 employees) nationwide in 2016, based on the statistics of U.S. businesses provided by the Census Bureau.

Panel A. UCC loans



Panel B. Tax liens



Panel C. Real properties

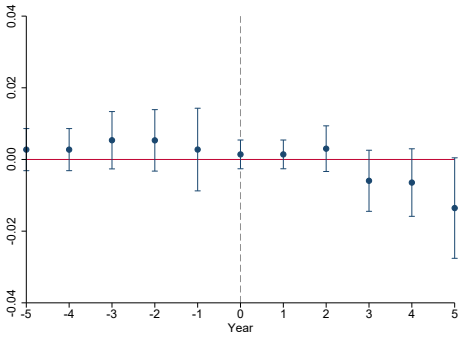


Figure 4. Effect of a Bonus on Firms' Secured Financing, Tax Delinquency, and Real Properties

This figure shows the effect of receiving a bonus on having Uniform Commercial Code (UCC) loans, tax liens, and real properties. The independent variable is *ln(Bonus)*, which is the log of one plus the commission that retailers receive after taxes for selling a jackpot winning ticket. Panel A reports the estimates prior to and after the jackpot shock of regressing an indicator for the retailer having a UCC secured loan in or before the indicated year on *ln(Bonus)*. Panel B presents the estimates prior to and after the shock of regressing an indicator for the retailer having a tax lien placed against its property in or before the indicated year on *ln(Bonus)*. Panel C shows the estimates prior to and after the shock of regressing an indicator for the retailer having a real property in or before the indicated year on *ln(Bonus)*. Year 0 indicates the year when a retailer receives the bonus. All monetary values are expressed in real 2016 dollars, and *ln(Bonus)* is standardized. All specifications include pre-treatment characteristics, the game, and the year of winning fixed effects. Heteroskedasticity-robust standard errors are clustered at the state level.

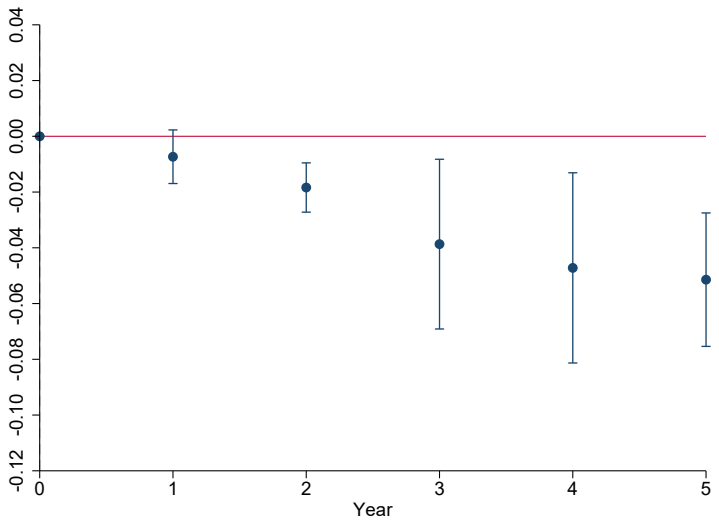


Figure 5. Effect of a Winning Ticket Bonus on Firms' Survival

This figure shows the effect of receiving a bonus for selling a winning ticket on firms' survival. The dependent variable for each regression is an indicator for survival in or before the specified year. For single establishment firms, we identify a retailer as surviving if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, we identify a firm as surviving if LN reports the firm as active. We also check for location changes using LN and whether the establishment remains open using Yelp and Google. The independent variable is *ln (Bonus)*, which is the log of one plus the bonus that retailers receive after taxes for selling a winning jackpot ticket. Year 0 indicates the year when a retailer receives the bonus. All monetary values are expressed in real 2016 dollars, and *ln(Bonus)* is standardized. All specifications include pre-treatment characteristics, the game, and the year of winning fixed effects. Heteroskedasticity-robust standard errors are clustered at the state level.

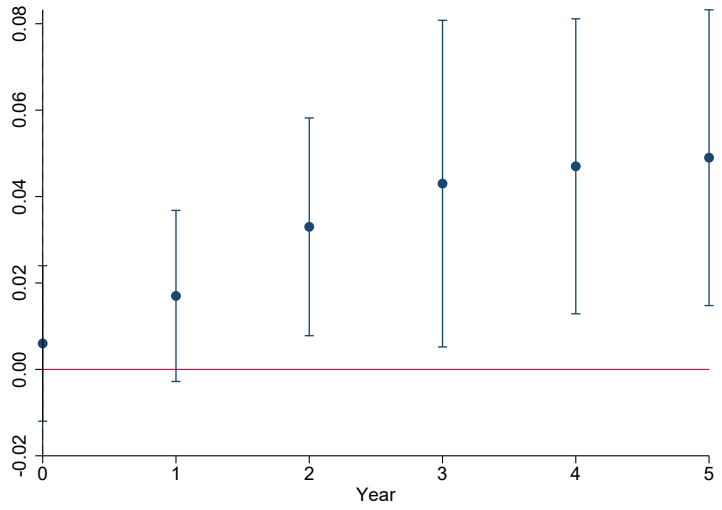


Figure 6. Effect of a Winning Ticket Bonus on Starting a New Business

This figure shows the effect of receiving a bonus for selling a winning ticket on starting a new business. The dependent variable for each regression is an indicator variable equal to one if the owner files for a "doing business as" (DBA), files for a business license, forms a limited liability company (LLC), or registers a corporation in or before the specified year. The independent variable is *ln(Avg bonus)* , which is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket divided by the number of owners per store. Year 0 indicates the year when a retailer receives the bonus. All monetary values are expressed in real 2016 dollars, and *ln(Avg bonus)* is standardized. All specifications include pre-treatment characteristics, the game, and year of winning fixed effects. Heteroskedasticity-robust standard errors are clustered at the retailer level.

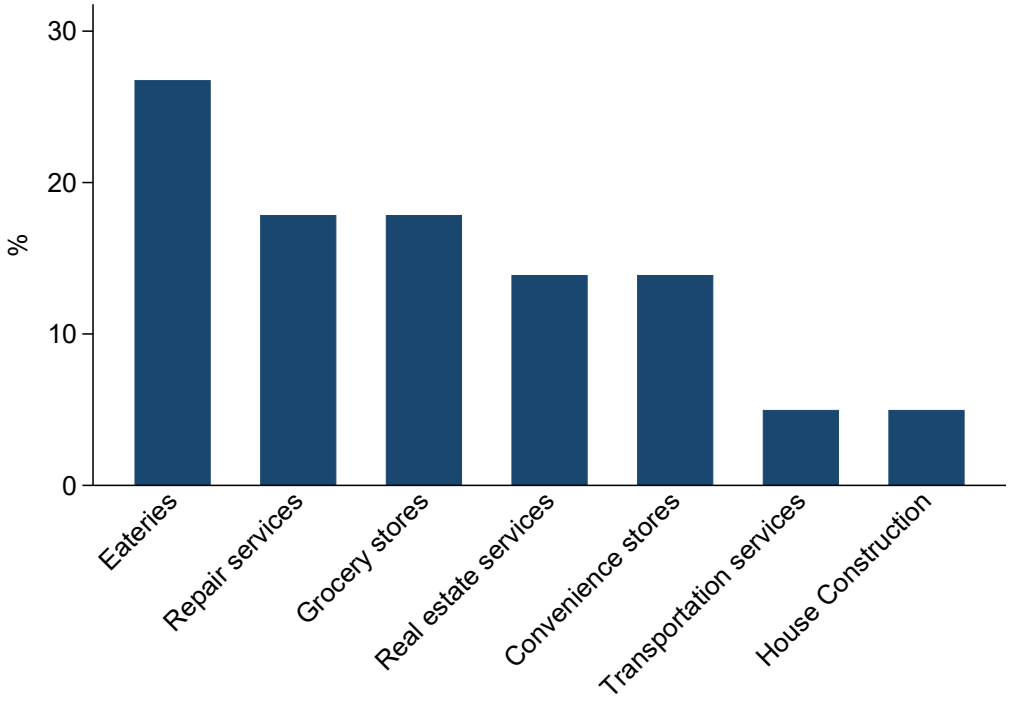
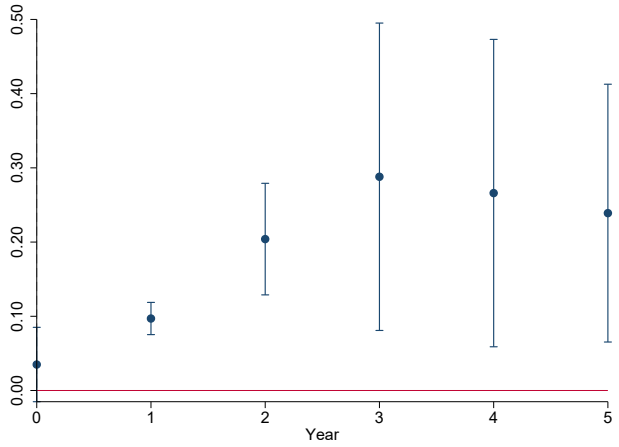


Figure 7. Types of New Businesses Started after Receiving a Winning Ticket Bonus

This graph shows the types of business started after a jackpot shock. In the sample, eateries or restaurants are businesses that serve only food and drinks. Repair services predominantly correspond to automobile repair shops that offer both mechanical and bodywork repairs. Grocery stores or supermarkets are establishments larger than convenience stores that offer a higher variety of products. Convenience stores are small retail businesses that stock a range of everyday items, such as groceries, snack foods, tobacco products, over-the-counter drugs, and toiletries. Transportation services comprise firms that transport property and passengers. House construction services correspond to firms that build and remodel homes and commercial properties.

Panel A. Revenue growth



Panel B. Employment growth

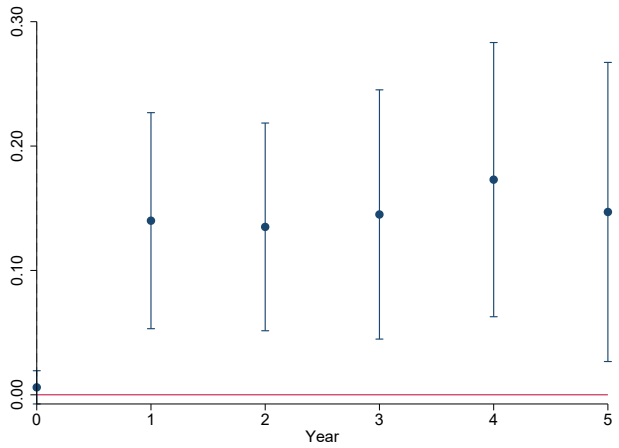


Figure 8. Effect of a Winning Ticket Bonus on Revenue and Employment

This figure shows the effect of receiving a bonus for selling a winning ticket on revenue and the number of employees. The independent variable is *ln(Bonus)*, which is the log of one plus the commission that retailers receive after taxes for selling a winning jackpot ticket. Panel A reports the estimates of the effect of receiving a bonus on the revenue growth from 1 year before the shock to the indicated year after the shock. Panel B depicts the estimates of the effect of receiving a bonus on the growth in the number of employees from 1 year before the shock to the indicated year after the shock. Year 0 indicates the year when a retailer receives the bonus. All specifications include pre-treatment characteristics at the retailer and the local levels, the game, and year of winning fixed effects. Heteroskedasticity-robust standard errors are clustered at the state level.

Table 1. Summary Statistics

This table reports summary statistics for the sample of retailers that sold winning Mega Millions or Powerball jackpot tickets between 2002 and 2016. The retailer and bonus datasets come from different public sources and are complemented with information collected from discussions with representatives from 39 state lotteries. The retailer covariates and outcomes come from Lexis Nexis Public Records (LN) and Dun and Bradstreet (D&B) and are complemented with local-level data from the 2000 Census. The retailers in the sample are located across 39 states and 200 counties. The dataset contains 292 jackpot retailers that sold winning jackpot tickets in the sample period. For a subset of retailers (96), LN provides owner's information (196 owners). *Prize* is the amount in U.S. dollars of the jackpot prize. *Bonus* is the amount in U.S. dollars that retailers receive for selling a winning jackpot ticket. The pre-treatment characteristics are *Number of connected stores*, the number of other locations that the firm has; *UCC loans*, an indicator for whether the retailer ever had a secured debt Uniform Commercial Code (UCC) filing prior to receiving the bonus; *Real properties*, an indicator variable for whether the retailer owned a real property prior to receiving the bonus; and *Tax liens*, an indicator variable for whether the retailer had a history of tax liens before the shock. Outcomes variables are measured 3 years following the jackpot shock. *Retailer closed* is an indicator variable equal to one if the retailer is reported as closed. For single establishment firms, we identify a retailer as open if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, we identify a firm as surviving if LN reports the firm as active. *Start new business ex-post* is an indicator variable equal to one if the owner files for a "doing business as" (DBA), files for a business license, forms a limited liability company (LLC), or registers a corporation. *Corporate bankruptcy ex-post* is an indicator variable equal to one if the business files for bankruptcy protection. *Personal bankruptcy ex-post* is an indicator variable equal to one if the owner files for personal bankruptcy protection. All monetary values are expressed in real 2016 dollars.

Panel A: Retailers

Variable	N	Mean	SD	p50
	(1)	(2)	(3)	(4)
Prize (thousands)	292	155,382.13	181,801.64	105,132.4
Bonus (thousands)	292	151.70	261.28	55.67
Pre-treatment characteristics at retailers' level				
Number of years in business	292	9.98	10.05	10
Number of connected establishments	292	0.70	1.78	0
Revenue (thousands)	191	470.24	481.49	363.37
Employees	210	5.84	5.01	5
UCC loans	292	0.29	0.46	-
Real properties	292	0.11	0.31	-
Tax liens	292	0.08	0.26	-
Percentage population college degree (ZIP code)	292	14.99	7.98	13.45
Population (thousands, ZIP code)	292	9.83	6.67	9.22
Median income (thousands, ZIP code)	292	55.38	15.93	52.72
Outcomes at the retailers' level (3-year)				
Retailer closed	280	0.06	0.24	-
Revenue ex-post (thousands)	166	505.4	340.40	381.74
Employees ex-post	186	6.92	5.27	6
UCC loans ex-post	280	0.09	0.28	-
Real properties ex-post	280	0.03	0.16	-
Tax liens ex-post	280	0.03	0.17	-
Corporate bankruptcy ex-post	280	0.00	0.00	-

Table 1 (Continued)

Panel B: Owners

Variable	N	Mean	SD	p50
	(1)	(2)	(3)	(4)
Pre-treatment characteristics at owners' level				
Median income (thousands, ZIP code)	196	68.05	28.84	62
Age	153	49.52	13.55	50
Number of years as owner	196	9.44	10.79	10
Male	184	0.75	0.43	-
UCC loans	196	0.32	0.47	-
Real properties	196	0.34	0.46	-
Tax liens	196	0.09	0.28	-
Outcomes at owners' level (3-year)				
UCC loans ex-post	177	0.10	0.30	-
Real properties ex-post	177	0.09	0.29	-
Start a new business ex-post	177	0.12	0.19	-
Tax liens ex-post	177	0.04	0.20	-
Personal bankruptcy ex-post	177	0.02	0.13	-

Table 2. Test of Randomization

This table reports results testing the random assignment of the size of the winning jackpot bonus. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket. Columns 1-3 report estimates from an ordinary least squares (OLS) regression of *ln(Bonus)* on the variables listed and year of winning and game fixed effects. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. The *p*-value is for an F-test of the joint significance of the variables listed in the rows. Heteroskedasticity-robust standard errors are clustered at the state level. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Dependent variable	ln(Bonus)		
	(1)	(2)	(3)
Number of years in business	0.008	0.008	0.007
	(0.007)	(0.008)	(0.009)
Number of connected stores	0.008	0.009	0.007
	(0.031)	(0.035)	(0.039)
UCC loans ex-ante	-0.120	-0.096	-0.147
	(0.204)	(0.218)	(0.163)
Real properties ex-ante	-0.013	-0.010	0.159
	(0.435)	(0.433)	(0.370)
Tax liens ex-ante	0.053	0.023	0.084
	(0.479)	(0.501)	(0.496)
Percentage population college degree (ZIP code)		-0.006	
		(0.006)	
ln(Population) ZIP code		0.081	
		(0.138)	
ln(Median income) ZIP code		0.058	
		(0.080)	
Percentage population college degree (state)			0.023
			(0.091)
ln(Population) state			0.534
			(0.387)
ln(Median income) state			-0.402
			(0.381)
Joint F-test	[0.681]	[0.354]	[0.279]
Year FE	Yes	Yes	Yes
Game FE	Yes	Yes	Yes
Observations	280	280	280
R-squared	0.053	0.061	0.186

Table 3. Effect of a Winning Ticket Bonus on Firms' Survival

This table reports the estimates of the effect of receiving a bonus for selling a winning ticket on firms' survival. *Survival* is an indicator variable equal to one if the retailer remains open 3 years after receiving a winning ticket bonus. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket. For single establishment firms, we identify a retailer as surviving if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, we identify a firm as surviving if LN reports the firm as active. We also check for location changes using LN and whether the establishment remains open using Yelp and Google. Column 1 presents the estimate for the main specification without any control or fixed effects. Columns 2–4 include year of winning and game fixed effects. Column 3 includes pre-treatment characteristics at the retailer level, Column 4 also includes pre-treatment characteristics at the ZIP code level based on retailer location, and Column 5 includes pre-treatment covariates at state level. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Heteroskedasticity-robust standard errors are clustered at the state level. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Dependent variable	Survival				
	(1)	(2)	(3)	(4)	(5)
ln(Bonus)	-0.040**	-0.037**	-0.037**	-0.037**	-0.037***
	(0.018)	(0.017)	(0.016)	(0.015)	(0.011)
ln(Prize)			-0.013*	-0.014*	-0.015*
			(0.008)	(0.008)	(0.009)
Number of years in business			0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)
Number of connected stores			0.009	0.008	0.010
			(0.007)	(0.007)	(0.007)
UCC loans ex-ante			-0.005	-0.008	-0.012
			(0.037)	(0.034)	(0.038)
Real properties ex-ante			0.061***	0.062***	0.048**
			(0.017)	(0.018)	(0.020)
Tax liens ex-ante			-0.067	-0.058	-0.078
			(0.065)	(0.067)	(0.068)
Percentage pop college degree (ZIP code)				-0.002	
				(0.002)	
ln(Population) ZIP code				-0.018	
				(0.012)	
ln(Median income) ZIP code				0.026**	
				(0.013)	
Percentage pop college degree (state)					-0.004
					(0.005)
ln(Population) state					-0.007
					(0.014)
ln(Median income) state					0.042**
					(0.020)
Year FE	No	Yes	Yes	Yes	Yes
Game FE	No	Yes	Yes	Yes	Yes
Observations	280	280	280	280	280
R-squared	0.029	0.086	0.105	0.114	0.116

Table 4. Effect of a Winning Ticket Bonus on Other Firms' and Owners' Outcomes

This table reports the effect of receiving a bonus for selling a winning ticket on having Uniform Commercial Code (UCC) loans, tax liens, bankruptcy, and real properties. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket. *ln(Avg bonus)* is the log of one plus a winning ticket bonus after taxes divided by the number of owners per store. Panel A reports the estimates of the effect of a winning ticket bonus on retailers' outcomes. Panel B reports the results of the impact of the average winning bonus on owners' outcomes. Panel A considers four retailers' outcomes. The dependent variable is an indicator variable for the retailer having a UCC secured loan 3 years following the bonus shock (Column 1), an indicator variable for the retailer having a tax lien 3 years after the shock (Column 2), an indicator variable for the retailer filing for corporate bankruptcy (Column 3), or an indicator variable for the retailer having a new real property 3 years after the shock (Column 4). Panel B considers four owners' outcomes. The dependent variable is an indicator variable for the owner having a UCC secured loan 3 years following the bonus shock (Column 1), an indicator variable for the owner having a tax lien 3 years after the shock (Column 2), an indicator variable for the owner filing for personal bankruptcy (Column 3), or an indicator variable for the owner having a new real property 3 years after the shock (Column 4). All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Controls include the number of years in business, the number of connected establishments, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, percentage of population with college degree (ZIP code), ln(Population) ZIP code, and ln(Median income) ZIP code. All specifications control for game and year of winning fixed effects. Heteroskedasticity-robust standard errors are clustered at the state level (Panel A) and the retailer level (Panel B). $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

Panel A: Retailers

Dependent variable	UCC loans	Tax liens	Corporate bankruptcy	Real properties
	(1)	(2)	(3)	(4)
ln(Bonus)	-0.037***	-0.020***	0.000	-0.006
	(0.009)	(0.004)	(0.000)	(0.004)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Game FE	Yes	Yes	Yes	Yes
Observations	280	280	280	280
R-squared	0.067	0.060	0.000	0.073

Panel B: Owners

Dependent variable	UCC loans	Tax liens	Personal bankruptcy	Real properties
	(1)	(2)	(3)	(4)
ln(Avg bonus)	0.007	-0.004	0.021	0.055**
	(0.024)	(0.016)	(0.018)	(0.026)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Game FE	Yes	Yes	Yes	Yes
Observations	177	177	177	177
R-squared	0.221	0.066	0.088	0.193

Table 5. Firms' Survival and Owners' Age

This table reports the estimates of the effect of receiving a bonus for selling a winning ticket on firms' survival for different age groups of owners. *Survival* is an indicator variable equal to one if the retailer remains open 3 years after receiving the bonus. *ln(Avg bonus)* is the log of one plus the amount in U.S. dollars that retailers receive for selling a winning jackpot ticket divided by the number of owners per store. *Age* is an indicator variable equal to one if owner age is above the sample median. *Age>60* is an indicator variable equal to one if owner age is above 60. *Age>65* is an indicator variable equal to one if owner age is above 65. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Controls include the number of years in business, number of connected stores, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, the percentage of the population with a college degree (ZIP code), ln(Population) ZIP code, and ln(Median income) ZIP code. All specifications control for game and year of winning fixed effects. Standard errors are heteroskedasticity-robust and clustered at retailer level. *p <0.1; **p <0.05; ***p <0.01.

Dependent variable	Survival		
	(1)	(2)	(3)
ln(Avg bonus)	-0.132***	-0.059***	-0.035
	(0.035)	(0.020)	(0.026)
Age>median	0.028		
(=1: age>median; =0: otherwise)	(0.041)		
ln(Avg bonus) x age>median	0.002**		
	(0.001)		
Age>60		-0.041	
(=1: age>60; =0: otherwise)		(0.066)	
ln(Avg bonus) x age>60		0.103**	
		(0.039)	
Age>65			0.027
(=1: age>65; =0: otherwise)			(0.017)
ln(Avg bonus) x age>65			0.051*
			(0.026)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Game FE	Yes	Yes	Yes
Observations	148	148	148
R-squared	0.153	0.188	0.140

Table 6. Firms' Survival and Pre-treatment Revenue

This table reports the estimates of the effect of receiving a bonus for selling a winning ticket on firms' survival, for the sub-sample in which D&B provides pre-treatment revenue data. *Survival* is an indicator variable equal to one if the retailer remains open 3 years after receiving a winning ticket bonus. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket. *ln(Revenue)* is the log of one plus the revenue before the shock. For single establishment firms, we identify a retailer as surviving if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, we identify a firm as surviving if LN reports the firm as active. We also check for location changes using LN and whether an establishment remains open using Yelp and Google. Column 1 presents the estimate for the main specification including pre-treatment characteristics at the ZIP code level based on retailer location. Column 2 includes revenue 1 year before the shock. Column 3 reports the estimates when *ln(Bonus)* and *ln(Revenue) ex-ante* are interacted. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Heteroskedasticity-robust standard errors are clustered at the state level. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Dependent variable	Survival		
	(1)	(2)	(3)
ln(Bonus)	-0.035**	-0.035**	-0.028**
	(0.015)	(0.014)	(0.012)
ln(Revenue) ex-ante		0.027*	0.027*
		(0.015)	(0.015)
ln(Bonus) x ln(Revenue) ex-ante			0.012
			(0.008)
ln(Prize)	-0.011	-0.014	-0.013
	(0.011)	(0.012)	(0.012)
Number of years in business	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)
Number of connected stores	0.003	0.003	0.003
	(0.009)	(0.009)	(0.009)
UCC loans ex-ante	-0.019	-0.021	-0.027
	(0.033)	(0.037)	(0.038)
Real properties ex-ante	0.074***	0.062**	0.063**
	(0.027)	(0.024)	(0.024)
Tax liens ex-ante	-0.034	-0.032	-0.031
	(0.025)	(0.024)	(0.025)
Percentage population college degree (ZIP code)	-0.005	-0.005	-0.005
	(0.003)	(0.003)	(0.003)
ln(Population) ZIP code	-0.021	-0.020	-0.020
	(0.014)	(0.014)	(0.014)
ln(Income) ZIP code	0.026*	0.024*	0.024*
	(0.015)	(0.013)	(0.013)
Year FE	Yes	Yes	Yes
Game FE	Yes	Yes	Yes
Observations	183	183	183
R-squared	0.140	0.157	0.162

Table 7. Effect of a Winning Ticket Bonus on Starting a New Business

This table reports the estimates of the effect of receiving a bonus for selling a winning ticket on owners starting a new business. *ln(Avg bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket divided by the number of owners per store. *Start new business* is an indicator variable equal to one if the owner files for a "doing business as" (DBA), files for a business license, forms a limited liability company (LLC), or registers a corporation. Column 1 presents estimates from the specification without any control or fixed effects. Columns 2 and 3 include year of winning and game fixed effects. Column 3 includes controls, such as the number of years in business, the number of connected establishments, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, and ln(Median income) ZIP code. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Standard errors are heteroskedasticity-robust and clustered at retailer level. *p <0.1; **p <0.05; ***p <0.01.

Dependent variable	Start new business		
	(1)	(2)	(3)
ln(Avg bonus)	0.044**	0.043**	0.045**
	(0.016)	(0.021)	(0.020)
Controls	No	No	Yes
Year FE	No	Yes	Yes
Game FE	No	Yes	Yes
Observations	177	177	177
R-squared	0.048	0.116	0.140

Table 8. Start a New Business: Cross-Sectional Tests

This table reports the effect of the winning bonus for the retail owners on starting a new business 3 years after the shock. *ln(Avg bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket divided by the number of owners per store. *Start new business* is an indicator variable equal to one if the owner files for a "doing business as" (DBA), files for a business license, forms a limited liability company (LLC), or registers a corporation 3 years after the shock. *High-income ZIP code* is an indicator variable equal to 1 if the owner lives in a ZIP code with an income above the sample median. *Homeownership* is an indicator variable equal to one if the retail owner is a homeowner before the shock. *Age>median* is an indicator variable equal to one if the owner's age is above the sample median. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Controls include the number of years in business, the number of connected stores, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, and ln(Median income) ZIP code. All specifications control for game and year of winning fixed effects. Standard errors are heteroskedasticity-robust and clustered at retailer level. *p <0.1; **p <0.05; ***p <0.01.

Dependent variable	Start new business		
	(1)	(2)	(3)
ln(Avg bonus)	0.093***	0.073**	0.086**
	(0.031)	(0.027)	(0.038)
High-income ZIP code	-0.021		
(=1: ZIP code income > median; =0: otherwise)	(0.029)		
ln(Avg bonus) x high-income ZIP code	-0.086**		
	(0.039)		
Homeownership		-0.016	
(=1: Yes; =0: No)		(0.042)	
ln(Avg bonus) x homeownership		-0.069**	
		(0.032)	
Age>median			-0.043
(=1: age>median; =0: otherwise)			(0.044)
ln(Avg bonus) x age>median			-0.034
			(0.060)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Game FE	Yes	Yes	Yes
Observations	177	177	148
R-squared	0.101	0.082	0.103

Table 9. Effect of a Winning Ticket Bonus on Revenue and Employment

This table reports the estimates of the effect of receiving a bonus for selling a winning ticket on revenue and number of employees. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket. *Revenue Growth* measures the revenue growth from 1 year before the shock to 3 years after receiving the winning ticket bonus. *ln(Revenue)* is the log of one plus revenue 3 years after receiving the winning ticket bonus. *Employee Growth* measures the growth in the number of employees from 1 year before the shock to 3 years after receiving a winning ticket bonus. *ln (Employees)* is the log of one plus the number of employees years after receiving a winning ticket bonus. Controls include the number of years in business, the number of connected stores, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, revenue ex-ante, the number of employees ex-ante, and ln(Median income) ZIP code. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Standard errors are heteroskedasticity-robust and clustered at state level. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Panel A

	Revenue growth		ln(Revenue)	
	(1)	(2)	(3)	(4)
ln(Bonus)	0.279**	0.288**	0.149**	0.150**
	(0.127)	(0.124)	(0.061)	(0.057)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Game FE	Yes	Yes	Yes	Yes
Observations	166	166	166	166
R-squared	0.527	0.593	0.141	0.164

Panel B

	Employee growth		ln(Employees)	
	(1)	(2)	(3)	(4)
ln(Bonus)	0.144**	0.145**	0.171**	0.183**
	(0.064)	(0.060)	(0.082)	(0.078)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Game FE	Yes	Yes	Yes	Yes
Observations	186	186	186	186
R-squared	0.111	0.122	0.157	0.178

Appendix

Table IA.1. Number of Retailers That Sold Winning Jackpot Tickets

This table reports the number of retailers that sold winning Mega Millions or Powerball jackpot tickets between 2002 and 2016.

Year	Number of retailers
2002	9
2003	21
2004	19
2005	17
2006	16
2007	28
2008	20
2009	25
2010	23
2011	21
2012	22
2013	27
2014	15
2015	17
2016	12

Table IA.2. Sample Differences

This table reports the differences in retailers' pre-treatment characteristics and outcome variables between the sample of retailers for which LN provides owners' information and the sample without owners' data. The full sample comprises 292 retailers, and for 96 of them, information about the owners is available through LN (196 owners). *Bonus* is the amount in U.S. dollars after taxes that retailers receive for selling a winning jackpot ticket. *Number of connected establishments* is the number of other locations that the firm has. *UCC loans* is an indicator for whether the retailer ever had a secured debt (i.e., UCC filing) prior to receiving the bonus. *Real properties* is an indicator variable for whether the retailer owned a real property prior to receiving the bonus. *Tax liens* is an indicator variable for whether the retailer had a history of tax liens placed against its property before the shock. Outcome variables are measured 3 years following the shock. *Retailer closed* is an indicator variable equal to one if the retailer is reported closed. For single establishment firms, we identify a retailer as open if it meets the following criteria: (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, we identify a firm as surviving if LN reports the firm as active. All monetary values are expressed in real 2016 dollars.

Variable	Firms without owners' data	Firms with owners' data	Difference	p-value
	(1)	(2)	(3)	(4)
Bonus (thousands)	136.85	169.46	32.61	0.29
Pre-treatment characteristics				
Number of years in business	10.55	9.33	1.22	0.21
Number of connected establishments	0.69	0.88	0.19	0.27
Revenue (thousands)	467.15	473.01	5.86	0.43
Employees	5.76	5.89	0.13	0.55
UCC loans	0.28	0.31	0.03	0.24
Real properties	0.09	0.09	0	0.90
Tax liens	0.09	0.07	0.02	0.11
Percentage population college degree (ZIP code)	15.39	14.50	0.89	0.34
Population (thousands, ZIP code)	9.75	9.95	0.2	0.80
Median income (thousands, ZIP code)	56.33	54.22	2.11	0.26
Outcomes				
Retailer closed	0.95	0.92	0.03	0.30
UCC loans ex-post	0.08	0.09	0.01	0.46
Real properties ex-post	0.02	0.03	0.01	0.54
Tax liens ex-post	0.03	0.04	0.01	0.55

Table IA.3. Effect of a Winning Ticket Bonus on Other Firms' Outcomes Conditional on Surviving

This table reports the effect of receiving a bonus for selling a winning ticket on having Uniform Commercial Code (UCC) loans, tax liens, and real properties for the sub-sample of firms that survived. The sample consists of retailers that were reported as open 3 years after the shock. *ln(Bonus)* is the log of one plus the amount in U.S. dollars that retailers receive for selling a winning jackpot ticket. Column 1 reports the estimates for the retailer having a UCC secured loan 3 years following the bonus shock. Column 2 presents the estimates on an indicator variable for the retailer having a tax lien placed against its property 3 years after the shock. Column 3 shows the estimates of an indicator variable for the retailer having a real property 3 years after the shock. All monetary values are expressed in real 2016 dollars. Continuous variables are standardized. Controls include the number of years in business, the number of connected establishments, UCC loans ex-ante, real properties ex-ante, tax liens ex-ante, the percentage of the population with a college degree (ZIP code), ln(Population) ZIP code, and ln(Median income) ZIP code. All specifications control for game and year of winning fixed effects. Standard errors are heteroskedasticity-robust and clustered at state level. $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

Dependent variable	UCC loans	Tax liens	Real properties
	(1)	(2)	(3)
ln(Bonus)	-0.040***	-0.016***	-0.005
	(0.010)	(0.003)	(0.005)
Sample	Survived	Survived	Survived
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Game FE	Yes	Yes	Yes
Observations	263	263	263
R-squared	0.078	0.059	0.075

Table IA.4. Multinomial Logit Estimates of Remaining Open and Starting a New Business

This table reports the estimates of multinomial logit regressions of the effect of receiving a bonus for selling a winning ticket on keeping the current retailer open and starting a new business. The choices are among the following: (1) close current business and do not start a new business, (2) close current business and do start a new business, (3) current business remains open and do start a new business, and (4) current business remains open and do not start a new business. The first category (close retailer and do not open a new business) is the base category. *ln(Avg bonus)* is the amount in U.S. dollars that retailers receive after taxes for selling a winning jackpot ticket divided by the number of owners per store. Panel A presents the estimates for the multinomial logit, and Panel B reports the marginal effects. Continuous variables are standardized. Heteroskedasticity-robust standard errors are clustered at the retailer level. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Panel A: Estimates

	Close and start	Remain open and start	Remain open and nothing
	(1)	(2)	(3)
ln(Avg bonus)	1.679***	0.810**	-0.023**
	(0.571)	(0.407)	(0.010)
Controls	Yes		
Observations	177		
Log-likelihood	-128.87		
Pseudo -squared	0.100		

Panel B: Marginal effects

	Close and start	Remain open and start	Remain open and nothing
	(1)	(2)	(3)
ln(Avg bonus)	0.078***	0.044**	-0.115***
	(0.027)	(0.019)	(0.028)

Data Appendix

Variable Definitions

Variable	Description	Data source
Survival	For single establishment firms, survival is an indicator variable equal to one if (1) the Optimizer program matches the establishment to a D&B retailer and (2) LN reports the firm as active. For multiple establishment companies, survival is an indicator variable equal to one if LN reports the firm as active.	Dun and Bradstreet, Lexis Nexis Public Records Comprehensive Business Report
Start a Business	Indicator variable equal to one if a registry records a filing for a "doing business as" (DBA), an application for a business license, or a filing for a limited liability company (LLC) or a corporation in or before the indicated year following the jackpot shock	Lexis Nexis Public Records Comprehensive Comprehensive Person Report
UCC Loans	Indicator variable equal to one if a registry records a UCC loan secured by fixed assets in or before the indicated year following the jackpot shock	Lexis Nexis Public Records Comprehensive Business Report (retailers) and Comprehensive Person Report (owners)
Tax Liens	Indicator variable equal to one if a registry records that a lien has been placed on a property to secure the payment of taxes in or before the indicated year following the jackpot shock	Lexis Nexis Public Records Comprehensive Business Report (retailers) and Comprehensive Person Report (owners)
Real Properties	Indicator variable equal to one if a registry records an acquisition of a real property in or before the indicated year following the jackpot shock	Lexis Nexis Public Records Comprehensive Business Report (retailers) and Comprehensive Person Report (owners)
Bankruptcy	Indicator variable equal to one if a debtor files for bankruptcy protection in or before the indicated year following the jackpot shock	Lexis Nexis Public Records Comprehensive Business Report (retailers) and Comprehensive Person Report (owners)
Revenue	Annualized revenue at the store level reported by the business	Dun and Bradstreet
Employees	Number of employees at the store level reported by the business	Dun and Bradstreet