Entrepreneurship and Economic Conditions: Evidence from Regional Windfall Gains*

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Abstract

We study the effect of local economic conditions on entrepreneurial activity using the randomized assignment of monetary prizes provided by the Spanish Christmas Lottery. Lottery winners tend to be geographically concentrated as tickets are typically sold by local outlets and have a large economic impact on a local community. We find higher firm creation in winning provinces. This increase is also present in tradable and manufacturing industries, especially in regions with low bank loan supply, supporting the hypothesis that financial constraints can impair firm creation. Our results suggest that local demand and financial constraints are important drivers of entrepreneurial activity.

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1 Introduction

Promoting an entrepreneurial society is a priority shared by many governments worldwide as new firms are key to economic growth and job creation (Ayyagari, Demirguc-Kunt, and Maksimovic (2011), Haltiwanger, Jarmin, and Miranda (2013)). Thus, identifying and understanding the economic mechanisms that affect firm creation is important. Specifically, how entrepreneurial activity responds to changes in economic conditions and financial constraints is critical to evaluate economic policies, such as changes to retirement systems, the provision of government loans, and tax policy.

The relation between entrepreneurial wealth and firm creation has received considerable attention in the literature. There is substantial evidence showing a strong correlation between wealth and the propensity to start a business (Evans and Jovanovic (1989), Evans and Leighton (1989), Holtz-Eakin, Joulfaian, and Rosen (1994)). However, the precise economic mechanisms underlying the role of wealth in firm creation are not well understood. Hurst and Lusardi (2004) report that the relation between wealth and business entry is mostly flat. In contrast, Adelino, Schoar, and Severino (2015) and Schmalz, Sraer, and Thesmar (2017) show that real estate collateral is important for entry into entrepreneurship.

It is challenging to identify the causal effect of economic conditions and financial constraints on firm creation for several reasons. Individuals with wealthier family members have less credit constraints and are more likely to start a firm, but they may also have greater access to business opportunities for reasons unrelated to their wealth. In addition, when the economy is performing well, there are less incentive to startup new firms. In short, the relation between entrepreneurial activity, economic conditions, and credit constraints are jointly determined in equilibrium. Therefore, it is difficult to empirically identify how economic conditions and credit constraints affect entrepreneurial activity.

In this paper, we study the effect of economic conditions and financial constraints on firm creation by exploiting a unique randomized natural experiment: the Spanish Christmas Lottery. This lottery is more of a social event than a gamblers' lottery, in which about 75% of the population participates. In addition, its economic impact is quite large – participants

spend more than 3 billion euros on the Christmas Lottery, amounting to about 0.3% of the country's gross domestic product (GDP). This lottery does not award one big prize to a few individuals, but to several thousand individuals sharing the same ticket number. Since each number is mostly sold by one lottery outlet, winners tend to be geographically concentrated. Using National Accounts statistics, Bagues and Esteve-Volart (2016) show that prizes are collected during the same year and in the province where the tickets were sold. They show that each euro of lottery prize implies an increase in households' disposable income of 88 cents in a given province and year in which prizes are collected. The impact of this lottery is economically significant – the province with the maximum prize per capita receives an income shock equivalent to the 4% of its GDP. In this paper, we use the Christmas Lottery expenditures and prizes to identify random regional variation in economic conditions and financial constraints in the 1993-2015.

We find that the regional windfall gains due to the Christmas Lottery have a significant effect on entrepreneurial activity. The number of new businesses significantly increases in winning provinces. The effect is economically sizable: the growth rate of the number of firms (i.e., net entry rate) in winnings provinces increases by 0.8% compared to nonwinning provinces in a given year. Considering that the average net entry rate is 2.6% in our sample period, the effect of the lottery income shock represents about 30% of the average.

One possible concern with our methodology is that in regions where the economic conditions improve, households might spend more in the Christmas Lottery, affecting the odds of holding the winning tickets. To address these concerns, we include several macroeconomic variables at the province level as controls and estimate regressions with province fixed-effects. We also control for the total expenditures in lotteries, the number of tickets awarded in the province, and regional banking system characteristics. We also estimate specifications excluding the largest province and the province where individuals purchase more tickets. Our results remain unchanged.

After establishing the link between lottery prizes and firm creation, we examine what is the legal type and the number of jobs created by new firms. We find that the effect in

self-employment and limited liability companies is larger than in public liability companies. We also find that newly created firms are more likely to be small firms (with less than 10 employees) and medium firms (less than 50 employees), while large firms (more than 50 employees) are unlikely to be created as a consequence of lottery prizes. These results suggest that small firms, which are more likely to be financially constrained, are those that benefit the most from the lottery income shock. This is consistent with the notion that banks are often reluctant to finance small start-ups because of high uncertainty, information asymmetry, and agency costs (Beck, Demirgüç-Kunt, and Maksimovic (2005)).

We also investigate how the lottery income shock affects firm entry and exit rates rather than just the net entry rate. To this end, we use firm-level data and aggregate every year the number of firms created and liquidated by province. We find a positive and significant effect in entry rates of winning provinces and an insignificant effect in exit rates.

We analyze how the lottery income shock affects the dynamics of firm creation over time. Firm creation grows at about the same rate in winning and nonwinning provinces in the years before the lottery prize, mitigating concerns of preexisting differential trends. Firm creation increases significantly more in winning provinces than in nonwinning provinces in the years after the lottery award.

We also show that our results are not driven by certain industries. The differential effect on the entry rate is positive and significant for businesses operating in industries that depend more on local demand (i.e., non-tradable industries). Our findings suggest that regional windfall gains can have a substantial economic benefit for local economies through a multiplier effect on local spending. The differential effect on the entry rate is also positive and significant in tradable and manufacturing industries with a similar magnitude to that in non-tradable industries. The effect is especially pronounced in regions with lower bank loan supply. These findings are consistent with financial constraints impairing firm creation. We conclude that local both aggregate demand and access to finance are important drivers of entrepreneurial activity.

We examine the survival of firms created at the time of the lottery prize. In a frictionless

capital market, personal wealth should not affect neither the decision to enter self-employment nor the scale of the business that is started. However, in the presence of frictions, self-employment would be related to wealth and collateral value (Evans and Jovanovic (1989)). In this setting, skilled entrepreneurs would be prevented from starting new business due to lack of financial resources. We find that firms created in winning provinces have higher survival rates, especially those firms operating in tradable and manufacturing industries. Since these firms that depend less on local demand have higher survival rates, we conclude that individuals are not just taking advantage of the good economic conditions. This result supports the hypothesis that financial constraints restrict skilled individuals to turn ideas into a successful business.

We also conduct tests at the firm level. We study what are the differences in assets, sales, employment, capital structure, and probability of default of firms created in winning provinces relative to nonwinning provinces in their first year of life. We find that firms created after the lottery prize have lower sales growth, lower equity-to-assets ratio and higher default risk. However, firms created in tradable industries have higher equity-to-assets and lower default risk. We conclude that firms in tradable industries, which are not as dependent on local demand, use more equity financing, suggesting that lottery prizes alleviate financial constraints and provide capital to start a business.

Our study contributes to three strands of the literature. First, we contribute to a growing literature that uses lottery data as an exogenous liquidity shock to study a number of individual decisions. This literature focus on the effects of lottery prizes on labor supply (Imbens, Rubin, and Sacerdote (2001), Cesarini, Lindqvist, Notowidigdo, and Ostling (2017)), individual bankruptcy (Hankins, Hoekstra, and Skiba (2011)), and consumption (Kuhn, Kooreman, Soetevent, and Kapteyn (2011)). More recently, Bagues and Esteve-Volart (2016) use lottery prizes to study the effect of economic conditions on national election outcomes in Spain, and Cesarini, Lindqvist, Notowidigdo, and Ostling (2017) study the effect of lotteries on players' own health and child development in Sweden.

Second, we contribute to the literature on financial constraints and entrepreneurship.

The previous literature has found mixed evidence. Evans and Jovanovic (1989), Evans and Leighton (1989), and Holtz-Eakin, Joulfaian, and Rosen (1994) find a strong positive correlation between entrepreneurial wealth and the likelihood of starting a business. In addition, Adelino, Schoar, and Severino (2015) and Schmalz, Sraer, and Thesmar (2017) show the importance of real estate collateral to entrepreneurial activity. However, Hurst and Lusardi (2004) challenge these findings and argue that the correlation between wealth and firm creation only reflects the preferences or opportunities of a group of individuals. Our paper adds to this literature by studying income shocks (the randomized assignments of monetary prizes provided by a syndicated lottery) instead of wealth. Two key aspects of the Spanish Christmas Lottery – it is a social event and a income shock to households in the same geographic area – make our setting unique to study how changes in economic conditions and individual wealth affect entrepreneurial activities.

Finally, our paper contributes to the literature on the link between economic activity and firm creation (e.g., Koellinger and Thurik (2012)). Our paper shows that firm creation responds to local demand shocks that generate growth opportunities. Our contribution is to provide causal evidence that local economic conditions affect entrepreneurship.

2 Data

2.1 Christmas Lottery Background

The Spanish Christmas Lottery (*Lotería del Gordo*) is a national lottery game that has been held since 1812. Nowadays, this lottery is held every year on December 22 and is considered the biggest lottery game worldwide. Compared with more than 500 lotteries held every year in Spain, the Christmas lottery represents one-fifth of total lottery sales. About three-quarters of the population participate in the Christmas lottery, and around 55% of them are newcomers, people who only play the lottery in Christmas.

The tickets have five-digit numbers. There were 66,000 numbers played until 2004 and 85,000 between 2005 and 2010. The numbers played have raised to 100,000 since 2011. Each

number is generally sold by one lottery outlet, and the numbers that are allocated to each outlet are randomly assigned using a computer. Each number is divided into 165 series, and each of these series consist of 10 fractions that can be also divided into smaller shares. The price of a fraction is 20 euros, so the cost of buying a whole number is 33,000 euros since 2011. People tend to buy one fraction (20 euros) but they can also buy a share of 5 and 2 euros. Thus, depending on the number of shares sold, there might be between 1,650 and 16,500 ticket holders for each number.

The amount of money assigned to prizes is 70% of the money collected (i.e., 2,320 million euros). The remaining 30% is distributed as commissions for outlet, internal revenue, and to cover administration costs. For the top three prizes, the holders of the first prize get 20,000 euros per euro played, the second prize awards winners with 6,250 euros, and the third prize awards winners with 2,500 euros. Given that the standard ticket costs 20 euros, a first prize winner will receive an income shock of 400,000 euros.[1]

2.2 Province-level and Firm-level Data

We merge the Christmas Lottery data with information about the number of firms and their characteristics aggregated at the province level. The data come from the Spanish Central Directory of Enterprises (Directorio Central de Empresas, DIRCE) and it is compiled by the Spanish National Statistics Office (Instituto Nacional de Estadistica, INE). INE does not provide individual firm-level data, and the information is given for groups of firms in a given range of firm characteristics. DIRCE is the first official database on individual firms for the Spanish economy, which covers the population of existing firms. The changes in the number of existing business and number of employees allows the analysis of the progress made by cohorts of firms, which began their activity in a particular year and province.

We also obtain information on macroeconomic variables at the province level such as

[1]These prizes were 10,000 euros, 4,800 euros, and 2,400 euros per euro played between 1986 and 2004; and 15,000, 5,000, and 2,500 between 2005 and 2011. All the Christmas lottery prizes were tax exempt until 2013, in which a 20% tax was imposed for prizes larger than 2,500 euros. See Bagues and Esteve-Volart (2016) for more details about the Christmas lottery players' characteristics.

population, inflation rate, labor force participation, unemployment rate, house prices, bank loans, and gross domestic product (GDP) per capita from 1993 to 2015. The data on population, inflation rate, labor force participation, and GDP are from INE, data on outstanding loans are from the Statistics Bulletin of the Bank of Spain, and data on house prices are from different sources – ST Sociedad de Tasación (the largest independent Real Estate Valuation firms in Spain), Idealista and Fotocasa (the two largest real state portals in Spain).

We supplement our province-level data with firm-level data from Amadeus and Sabi databases. Amadeus is a commercial pan-European database provided by Bureau van Dijk, containing financial information on over 2.5 million public and private companies in Spain. The database contain detailed firm-level characteristics and accounting data. In addition, Amadeus also provides year of incorporation, industry (the three-digit NACE code—the European standard of industry classification) and the province where the firm is located. The other source of information is the Sabi database, an enhanced version of Amadeus for Spain. Sabi is especially useful because it covers a larger fraction of new and SMEs across all industries, and contains information not only on active firms, but also on firms that have been already liquidated.

2.3 Summary Statistics

Table 1 presents summary statistics for the Christmas lottery and macroeconomic variables at the province level. Panel A summarizes the Christmas lottery expenditure, number of tickets sold and prizes by province. The average yearly expenditure per capita in a province is 57 euros. On aggregate, this represents about 0.28% of the GDP of that province. The average top three lottery prizes are 21 euros per capita or about 0.14% of the GDP at the province level. While we observe the geographical distribution of the top three prizes, which account for about three-quarters of the total prizes, we cannot observe the remaining small prizes that are awarded by the lottery. Thus, we consider the top three lottery prizes in our analysis. Given the random nature of the prizes, we can assume that their geographical

distribution is proportional to the expenditure by province. Panel B of Table 1 reports summary statistics for provinces that were awarded the maximum prize per capita in each year during our sample period. The average lottery prize received by a winning province is equivalent to about 4% of province-level GDP and about 723 euros per capita. The number of tickets sold in winning provinces is about 1,500, approximately one for every 800 individuals. Because these fractions tend to be split in smaller shares (a fourth or a tenth), this figure should be considered as a lower bound of the number of individuals receiving lottery prizes. Panel C describes average macroeconomic characteristics of the provinces during our sample period. The average province has 864 thousands habitants, 17% unemployment rate, 2.7% inflation rate, and 19,500 euros GDP per capita.

Panel A of Table 2 presents the distribution of existing firms by legal form and number of employees. The average number of existing firms per province is more than 60,000. These firms include public limited companies, limited liability companies, and self-employment. Self-employment represents about 56% of the businesses, while public-limited companies represent only 3.7%. In addition, more than 90% of these firms have less than 10 employees. Panel B summarizes the average number of firms across provinces, total and by sector, of our Amadeus/Sabi sample from 1993 to 2014.

Table 3 reports average firm characteristics and macroeconomic variables for lottery winning and nonwinning provinces, as well as their differences, in the year before the lottery prize. There are no significant differences in assets, sales growth, employment growth, capital structure, and probability of default across firms. In addition, we do not find any differences in GDP growth, inflation growth, unemployment growth, house prices growth, and population growth across winning and nonwinning provinces.

3 Entrepreneurial Activity and the Christmas Lottery

3.1 Net Firm Entry

We examine the effect of the Christmas Lottery income shock (i.e., prize) on entrepreneurship. Our baseline specification employs a difference-in-differences (DD) estimator that compares firm creation in provinces that receive the lottery prize (treatment group) relative to provinces that do not receive the lottery prize (control group). The sample consists of province-level data in the 2000-2015 period provided by INE.

The province-level specification we use is as follows:

$$\Delta Firms_{i,t+1} = \beta Prize_{i,t} + \theta Expenditure_{i,t} + \gamma Z_{i,t-1} + \delta_i + \delta_t + \varepsilon_{i,t+1} \tag{1}$$

where $\Delta Firms_{i,t+1} = (Firms_{t+1} - Firms_{t-1})/Firms_{t-1} \times 100$ is the growth rate (in percentage) of the number of firms in province i between $t-1$ and $t+1$ (net entry rate); $Prize_{i,t}$ is a dummy variable that takes a value of one if any of the top three prizes was awarded in province i in year t, and zero otherwise.[2] $Expenditure_{i,t}$ is the expenditure per capita in lottery in year t in province i; Z_{it-1} include GDP per capita growth, inflation growth, unemployment growth, house prices growth, population growth, and bank loans growth.[3] δ_i is a province fixed effect and δ_i is a time (year) fixed effect. The coefficient of interest β measures the average difference in net entry rate between winning provinces and nonwinning provinces.

Table 4 shows the results. We find a positive and significant effect of the lottery prize on the net entry rate in winnings provinces relative to nonwinning provinces. The increase in the number of firms can occur because more firms are created, or because less firms are liquidated. We analyze firm entry and exit rates below.

The regression in column (1) only controls for lottery expenditure and year fixed effects.

[2] Lottery is awarded on December 22nd of year t, but disbursed a few days later on January of year $t+1$.

[3] All values are measured as of December. Growth is measured as the change between year $t-1$ and year $t-2$.

The coefficient of interest β is 0.76. This indicates that the growth rate of the number firms in winnings provinces in 0.76 percentage points higher than in nonwinnings provinces. Given that the net entry rate is 2.6% in our sample period, the effect of the lottery prize represents about 30% of the average. Results are robust to the inclusion of additional control variables (column (2)), province fixed effects (column (3)), and regressions weighted using population as weights (column (4))). In particular, column (3) includes province fixed effects, which controls for unobserved time-invariant province heterogeneity and the estimator is driven by within-province variation. Results are also robust when we drop Madrid and Lleida from the sample, which are provinces with special characteristics.[4]

In column (6) we substitute $Prize_{i,t}$ with $TopPrize_{i,t}$, $MidPrize_{i,t}$ and $BottomPrize_{i,t}$ as our explanatory variables of interest. $TopPrize_{i,t}$ is a dummy variable that takes a value of one if province i is in the top tercile of prizes per capita in year t, and zero otherwise. $MidPrize_{i,t}$ is a dummy variable that takes a value of one if province i is in the middle tercile of prizes per capita in year t, and zero otherwise. $BottomPrize_{i,t}$ is a dummy variable that takes a value of one if province i is in the bottom tercile of prizes per capita in year t, and zero otherwise. The results show that the effect on net firm creation is driven by provinces that are in the top tercile of lottery prizes. The coefficient is positive for the other terciles of prizes but imprecisely estimated.

3.2 Firm Entry and Exit

We analyze the effect of the lottery prize on firm entry and exit rates using the firm-level data from the Amadeus and Sabi databases aggregated at the province level. The sample period is from 1993 to 2015.

The province-level specification we use is as follows:

$$Y_{i,t+1} = \beta MaxPrize_{i,t} + \theta Expenditure_{i,t} + \gamma Z_{i,t-1} + \delta_i + \delta_t + \varepsilon_{i,t+1} \quad (2)$$

[4]Madrid is the capital and biggest city in Spain and there can be more lottery expenditure and more economic activity. The province of Lleida has a city called Sort that has a strong Christmas lottery tradition and spends a high amount in this lottery (around 3% of total sales).

where $Y_{i,t+1}$ is the entry rate, exit rate or net entry rate (in percentage). The entry rate is the number of firms created in year $t+1$ divided by the number of firms in year t. The exit rate is the number of firms that exit in $t+1$ divided by the number of firms in year t. Net entry rate is the growth rate of the number of firms in province i between $t+1$ and t. $MaxPrize_{i,t}$ is a dummy variable that takes a value of one if province i received the maximum prize (top three) per capita in year t, and zero otherwise.

Table 5 presents the estimates of the effect of the lottery prize on the entry rate, exit rate, and net entry rate. Column (1) shows that the $MaxPrize$ coefficient is positive and significant in the entry rate and net entry rate regressions. The results indicate that the entry rate increases by 0.68 percentage points in winning provinces relative to nonwinning provinces. Net entry rate increases by 0.79 percentage points in winning provinces relative nonwinning provinces, which represents about 30% of the average. We do not find a significant effect of the lottery prize on the exit rate, although the coefficient is negative. This negative coefficient indicates that firm exit is lower after the lottery award.

In alternative, we use use the lottery prize in euros per capita and the number of tickets awarded as explanatory variables. Table 6 presents the results. Column (1) indicates that if we give 1,000 euros to each individual in a province, the entry rate rises by 0.24 percentage points. Given that the average number of of firms in a province is 16.215 (see Panel B of Table 2), this result indicates that giving 1,000 euros to each individual of a province increases the number of new firms by 38. Net firm creation increases rises by 0.32 percentage points for every 1,000 euros awarded to each individual of a province, which corresponds to a net increase of 53 firms.

Columns (4)-(6) of Table 6 show results for the number of tickets awarded per capita by province. For every 1,000 tickets awarded, the entry rate increases by 0.28 percentage points and the net entry rate increases by 0.34 percentage points. This implies that for every 1,000 tickets awarded, 46 new firms are created and net firm entry increases by 55 firms.

3.3 Firm Creation Dynamics

In this section, we study the dynamics over time of the relation between the lottery prize and entrepreneurship. We use the specification in equation (2) with four lags and two leads of the dummy variable $MaxPrize$.

Table 7 shows a positive and significant effect on entry rate and net entry rate after the lottery prize. The effect lasts for two years for the entry measure, and it lasts for three years for the net entry measure. In addition, we find that treatment and control groups follow parallel trends before the treatment, mitigating concerns about preexisting differential trends.

Figure 3 shows the estimated β_n coefficients and corresponding 95% confidence intervals. We include the same number of years before and after the shock. The figure shows the entry rate around a lottery prize. We find a significant increase in entry rate in the year after the lottery award and then the entry rate reverts towards the mean. There is no evidence of significant preexisting differential trends.

3.4 Financial Constraints

We conduct a series of tests of the hypothesis that financial constraints impair entrepreneurship. We analyze the dynamics over time of the lottery prize on firm entry for different sectors as classified by Mian and Sufi (2014). Specifically, we study the effect of the lottery prize on entrepreneurship in industries that depend more on local demand (non-tradable) and industries that depend less on local demand (tradable). If the effect of the lottery prize on firm creation is a consequence of an increase in local demand, not an effect of financial constraints, the effect should be insignificant in tradable industries. In contrast, if financial constraints impair firm creation, we should also find an effect in the tradable sector. To analyze this hypothesis, we use equation (2) and estimate the relation between the lottery and the entry rate across different industries.

Table 8 shows that our estimates for the tradable sector are of similar magnitude to those for the non-tradable sector. In column (1), we find that the effect of the lottery on the entry

rate is still positive and significant at 0.64 when we exclude the construction sector. We exclude the construction and the retail sector in column (2) and the non-tradable sector in column (3). The effect of the lottery on the entry rate is slightly reduced to 0.53-0.59 but it is still positive and significant. This implies that our results are not solely driven by firms in the non-tradable sector or in the construction sector. In column (4) we focus on the tradable sector, and in column (5) we focus on the manufacturing sector. If the effect of the lottery on firm creation is primarily driven by a local demand shock, then the coefficient should be significantly reduced when we focus on the tradable and manufacturing sectors. We find the the impact of the lottery on firm creation remains positive and significant in the tradable and manufacturing sectors at 0.53-0.57. This finding is consistent with financial constraints playing an important role in entrepreneurship.

Next, we analyze the role of bank loan supply on the effect of the lottery prize on entrepreneurship. We use equation (2) and split the sample into provinces with high and low bank loan supply based on the median amount of bank loans per capita by province. Table 9 shows that the $MaxPrize$ coefficients in the entry rate and net entry rate regressions are positive and significant for both samples, but the magnitude of the coefficients is significantly larger for the sample with low bank loan supply. These results indicate that the effect of the lottery prize on entrepreneurship is larger in provinces with lower access to credit. This result suggests that financial constraints play an important role in shaping the effect of the lottery prize on entrepreneurship.

3.5 Macroeconomic Indicators

We analyze whether there is a significant impact of the lottery on several macroeconomic indicators such as GDP, unemployment rate, bank loans and transfers. Table 10 presents the results. At the province level, we do not find any significant impact of the lottery on any macroeconomic indicator in the year of the lottery prize and the three years after. These results are in line with Bagues and Esteve-Volart (2016). As they claim, this is because

provinces in Spain have a high openness ratio.[5] This is evidence that the local demand shock due to the lottery prize is not sizable enough to impact macroeconomic indicators. This evidence is consistent with the hypothesis that financial constraints play a role in the effect of the lottery prize on entrepreneurship, and that local demand shocks do not drive all the results.

To better understand whether the openness channel is operating and the effects of the lottery, we split our sample into low (first quartile) and high (fourth quartile) levels of economic openness. We measure economic openness with the trade-to-GDP ratio (the sum of exports and imports divided by GDP). Table 11 shows that the impact of the lottery prize on GDP is not significant in the years after the lottery shock, but the coefficients in the provinces with a low openness ratio are larger than in the provinces with high openness ratio. There is a significant decrease in unemployment rate following the lottery prize in provinces with a low openness ratio, while the effect is insignificant in provinces with a high openness ratio.

3.6 Firm Size and Type

We now turn to study whether there are differences in the type of firms created after the lottery prize. We decompose the net entry rate according to firm type and firm size using equation (1).

To study the importance of financial constraints for firm creation, we use the variation in the amount start-up capital needed to create a new firm (Hurst and Lusardi (2004) and Adelino, Schoar, and Severino (2015)). The minimal feasible scale of businesses differs across firm types. Self-employment and limited liability companies require little start-up capital, while a public limited company requires higher start-up capital, which which are too high to be financed with lottery prizes.[6]

Table 12 shows the estimates by type of firms that are created following the lottery shock.

[5] According to Bagues and Esteve-Volart (2016), the openness ratio of the average Spanish province between 1995 and 2007 was equal to 168% (C-Intereg database).

[6] In Spain, the minimum capital required to start a limited liability company is 3,000 euros while it is 60,000 euros to start a public limited company.

We find that the lottery prize has a significant effect in the net entry rate for self-employment and limited liability companies, i.e., in cases with lower start-up capital. This indicates that financial constraints are important to start a business, but the size of the lottery prize is not sufficiently large enough to meet the capital requirements of public limited companies. This result is consistent with the financial constraint hypothesis, smaller firms that require less capital to start are those that benefit the most from the lottery prize. Results show that the growth in self-employment presents the biggest magnitude relative to the other types of firms. Self-employment increases by 0.77 percentage points in winning provinces relative to nonwinning provinces. The effect on limited liability companies creation is also positive and significant. The effects on public limited companies and other associations creation (this include collective businesses, partnerships, associations and cooperatives) are not significant, although the coefficient is positive.

Table 13 shows the estimates of the effect of the lottery prize on the net entry rate by firm size (as proxied by the number of employees). We classify firms in three possible groups: 0 to 9 employees, 10 to 49 employees and above 49 employees. The lottery prize has a positive effect on the creation of small and medium firms (up to 49 employees). The effect is of similar magnitude for the creation of small and medium firms. Net entry rate increases in winning provinces by 0.68% for firms with less than 10 employees, and by 0.71% for firms for firms with 10 to 49 employees. There is no effect for firms with more than 49 employees.

The underlying reason why we do not find a significant result in large firms is that the size of the lottery prize is not sufficiently big. In fact, the prize is not a unique income shock received by a single individual, but it is dispersed among several individuals that bought the winning tickets. As explained in Section 2.1, although a number is usually sold in a single outlet, depending on the number of fractions and shares sold, there might be up to 16,500 ticket holders for each number. Moreover, the window we use to measure firm creation is roughly a year, and it is unlikely that firms in a year have more than 50 employees.

3.7 Firm Characteristics and Survival

In this section we study whether the lottery prize affects firm survival and the characteristics of new firms. We first examine the number of bankruptcies at the province level. Table 14 shows the estimates of the impact of the lottery prize on the number of bankruptcies in the subsequent two years using equation (2). We only find a significant increase in the number of bankruptcies after the lottery prize for firms in the non-tradable sector, which are those that are more dependent on local demand. This indicates that after the lottery shock, firms created in the non-tradable sector as a consequence of the lottery prize and increase in local demand are of "lower" quality or have a "short-term" purpose, and therefore survive less. In contrast, in the tradable sector there are no significant differences in the number of bankruptcies for firms created after or before the lottery prize.

We also perform tests on firm characteristics their first year of life and four year after creation. The firm-level specification we use is as follows:

$$Y_{j,t+1} = \beta TreatTS_{j,t} + \theta Expenditure_{j,t} + \gamma Z_{i,t-1} + \delta_i + \delta_t + \varepsilon_{j,t+1} \tag{3}$$

where $Y_{j,t+1}$ is a characteristic of firm j, and $TreatTS$ is a dummy variable that takes a value of one for new firms incorporated in province j awarded with the top prize in any of the two previous years, and zero for new firms incorporated in province j awarded with the top prize in any of the two following years. By including province fixed effects δ_i, we control for unobserved province heterogeneity by performing a within-province analysis. Thus, we compare firms created in the same province before and after the lottery prize. The size of the sample is small, since only firms in provinces awarded with the lottery in the previous two years or in the following two years are included. We interact the variable $TreatTS$ with a dummy for the tradable sector, which allows to capture heterogeneous effects of the lottery in the tradable versus non-tradable sectors.

The firm characteristics that we study are firm size (proxied by total assets), sales growth, employment growth, capital-to-assets ratio, and the Z-Score as a proxy for the probability of

default.[7] Table 15, Panel A, presents the estimates for the first year of life. We find that firms created after the lottery prize have a lower capital-to-assets ratio, lower sales growth and higher risk. In contrast, firms created after the lottery prize in the tradable sector have higher capital-to-assets and lower risk. Thus, firms that are not as dependent on local demand tend to use more capital as a financing source. This result suggests that the lottery prize helps to alleviate financial constraints and provide capital to start a business. In addition, these firms exhibit lower risk, which indicates that entrepreneurs who receive the lottery prize and initiate a business are those with safer projects.

We conduct the same analysis for firms in their fourth year of life. Table 15, Panel B, presents the estimates. Again, we compare firms incorporated in provinces awarded with the top prize in any of the two previous years, to firms incorporated in provinces awarded with the top prize in any of the two following years. However, we now examine these firms four years after incorporation. Obviously, there is attrition in our existing sample, since many firms go bankrupt during these four years. We find that firms created by the lottery, in the long run, are on average larger, have higher employment growth but lower sales growth, and have higher capital-to-assets ratio.

We also analyze the impact of the lottery income shock on firm survival. We use equation (3) and perform a within-province analysis in which the number of years a firm lives is the dependent variable. Table 16 shows that firms created in provinces awarded with the lottery prize in any of the two previous years survive longer. In particular, firms in the tradable sector exhibit a significantly longer life. We conclude that firms that are created not a consequence of the local demand shock but of a reduction of financial constraints (i.e., firms in the tradable sector) are of higher "quality" and survive longer. These are firms that were not created before the lottery due to financial constraints.

[7] We measure the Z-Score as 0.717 × Working Capital/Assets + 3.107 × EBIT/Assets + 0.42 × Equity/Assets + 0.998 × Revenues/Assets.

4 Conclusion

Entrepreneurship is a key driver of economic growth and job creation. In this paper we exploit a randomized income shock – the Spanish Christmas lottery – to identify the causal effect of economic conditions and liquidity constraints on entrepreneurship. We show that winning provinces experience a differential effect on firm creation relative to nonwinning provinces. We find that firm creation is more pronounced in self-employment and small businesses, and is driven by firm entry, rather than a reduction in firm exit.

The driver of firm creation is not only the aggregate demand channel. We find evidence of a differential effect on firm creation in the tradable sector, which is less dependent on local demand. In addition, we find that the lottery prize effect is stronger in provinces with lower bank lending supply, and that firms created in tradable industries are more equity-financed and have higher survival rates. These findings are consistent with the financial constraints channel.

Our results suggest that the increase in entrepreneurial activity in response to local income shocks is driven by both a increase in investment opportunities and a reduction in individual financial constraints.

References

Adelino, Manuel, Antoinette Schoar, and Felipe Severino, 2015, House prices, collateral, and self-employment, *Journal of Financial Economics* 117, 288–306.

Ayyagari, Meghana, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2011, Small vs. young firms across the world: Contribution to employment, job creation, and growth, Policy Research Working Paper Series 5631 The World Bank.

Bagues, Manuel, and Berta Esteve-Volart, 2016, Politicians' luck of the draw: Evidence from the spanish christmas lottery, *Journal of Political Economy* 124, 1269 – 1294.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic, 2005, Financial and Legal Constraints to Growth: Does Firm Size Matter?, *Journal of Finance* 60, 137–177.

Cesarini, David, Erik Lindqvist, Matthew J. Notowidigdo, and Robert Ostling, 2017, The Effect of Wealth on Individual and Household Labor Supply: Evidence from Swedish Lotteries, *American Economic Review* 107, 3917–3946.

Evans, David, and Boyan Jovanovic, 1989, An estimated model of entrepreneurial choice under liquidity constraints, *Journal of Political Economy* 97, 808–827.

Evans, David, and Linda S Leighton, 1989, Some empirical aspects of entrepreneurship, *American Economic Review* 79, 519–35.

Haltiwanger, John, Ron Jarmin, and Javier Miranda, 2013, Who creates jobs? small versus large versus young, *The Review of Economics and Statistics* 95, 347–361.

Hankins, Scott, Mark Hoekstra, and Paige Marta Skiba, 2011, The Ticket to Easy Street? The Financial Consequences of Winning the Lottery, *The Review of Economics and Statistics* 93, 961–969.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey Rosen, 1994, Sticking it out: Entrepreneurial survival and liquidity constraints, *Journal of Political Economy* 102, 53–75.

Hurst, Erik, and Annamaria Lusardi, 2004, Liquidity constraints, household wealth, and entrepreneurship, *Journal of Political Economy* 112, 319–347.

Imbens, Guido W., Donald B. Rubin, and Bruce I. Sacerdote, 2001, Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players, *American Economic Review* 91, 778–794.

Koellinger, Philipp, and Roy Thurik, 2012, Entrepreneurship and the business cycle, *The Review of Economics and Statistics* 94, 1143–1156.

Kuhn, Peter, Peter Kooreman, Adriaan Soetevent, and Arie Kapteyn, 2011, The Effects of Lottery Prizes on Winners and Their Neighbors: Evidence from the Dutch Postcode Lottery, *American Economic Review* 101, 2226–2247.

Mian, Atif, and Amir Sufi, 2014, What Explains the 2007–2009 Drop in Employment?, *Econometrica* 82, 2197–2223.

Schmalz, Martin C., David A. Sraer, and David Thesmar, 2017, Housing Collateral and Entrepreneurship, *Journal of Finance* 72, 99–132.

Figure 1: Average Lottery Expenditure by Province

This figures shows the average lottery expenditure per capita in euros by province in the 1993-2015 period.

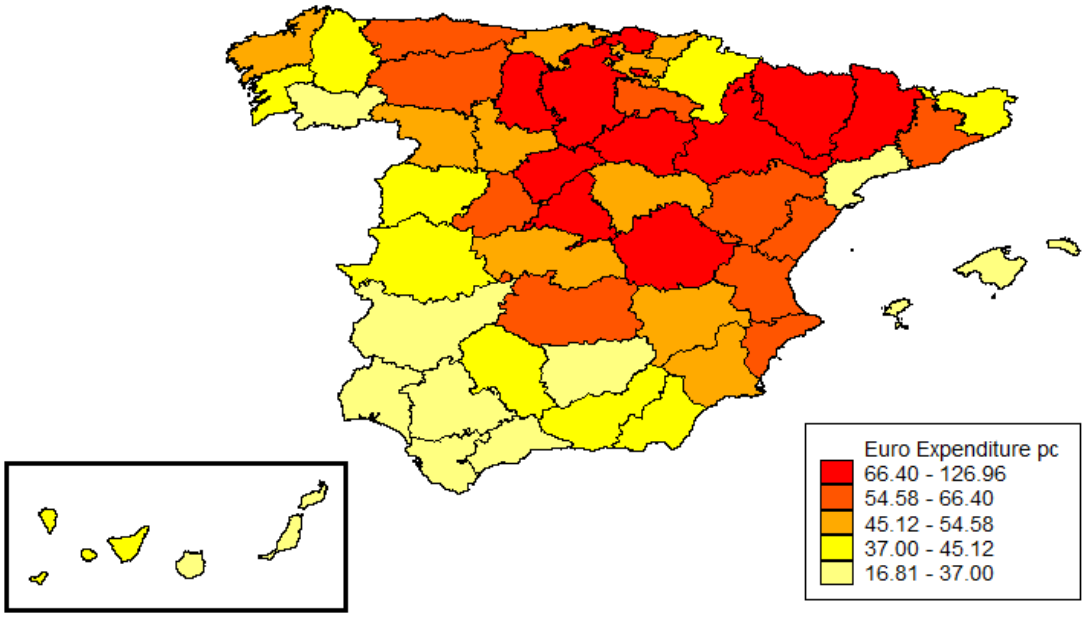

Figure 2: Average Lottery Prize by Province

This figures shows the average lottery top three prizes per capita in euros by province in the 1993-2015 period.

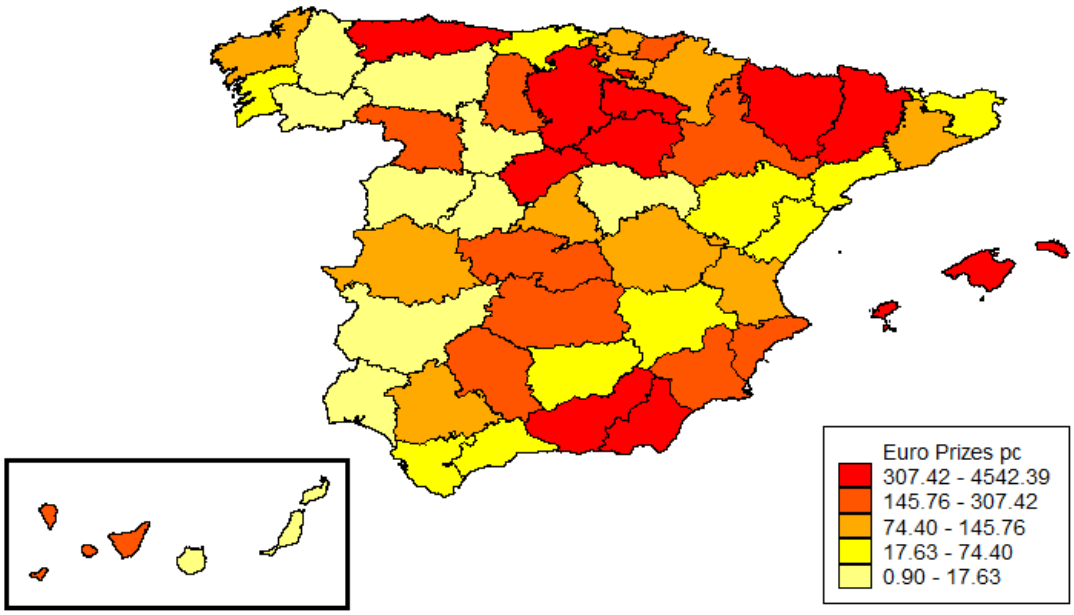

Figure 3: Average Net Firm Creation Around a Lottery Prize

This figure shows point estimates and 95% confidence intervals of the effect on the net entry rate of winning provinces relative to nonwinning provinces. The regression includes province and year fixed effects. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period.

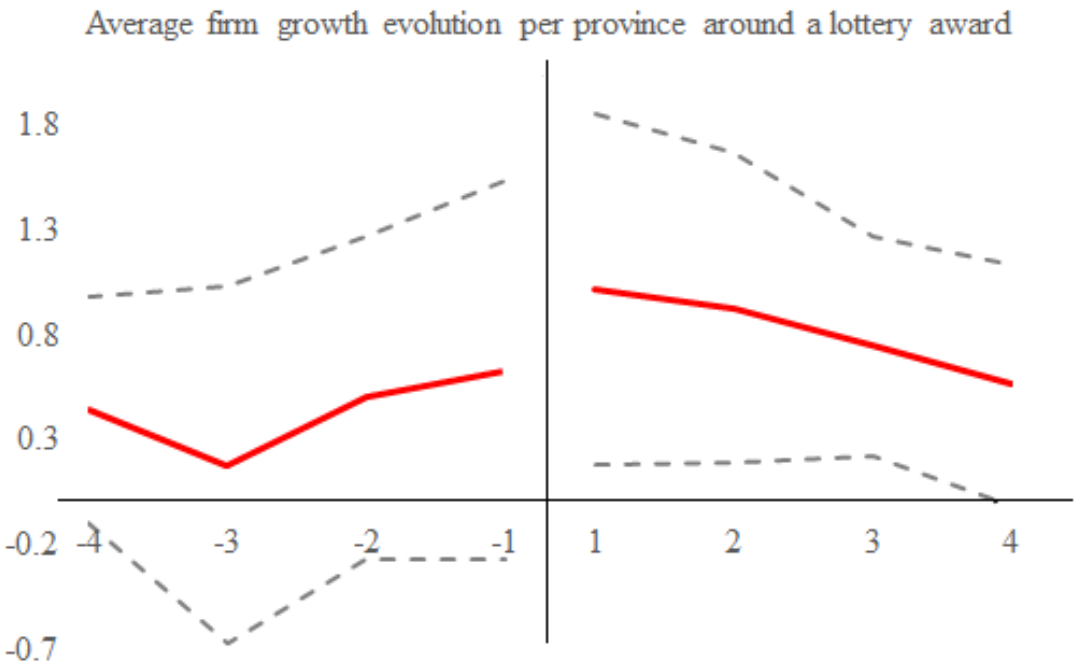

Table 1: Summary Statistics of Lottery and Macroeconomic Variables

This table shows mean, standard deviation, 25th-percentile, median and 75th-percentile of lottery and macroeconomic variables. All monetary variables are in constant 2010 euros.

	Mean	Standard Deviation	25%	Median	75%
Panel A: Lottery					
Expenditure per capita	57.03	27.98	40.33	52.71	67.98
Top Prizes per capita	20.69	182.64	0.00	0.00	0.75
Number of Tickets Awarded	91.13	346.22	0.00	0.00	10.00
Expenditure/GDP (%)	0.28	0.11	0.20	0.27	0.34
Top Prizes/GDP (%)	0.14	0.97	0.00	0.00	0.01
Number of Tickets Awarded/GDP (%)	0.03	0.20	0.00	0.00	0.00
Panel B: Lottery in Provinces with Maximum Prizes per capita					
Expenditure per capita	75.37	40.90	47.10	63.01	94.43
Top Prizes per capita	722.63	1,077.94	160.07	354.40	634.87
Number of Tickets Awarded	1,494.00	817.93	1,070.00	1,450.00	1,820.00
Expenditure/GDP (%)	0.34	0.16	0.23	0.31	0.40
Top Prizes/GDP (%)	4.14	5.05	1.11	2.05	4.69
Number of Tickets Awarded/GDP (%)	0.77	0.92	0.18	0.24	1.07
Prize per Ticket (thousand)	209.52	98.92	117.41	233.65	273.41
Panel C: Macroeconomic Variables					
Population (thousand)	864.23	1051.16	349.55	568.57	978.13
Inflation Rate (%)	2.68	1.76	1.73	2.95	3.78
Labor Force Participation (%)	54.08	5.57	50.13	54.25	58.22
Unemployment Rate (%)	16.95	8.06	10.44	15.80	22.00
Housing Price (euros/m2)	1,212.93	574.83	761.77	1,108.03	1,526.64
Outstanding Loans per capita (thousand)	18.36	9.84	10.14	16.50	24.72
GDP per capita (thousand)	19.48	4.85	15.93	18.72	22.52

Table 2: Summary Statistics of Number of Firms by Province and Sector

This table shows mean, standard deviation, 25%-percentile, median and 75%-percentile of the number of firms. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period.

	Mean	Standard Deviation	25%	Median	75%
Panel A: Number of Firms by Province					
Number of Firms and Self-Employment	61,422	86,165	22,466	37,664	65,668
Public Liability Companies	2,251	5,327	470	959	1,830
Limited Liability Companies	24,857	38,871	7,987	14,370	25,231
Self-Employment	34,156	43,020	13,456	22,497	3,7357
Government-Owned Firms	159	196	64	105	174
Firms < 10 Employees	58,109	81,101	21,526	35,605	62,010
Firms $10 - 50$ Employees	2,807	4,192	885	1,603	2,978
Firms > 50 Employees	506	977	107	243	508
Panel B: Number of Firms by Sector					
Total Number of Firms	16,215	27,049	4,069	8,242	16,389
Construction	3,346	4,893	846	1,783	3,753
Retail	1,403	1,972	410	823	1,562
Accommodation and Food	860	1,260	209	449	964
Financial	306	805	43	104	224
Manufacturing	1,827	2,708	567	1,037	1,894

Table 3: Average Firm Characteristics and Macroeconomic Variables of Winning and Nonwinning Provinces

This table shows average firm characteristics and macroeconomic variables of winning and nonwinning provinces in the year before the lottery award. Differences between the groups are also shown. The sample consists of firms available from the Amadeus/Sabi databases in the 1993-2015 period. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

Panel A: Firm Characteristics									
	All Firms			Tradable Sector			Non-Tradable Sector		
	Nonwinning	Winning	Difference	Nonwinning	Winning	Difference	Nonwinning	Winning	Difference
Assets	11.176	11.269	-0.092	11.419	11.536	-0.118	11.014	11.062	-0.048
Sales Growth $(t, t+4)$	172.072	82.044	90.028	806.298	39.968	766.331	91.490	9.491	81.999
Employment Growth $(t, t+4)$	2.164	1.625	0.538	2.574	2.587	-0.013	1.353	1.248	0.105
Capital-to-Assets	0.341	0.334	0.007	0.335	0.300	0.035	0.258	0.236	0.022
Z-Score	1.662	1.546	0.116	1.479	1.823	-0.344	1.830	1.138	0.691

Panel B: Macroeconomic Conditions			
	No lottery	Lottery	Difference
ΔGDP per capita	1.514	2.156	-0.643
ΔInflation	-23.937	-19.488	-4.448
ΔUnemployment	4.754	2.823	1.931
ΔHouse Prices	2.990	2.783	0.207
ΔPopulation	0.469	0.435	0.034

Table 4: The Effect of Lottery Prizes on Firm Creation

This table presents estimates of regressions of the growth rate of the number of firms between year $t-1$ and $t+1$ (net entry rate). In columns (1)-(5), *Prize* is a dummy variable that takes a value of one if any of the top three prizes was awarded to a given province in year t, and zero otherwise. In column (6), *TopPrize*, *MidPrize* and *BottomPrize* are dummy variables that take a value of one if a province is in the top tercile, middle tercile or lower tercile of prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the INE database in the 2000-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Prize	0.762**	0.669**	0.673**	0.632**	0.677**	
	(2.51)	(2.18)	(2.11)	(2.31)	(2.08)	
TopPrize						0.488**
						(2.01)
MidPrize						0.766
						(1.45)
BottomPrize						0.724
						(1.05)
Expenditure	-10.415**	-6.506**	25.181	-8.422	24.227	-6.207**
	(-2.02)	(-2.10)	(1.55)	(-1.30)	(0.67)	(-2.22)
ΔGDP pc		0.077	0.052	0.084	0.052	0.078
		(1.50)	(1.07)	(1.10)	(1.07)	(1.50)
ΔInflation		-0.045***	-0.013	-0.046**	-0.014	-0.046***
		(-2.90)	(-1.49)	(-2.56)	(-1.40)	(-3.01)
ΔUnemployment		-0.013	-0.011	-0.012	-0.011	-0.013
		(-1.17)	(-0.90)	(-1.13)	(-0.86)	(-1.18)
ΔHouse Prices		0.050***	0.043**	0.039**	0.044**	0.049***
		(3.91)	(2.44)	(2.16)	(2.53)	(4.04)
ΔPopulation		0.999***	0.688***	0.922***	0.691***	1.004***
		(6.31)	(3.13)	(5.27)	(2.99)	(6.34)
Province FE	N	N	Y	N	Y	N
Year FE	Y	Y	Y	Y	Y	Y
Population Weights	N	N	N	Y	N	N
Sample	All	All	All	All	Ex. Madrid & Lleida	All
Observations	800	800	800	800	768	800
Adjusted R-square	0.511	0.542	0.583	0.659	0.571	0.542

Table 5: The Effect of Lottery Prizes on Firm Entry and Exit

This table presents estimates of regressions of the firm entry rate, exit rate and net entry rate between year t and $t+1$. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Entry	(2) Exit	(3) Net Entry	(4) Entry	(5) Exit	(6) Net Entry
MaxPrize	0.683***	-0.110	0.794***	0.694***	-0.096	0.790***
	(3.48)	(-0.77)	(3.71)	(3.44)	(-0.71)	(3.57)
Expenditure	3.174	-6.684	9.858	0.505	-5.208	5.714
	(0.61)	(-1.38)	(1.35)	(0.10)	(-1.11)	(0.86)
ΔGDP pc				0.040**	-0.019	0.060***
				(2.31)	(-1.67)	(2.72)
ΔInflation				0.011	0.018***	-0.007
				(1.03)	(2.69)	(-0.83)
ΔUnemployment				-0.003*	-0.002**	-0.001
				(-1.68)	(-2.38)	(-0.64)
ΔHouse Prices				0.010*	0.001	0.009
				(1.69)	(0.14)	(1.14)
ΔPopulation				0.254***	-0.175***	0.429***
				(3.43)	(-3.30)	(4.75)
Province FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	1100	1100	1100	1100	1100	1100
Adjusted R-square	0.922	0.961	0.959	0.924	0.962	0.961

Table 6: The Effect of Lottery Prizes on Firm Entry and Exit: Continuous Variables

This table presents estimates of regressions of the firm entry rate, exit rate and growth rate of the number of firms (net entry) between year t and $t+1$. $TopPrizespercapita$ is the amount of top prizes per capita in each province (in euros thousands) in year t; and $NumberTicketsAwarded$ is the number of tickets awarded in each province (in thousands) in year t. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Entry	(2) Exit	(3) Net Entry	(4) Entry	(5) Exit	(6) Net Entry
Top Prizes per capita	0.235**	-0.089	0.324**			
	(2.10)	(-0.55)	(2.50)			
Number Tickets Awarded				0.282**	-0.058	0.340**
				(2.32)	(-0.67)	(2.14)
Expenditure	0.352	-5.223	5.575	0.689	-5.267	5.955
	(0.06)	(-1.11)	(0.83)	(0.13)	(-1.11)	(0.91)
ΔGDP pc	0.039**	-0.019	0.059**	0.040**	-0.019	0.059***
	(2.25)	(-1.66)	(2.66)	(2.28)	(-1.67)	(2.70)
ΔInflation	0.011	0.018***	-0.007	0.011	0.018**	-0.006
	(1.03)	(2.70)	(-0.89)	(1.26)	(2.68)	(-0.97)
ΔUnemployment	-0.003*	-0.002**	-0.001	-0.003	-0.002**	-0.001
	(-1.74)	(-2.31)	(-0.69)	(-1.61)	(-2.39)	(-0.55)
ΔHouse Prices	0.010*	0.001	0.009	0.010*	0.001	0.009
	(1.71)	(0.14)	(1.15)	(1.70)	(0.14)	(1.15)
ΔPopulation	0.254***	-0.175***	0.430***	0.253***	-0.175***	0.428***
	(3.38)	(-3.29)	(4.67)	(3.38)	(-3.30)	(4.70)
Province FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	1100	1100	1100	1100	1100	1100
Adjusted R-square	0.924	0.962	0.961	0.924	0.962	0.961

Table 7: The Dynamics of the Effect of Lottery Prizes on Firm Entry and Exit

This table presents estimates of regressions of the firm entry rate, exit rate and growth rate of the number of firms (net entry) between year t and $t+1$. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Entry	(2) Exit	(3) Net Entry	(4) Entry	(5) Exit	(6) Net Entry
MaxPrize_{t+2}	0.079	-0.159	0.238	0.066	-0.120	0.187
	(0.43)	(-0.63)	(0.66)	(0.38)	(-0.47)	(0.54)
MaxPrize_{t+1}	0.445	0.165	0.280	0.426	0.148	0.278
	(1.57)	(0.61)	(0.59)	(1.40)	(0.55)	(0.55)
MaxPrize_{t}	0.565***	-0.137	0.702**	0.554**	-0.105	0.659**
	(2.79)	(-0.65)	(2.33)	(2.64)	(-0.52)	(2.19)
MaxPrize_{t-1}	0.550**	-0.161	0.710**	0.586**	-0.165	0.751**
	(2.44)	(-0.88)	(2.07)	(2.50)	(-0.90)	(2.19)
MaxPrize_{t-2}	0.353	-0.462	0.815**	0.346	-0.424	0.771*
	(1.45)	(-1.58)	(2.08)	(1.39)	(-1.48)	(1.91)
MaxPrize_{t-3}	0.329	-0.140	0.468	0.307	-0.131	0.438
	(1.46)	(-0.57)	(1.20)	(1.43)	(-0.53)	(1.13)
MaxPrize_{t-4}	0.108	-0.025	0.134	0.118	-0.010	0.128
	(0.47)	(-0.11)	(0.39)	(0.54)	(-0.04)	(0.38)
Controls	N	N	N	Y	Y	Y
Province FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	948	948	948	948	948	948
Adjusted R-square	0.936	0.961	0.966	0.938	0.962	0.967

Table 8: The Effect of Lottery Prizes on Firm Entry by Sector

This table presents estimates of regressions of the firm entry rate between year t and $t+1$. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Excluding Construction	(2) Excluding Construction & Retail	(3) Excluding Construction & Non-Tradable	(4) Tradable	(5) Manufacturing
MaxPrize_{t+1}	0.172	0.204	0.128	-0.002	0.087
	(0.65)	(0.72)	(0.38)	(-0.01)	(0.30)
MaxPrize_{t}	0.637***	0.593**	0.528*	0.573*	0.525**
	(2.77)	(2.64)	(1.96)	(1.79)	(2.06)
MaxPrize_{t-1}	0.534***	0.479***	0.460***	0.110	0.517
	(3.21)	(3.17)	(2.71)	(0.36)	(1.49)
Controls	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	1100	1100	1100	1100	1100
Adjusted R-square	0.932	0.929	0.919	0.874	0.864

Table 9: The Effect of Lottery Prizes on Firm Entry and Exit: The Role of Bank Loan Supply

This table presents estimates of regressions of the firm entry rate, exit rate and net entry rate between year t and $t+1$. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. In columns (1)-(3) the group of low bank loan supply consists of provinces with below-median bank loans per capita. In columns (4)-(6) the group of high bank loan supply consists of provinces with above-median bank loans per capita. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	Low Bank Loan Supply			High Bank Loan Supply		
	(1) Entry	(2) Exit	(3) Net Entry	(4) Entry	(5) Exit	(6) Net Entry
MaxPrize	1.068***	-0.087	1.155***	0.338**	-0.130	0.468*
	(3.01)	(-0.56)	(2.81)	(2.07)	(-0.68)	(1.90)
Expenditure	12.430	-6.773	19.202*	-3.070	-2.432	-0.638
	(1.37)	(-1.56)	(1.87)	(-0.67)	(-0.73)	(-0.13)
ΔGDP pc	0.048*	-0.013	0.061*	0.031	-0.024*	0.055*
	(1.88)	(-0.67)	(1.75)	(0.93)	(-1.83)	(1.73)
ΔInflation	-0.015	-0.010	-0.005	0.017***	0.019**	-0.002
	(-0.10)	(-0.09)	(-0.03)	(5.12)	(2.35)	(-0.23)
ΔUnemployment	-0.001	-0.001	-0.000	-0.004*	-0.003	-0.001
	(-0.51)	(-0.93)	(-0.14)	(-1.72)	(-1.61)	(-0.19)
ΔHouse Prices	0.017**	-0.005	0.023**	0.023**	0.002	0.021
	(2.47)	(-0.76)	(2.67)	(2.18)	(0.23)	(1.36)
ΔPopulation	0.077	-0.155*	0.232	0.176**	-0.217**	0.393***
	(0.54)	(-1.81)	(1.56)	(2.34)	(-2.28)	(3.15)
Province FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	550	550	550	528	528	528
Adjusted R-square	0.934	0.963	0.963	0.937	0.965	0.966

Table 10: The Effect of Lottery Prizes on Macroeconomic Indicators

This table presents estimates of regressions of GDP per capita, bank loans per capita, unemployment rate and the amount of transfers per capita at the province level. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

Dependent Variable: GDP per capita	t	$t+1$	$t+2$	$t+3$
MaxPrize	-0.064	-0.224	-0.259	0.171
	(-0.69)	(-1.11)	(-0.94)	(1.39)
Expenditure	2.421**	2.534**	4.973**	7.126*
	(2.18)	(2.23)	(2.11)	(2.01)
Year FE	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y
Observations	1100	1100	1050	1000
Adjusted R-square	0.671	0.673	0.750	0.785
Dependent Variable: Bank Loans	t	$t+1$	$t+2$	$t+3$
MaxPrize	-0.201*	0.525	1.153	1.626
	(-1.90)	(1.30)	(1.50)	(1.60)
Expenditure	4.536**	4.161*	7.883*	11.889
	(2.02)	(1.84)	(1.70)	(1.61)
Year FE	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y
Observations	1174	1174	1125	1076
Adjusted R-square	0.821	0.821	0.874	0.894
Dependent Variable: Unemployment	t	$t+1$	$t+2$	$t+3$
MaxPrize	-0.376	-0.115	-0.316	-1.167*
	(-0.95)	(-0.28)	(-0.68)	(-2.00)
Expenditure	0.321	0.565	1.118	0.140
	(0.27)	(0.51)	(0.51)	(0.04)
Year FE	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y
Observations	1198	1198	1148	1098
Adjusted R-square	0.634	0.632	0.776	0.821
Dependent Variable: Transfers	t	$t+1$	$t+2$	$t+3$
MaxPrize	-0.022	0.195***	-0.010	0.010
	(-0.77)	(4.02)	(-0.72)	(0.35)
Lottery Expenditure	-0.053	-0.260**	-0.142	-0.208
	(-0.64)	(-2.55)	(-1.28)	(-1.31)
Year FE	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y
Observations	750	750	700	650
Adjusted R-square	0.176	0.248	0.355	0.422

Table 11: The Dynamics of the Effect of Lottery Prizes on Macroeconomic Indicators

This table presents estimates of regressions of GDP per capita and unemployment rate at the province level. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The group of low openness ratio consists of provinces in the bottom quartile of economic openness as proxied by trade-to-GDP ratio. The group of high openness ratio consists of provinces in the top quartile of economic openness as proxied by trade-to-GDP ratio. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	Low Openness Ratio				High Openness Ratio			
Dependent Variable: GDP per capita	t	$t+1$	$t+2$	$t+3$	t	$t+1$	$t+2$	$t+3$
MaxPrize	0.037	0.373	0.635	0.980	-0.422	-0.057	-0.034	0.078
	(0.43)	(1.08)	(1.07)	(1.66)	(-1.45)	(-0.56)	(-0.18)	(0.30)
Expenditure	1.905	2.336	4.650	6.481	2.988**	3.114*	2.244	2.035
	(1.02)	(1.15)	(1.42)	(1.30)	(2.16)	(1.75)	(0.91)	(0.63)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y	Y	Y	Y	Y
Observations	260	247	234	221	240	228	216	204
Adjusted R-square	0.609	0.583	0.718	0.783	0.761	0.758	0.834	0.858
	Low Openness Ratio				High Openness Ratio			
Dependent Variable: Unemployment	t	$t+1$	$t+2$	$t+3$	t	$t+1$	$t+2$	$t+3$
MaxPrize	1.384	-3.081**	-3.742**	-3.237	-0.401	0.477	0.262	0.853
	(0.51)	(-2.26)	(-2.71)	(-1.55)	(-0.79)	(0.53)	(0.41)	(0.88)
Expenditure	-1.483	-1.702	0.992	8.188	-11.461**	-4.787	-16.547**	-35.677***
	(-0.20)	(-0.24)	(0.10)	(0.63)	(-2.53)	(-1.25)	(-2.51)	(-4.11)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Population Weights	Y	Y	Y	Y	Y	Y	Y	Y
Observations	260	260	259	246	240	240	240	228
Adjusted R-square	0.599	0.578	0.752	0.806	0.699	0.714	0.857	0.899

Table 12: The Effect of Lottery Prizes on Firm Creation by Legal Status

This table presents estimates of regressions of the growth rate of the number of firms (net entry rate) between year $t-1$ and $t+1$. *Prize* is a dummy variable that takes a value of one if any of the top three prizes was awarded to a given province in year t, and zero otherwise. The sample consists of provinces available from the INE database in the 2000-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Self-Employment	(2) Public Limited Company	(3) Limited Liability Company	(4) Public Organisms
Prize	0.772**	0.340	0.576*	0.769
	(2.13)	(1.62)	(1.92)	(0.75)
Expenditure	3.932	5.885	48.501***	-56.678
	(0.17)	(0.80)	(2.83)	(-0.98)
ΔGDP pc	0.016	0.028	0.131**	0.278
	(0.27)	(0.78)	(2.66)	(1.62)
ΔInflation	-0.040**	-0.052*	0.016	-0.005
	(-2.45)	(-1.94)	(0.80)	(-0.05)
ΔUnemployment	-0.011	0.000	-0.010	0.045
	(-0.79)	(0.08)	(-1.18)	(1.51)
ΔHouse Prices	0.039**	0.013	0.057***	0.004
	(2.01)	(1.24)	(3.19)	(0.09)
Δ Population	0.535*	-0.210	0.739***	-0.082
	(1.93)	(-1.15)	(3.11)	(-0.11)
Year FE	Y	Y	Y	Y
Province FE	Y	Y	Y	Y
Observations	800	800	800	800
Adjusted R2	0.383	0.591	0.860	0.742

Table 13: The Effect of Lottery Prizes on Firm Creation by Number of Employees

This table presents estimates of regressions of the growth rate of the number of firms (net entry rate) between year $t-1$ and $t+1$. *Prize* is a dummy variable that takes a value of one if any of the top three prizes was awarded to a given province in year t, and zero otherwise. The sample consists of provinces available from the INE database in the 2000-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% or 1% level, respectively.

	(1) Less than 10	(2) Between 10 and 49	(3) 50 or more
Prize	0.679**	0.712*	-0.157
	(2.05)	(1.68)	(-0.20)
Expenditure	22.708	51.509	18.692
	(1.34)	(1.57)	(0.54)
ΔGDP pc	0.043	0.234***	0.175
	(0.84)	(3.30)	(1.42)
ΔInflation	-0.021**	0.100	0.204***
	(-2.30)	(1.66)	(2.83)
ΔUnemployment	-0.010	-0.012	-0.013
	(-0.84)	(-1.64)	(-0.75)
ΔHousing Price	0.044**	0.011	-0.026
	(2.42)	(0.55)	(-0.50)
ΔPopulation	0.741***	-0.204	-0.802
	(3.38)	(-0.54)	(-1.53)
Year FE	Y	Y	Y
Province FE	Y	Y	Y
Observations	800	800	800
Adjusted R2	0.536	0.870	0.733

Table 14: The Effect of Lottery Prizes on Bankruptcies

This table presents estimates of regressions of the number of bankruptcies by province in the following two years. $MaxPrize$ is a dummy variable that takes a value of one if a given province has the maximum prizes per capita in year t, and zero otherwise. The sample consists of provinces available from the Amadeus/Sabi databases in the 1993-2015 period. Robust t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 1%, 5% or 10% level, respectively.

	(1) All Firms	(2) Individuals	(3) Tradable Sector	(4) Non-Tradable Sector
MaxPrize	0.445	0.499	0.397	0.745**
	(1.26)	(1.10)	(0.99)	(2.02)
Expenditure	-2.720	-5.269*	-3.862	-8.254***
	(-1.22)	(-1.90)	(-1.67)	(-3.28)
ΔGDP pc	-0.014	0.006	-0.016	-0.017
	(-1.04)	(0.32)	(-0.96)	(-1.13)
ΔInflation	-0.023*	-0.035**	-0.016	-0.024
	(-1.84)	(-2.64)	(-0.95)	(-1.37)
ΔUnemployment	-0.001	-0.003***	-0.003**	-0.004***
	(-1.35)	(-2.75)	(-2.58)	(-3.02)
ΔHousing Price	-0.012***	-0.018***	-0.012***	-0.018***
	(-3.10)	(-4.11)	(-3.04)	(-4.76)
ΔPopulation	0.140*	0.246**	0.180	0.189
	(1.78)	(2.36)	(1.61)	(1.52)
Province FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	600	600	600	600
Adjusted R-square	0.418	0.524	0.330	0.473

Table 15: The Effect of Lottery Prizes on Firm Creation: Firm Outcomes

This table presents estimates of regressions of outcomes of newly created firms. Panel A shows outcomes of newly created firms in year t. Panel B shows outcomes of newly created firms in year $t+4$. Firm outcomes are assets (log), sales growth, employment growth, capital-to-assets ratio and Z-Score. $TreatTS$ is a dummy variable that takes a value of one for new firms incorporated in provinces awarded with the top prize in any of the two previous years, and zero for new firms incorporated in regions that will be awarded with the top prize in any of the the following two years. $Tradable$ is a dummy variable that takes a value of one for firms in the tradable sector. The sample consists of firms available from the Amadeus/Sabi databases in the 1993-2015 period. t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 1%, 5% or 10% level, respectively.

Panel A: Firm Outcomes in Year t					
	(1)	(2)	(3)	(4)	(5)
	Assets (log)	Sales Growth	Empl. Growth	Capital-to-Assets	Z-Score
TreatTS	0.065	-231.575***	0.057	-0.021***	0.080**
	(1.15)	(-3.66)	(1.29)	(-4.04)	(2.36)
TreatTS × Tradable	-0.146*	111.831	0.112	0.027*	-0.158***
	(-1.95)	(1.64)	(0.95)	(1.86)	(-3.15)
Expenditure	-3.054*	-1230.334	-0.619	0.884*	1.773
	(-2.01)	(-0.76)	(-0.78)	(2.01)	(0.35)
Tradable	0.009	-28.371	-0.092	-0.002	0.118
	(0.16)	(-0.72)	(-0.63)	(-0.15)	(0.92)
Controls	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	58672	34760	20793	58631	29177
Adjusted R-square	0.079	0.001	0.003	0.002	0.004

Panel B: Firm Outcomes in Year $t+4$					
	(1)	(2)	(3)	(4)	(5)
	Assets (log)	Sales Growth	Emp. Growth	Capital-to-Assets	Z-Score
TreatTS	0.048**	-217.449***	0.504***	0.031***	-0.010
	(2.20)	(-4.67)	(3.15)	(3.10)	(-0.69)
TreatTS × Tradable	-0.064	103.502*	-0.434	-0.023	-0.093
	(-0.71)	(1.75)	(-0.88)	(-0.88)	(-0.90)
Expenditure$_t$	1.035	2261.359**	-12.966	-2.114***	-0.977
	(1.24)	(2.65)	(-1.01)	(-7.16)	(-1.13)
Tradable	-0.060	-5.704	0.480	0.002	0.367***
	(-0.69)	(-0.13)	(0.93)	(0.05)	(2.91)
Controls	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	68081	17283	9965	68061	9965
Adjusted R-square	0.099	0.002	0.009	0.001	0.007

Table 16: The Effect of Lottery Prizes on Firm Survival

This table presents estimates of regressions of the number of years that a newly created firm survives. $TreatTS$ is a dummy variable that equals one for new firms incorporated in provinces awarded with the top prize in any of the two previous years, and zero for new firms incorporated in regions that will be awarded with the top prize in any of the the following two years. The sample consists of firms in their first year of life available from the Amadeus/Sabi databases in the 1993-2015 period. t-statistics clustered at the province level are shown in parentheses. *, **, and *** indicate statistical significance at the 1%, 5% or 10% level, respectively.

	(1) All Firms	(2) Tradable Sector	(3) Construction Sector	(4) Non-Tradable Sector
TreatTS	0.078***	0.263***	0.027	0.053
	(4.03)	(5.59)	(0.60)	(1.53)
Expenditure	-1.327**	-4.459**	-0.745	-0.229
	(-2.45)	(-2.27)	(-0.76)	(-0.22)
Controls	Y	Y	Y	Y
Province FE	Y	Y	Y	Y
Year FE	Y	N	N	N
Observations	159798	11151	47613	22956
Adjusted R-square	0.806	0.805	0.764	0.850