When a Town Wins the Lottery: Evidence from Spain

Christina Kent   Alejandro Martínez-Marquina *

October 6, 2022

Abstract

For over a century, Spain has conducted a national lottery which often results in the random allocation of large cash windfalls to one town. Leveraging data on lottery ticket expenditures, we match winning towns to non-winning towns with equal winning probability. Towns that won in recent decades experience higher consumption of durables and real estate appreciation. However, we find no signs of increased local activity as employment, businesses, and migration to the town all decrease. An analysis of a century of winners reveals stark and persistent population gains only for locations that won after the Civil War. Our results suggest a limited role for wealth transfers in spurring economic growth outside of large recessions.

JEL classifications: D12, J11, E30, N14, N34

Keywords: wealth shocks, demographic dynamics, local economy, cash transfers

*Martínez-Marquina: Marshall School of Business, University of Southern California, Los Angeles, CA 90089, (am04817@usc.edu). Kent: Mathematica (cakent@stanford.edu). We are thankful to Caroline Hoxby, Muriel Niederle, Ran Abramitzky, Raj Chetty, Luigi Pistaferri, Nicholas Bloom, Petra Persson, Rebecca Diamond, and numerous seminar participants for their invaluable comments and feedback. We also would like to thank Fernando Ramos, Roberto Garvía, Manuel Arellano, Jaume García, and Caterina Calsamiglia for sharing their vast knowledge of Spanish institutions and sources of data on Spanish towns, and Ana Pilar Montiel Rey for her outstanding research assistance. This research is supported by NSF grant DGE − 1147470, in addition to generous funding from The Europe Center at Stanford and the Shultz Foundation.

1. Introduction

Fiscal stimulus and wealth transfer programs are frequently used policy instruments, particularly in dire economic times. In recent years, in an effort to bolster economic performance, the US has implemented several stimulus packages. Often, these transfers are direct and permit recipients to spend the money at their discretion, for example, the tax rebates in 2003 (Shapiro and Slemrod, 2003) and 2009 (Shapiro and Slemrod, 2009), or direct stimulus checks sent during the recent Covid-19 pandemic.

Those who defend such policies argue that these transfers' positive effects on consumption and their fiscal multipliers justify their costs. However, there is the concern that relying too readily on such transfers might precipitate inflation and come short of the desired effects on economic growth. Addressing the effects of wealth transfers and how inflationary they are is empirically challenging as the timing and mobilization of such policies are rarely random and highly dependent on broader economic conditions.

In this paper, we leverage a natural experiment in Spain, a longstanding annual national lottery, where many inhabitants of randomly chosen towns receive approximately ten times their yearly income as a cash windfall overnight. This historical institution, which has been in place for more than a century, allows us to study whether large wealth transfers are inflationary, whether they cause an economic slowdown, or if, under some circumstances, they spur economic growth.

We exploit the largest lottery in the world, the Spanish Christmas Lottery, to study how wealth shocks impact local economies. In terms of its reward structure, the Spanish lottery is unique. Rather than awarding an individual winner the grand prize, as is customary in America, the prize is distributed to many people living in the same town. As a result of this particular prize structure, randomly selected towns in Spain experience wealth shocks each year. For example, in 2006, roughly 2000 residents in the small village of Almazán each won a cash windfall of ten times their yearly income. For our analysis, we define such towns as "winning towns" and match these winning towns to similar towns that never won but had the same probability of winning ex-ante. We then use a dynamic difference in difference design to estimate the lottery's causal effects on economic outcomes at the local level.

Three main features make the lottery an ideal case to study the impact of wealth transfers: the clustering of prizes to individuals living in the same town, the high level of participation (including risk-averse players), and the large prize size and number of winners each year. First, winners tend to live in the same town as it is traditional for friends, family, and neighbors to coordinate their lottery play by buying copies of the same number. Second, because people play the lottery as a cherished Christmas tradition, the lottery has an extremely high participation rate (75 percent of Spanish adults). The average lottery player is thus a reliable representation of the average Spanish adult, which limits selection bias. And third, because lottery participation is so high amongst the Spanish population, the lottery pot is quite sizeable and awards many enormous prizes, yielding thousands of winners yearly who receive wealth shocks up to 10 times their yearly income.

To evaluate the effects of the lottery, we construct a dataset on winning towns from newspaper reports and combine it with administrative data on town-level outcomes and lottery expenditures. From 1991 to 2016, we observe 288 unique winning towns. On average, 250 households in each town receive 3 to 24 times their yearly income in just one day.[1] The median cash windfall represents 2 percent of a town's GDP, with the maximum being 16 times a town's GDP. In our long-run analysis, we expand this dataset to include towns that won as far back as 1900 using newspaper historical archives. To the best of our knowledge, the Spanish lottery constitutes the only case where people from the same vicinity receive such pronounced and sudden wealth shocks on a sporadic basis.

We compare winning towns to non-winning towns that had the same probability of winning, based on lottery ticket sales and population, in a difference in difference design. We use a matching method to identify "control" towns with the same probability of winning but, by pure chance, did not win. While people in almost every Spanish town play the lottery, some towns might purchase lottery tickets more intensively than others. These differences in expenditures may correlate with economic growth outcomes and could potentially bias our estimates. For example, if rich locations purchase more lottery tickets. Hence, controlling for the ex-ante probability of winning is crucial for our analysis. Our matching strategy ensures that control towns are comparable to winning towns and have the same chance of winning, isolating the exogenous variation of the lottery randomization.

We find that winning towns in the last 30 years experienced boosts in demand for durable goods, land, and housing. One year following a win, people in winning towns tend to consume more: the total count of cars and trucks increases by 1 and 2 percent respectively, and lottery expenditures increase twofold. Similarly, we observe appreciation and more dynamism in the real estate market. Rural property values in winning towns go up by 13%, and home sales moderately increase two years after a

[1] Top prizes range between 50,000 and 400,000 euros per ticket.

win. The small magnitude of our estimates suggests a lower propensity to spend, in line with the literature on tax returns (Shapiro and Slemrod, 2003, 2009).

Despite its effects on demand and consumption, lottery shocks do not translate into economic growth. Instead, they appear to slow down economic activity and shrink the labor force. Following a lottery win, towns experience a 5% reduction in employment, lasting at least two years. In addition, we find no evidence of an increase in business activity; if anything, the number of firms decreases, although the estimates are noisier. These suggest strong income effects that push people out of the labor force, consistent with previous evidence from the literature (Imbens et al., 2001; Cesarini et al., 2017).

The economic slowdown and upward pressure on real estate prices ultimately affect non-winners. Migrant flows towards winning towns drop by 8%, suggesting that winning locations become less attractive to newcomers, which further reduces the labor force. Concerning people moving out, we find no evidence of changes in the migrant outflow, as winners do not seem to be using their newly found wealth to relocate to more prosperous locations. Altogether, sizable wealth shocks cause price pressure and seem detrimental to economic and population growth.

In our long-run analysis, where we observe more than a century of lottery winners, we find a distinct historical period when the lottery effects reverse and spur local growth: the two decades after the Spanish Civil war. We argue that this is not a coincidence and is a direct consequence of the lottery earnings mitigating the severe economic recession of the conflict and preventing a population exodus towards the main cities. During this time, winning towns maintained similar population growth as in the pre-war period. In contrast, control locations experienced a rapid and sharp decline in population right after the end of the conflict. Population differences persisted for decades, with winning towns having a population 20 percent higher 20 years later. A gap that exacerbates over time, reaching 31 percent 60 years after. In this context, wealth transfers seem to have set winning towns on a different path of growth, diverging from similar locations that were not as lucky.

Our work makes two key contributions to the literature. First, we analyze the impact of a large, one-time, unconditional cash transfer in a developed country, which allows us to study the general equilibrium effects in local economies. [2] The fact that we detect a slowdown in economic activity and negative spill-overs to non-recipients

[2]Previous work has studied cash transfers derived from the extraction of natural resources.For example, oil discoveries (Arezki et al., 2017), natural gas shale Cookson et al. (2020); Bellon et al. (2021), and dividends from the Alaska Permanent Fund (Jones and Marinescu, 2018).

suggests that previous findings in developing contexts might not extrapolate to developed economies. Egger et al. (2019) uses an RCT to study the effects of cash transfers to poor citizens of small towns in Kenya and find a large impact on consumption, positive spillovers on non-recipients, and minimal price inflation. Angelucci and De Giorgi (2009) study the effect of cash transfers on low-income families in Mexico and find that non-recipient families enjoy easier access to credit. In contrast, studies of lottery winners in developed economies like the US (Imbens et al., 2001) and Sweden Cesarini et al. (2017) find negative effects on earned income, in line with our findings on employment and business activity. Most closely related to our work is Hausman (2016), who finds a large spending multiplier and increase in car and home purchases as a response to a bonus targeted to US veterans in 1936.

Our second contribution relates to our long-run analysis, where we show how wealth shocks have a significant and permanent positive impact on growth in a period of great economic distress. This result suggests that a temporary shock prevented winning locations from moving to a new declining steady state, a finding relatively uncommon and different from previous works in the literature indicating strong path dependence for development (Redding et al., 2011; Bleakley and Lin, 2012). Most of the empirical work focuses on non-cash shocks, such as oil discoveries (Arezki et al., 2017), wartime bombs (Davis and Weinstein, 2002), or natural disasters (Boustan et al., 2017), and has found moderate impacts on economic growth that often decrease over time. Another related work is (Ager et al., 2019), where they focus on the long-term consequences of the negative wealth shock from the nullification of slave wealth in 1861 and find wealth convergence for the sons of previous slave owners. However, in this case, and others cited above, cities or sub-populations were not exogenously selected for these wealth shocks.

Consistent with previous findings on individual lottery winners' private consumption and investment decisions, our analysis contributes further to the spillover effects that arise when wealth increases for a plurality of people in a community. Previous literature on individual lottery winners has documented how individuals consume more (Kueng, 2018; Fagereng et al., 2019) and work less (Imbens et al., 2001). They also invest more (Briggs et al., 2015; Furaker and Hedenus, 2009) and are more likely to become self-employed (Cespedes et al., 2021). Individual lottery winners can also have spillover effects on neighbors, causing neighbors to increase their consumption despite not winning a prize themselves (Kuhn et al., 2011). While one jackpot winner may work less, they are unlikely to impact population dynamics, migration flows, and property values in their surrounding area. Only a wealth shock to many individuals living in the same location could have this effect.

With respect to previous research on the Spanish lottery (Bagues and Esteve-Volart, 2016; Bermejo et al., 2020), our analysis differs in that it focuses on town-level shocks and estimates both short and long-run effects. Bagues and Esteve-Volart (2016) study the impacts of the Christmas Lottery at the province-level elections and find no major effects on provinces' economic outcomes. In contrast, evidence shows an increase in the number of firms. However, a province often contains one winning town among many non-winners, in addition to including large capital cities that may dominate effects in smaller towns. Our new data on lottery winnings at the town level allows us to zero in on the precise location where the lottery was won, giving us much greater power to estimate the lottery's impact and to follow up decades later for more than a century of winners.

From a policy perspective, and with the caveat of the uniqueness of the Spanish context and its noticeable differences in magnitude and outreach, our results suggest that unconditional cash transfers, like universal basic income or tax rebates, risk causing higher pressure on prices and shrinking the labor force. Severe and temporary recessions might be the exception, like the recent Covid-19 pandemic, where many countries have implemented generous stimulus programs. Our long-run evidence suggests that wealth transfers in dire times like this might effectively prevent temporary shocks from becoming chronic, as recent evidence indicates (Kim and Lee, 2021).

The remainder of the paper proceeds as follows: In section 2, we explain the Spanish lottery and discuss why it is an ideal setting for evaluating wealth shocks. In section 3, we describe how we constructed the data on lottery winnings and the different sources for local economic outcomes. Then in section 4, we present our main results from our main matched difference in difference specification. Section 5 shows that our results are robust to various tests and alternative analyses, and section 6 investigates how the effect of the lottery changes based on the size of the prize. Section 7 focuses on the long-term effects of the lottery and their persistence, and section 8 concludes.

2. Setting

The Christmas Lottery is a cherished, centuries-old tradition that draws broad participation from the Spanish population. Three distinct features of the lottery make it an ideal test case for isolating the effects of wealth transfers: the high level of participation (including risk-averse players), the clustering of prizes to individuals living in the same town, and the large size and quantity of prizes. These combined features mean that large, random, and correlated wealth shocks can be identified in selected towns each year.

2.1. The Spanish Christmas Lottery: The Spanish Christmas Lottery is the largest lottery in the world and is run by the Spanish government. When the Spanish Christmas Lottery was first established in 1812, it was similar to many other lotteries at the time. However, particular events over many years shaped the lottery into a unique institution.

Lottery play in Spain began with King Charles III, who established the first lottery in 1763 during the second half of the XVIII century, following the design of lotteries being played in Naples.[3] In 1812, during Spain's fight for independence against France, the government was relocated to the city of Cadiz in southern Spain. The need for funds to defray the conflict led one of the Spanish ministers to propose a new lottery system as *"a way to increase revenue for the public treasury without ruining the taxpayers"*(Altabella and Cirugeda, 1962).[4] The new system introduced a lottery with a limited amount of numbered tickets, with each number divided into smaller shares called *"décimos"*, each entitled to a fixed fraction of the prize if their ticket number was drawn.

This lottery proved very popular and soon expanded to the entire country as the Spanish army pushed back French troops. Within five years of the lottery's creation, the number of lottery ticket vendors had already increased to almost five hundred across Spain. Nonetheless, the huge popularity of the new lottery was not free of controversy. In 1862, as concerns about gambling addiction arose, the Spanish Parliament voted on a motion to dissolve the lottery entirely (Altabella and Cirugeda, 1962). The motion failed, and the government did not abolish it. However, they dramatically increased the cost of tickets to deter gambling among the poor. Rather than decrease participation, the effect was quite the opposite: members of the working class began pooling their money to purchase lottery tickets. This particular pattern of playing, known as *syndicate play*, helped to convert the lottery from an individual game mainly played by a few gamblers into a widespread social tradition played by most Spanish adults.[5]

[3] Altabella and Cirugeda (1962) provides an excellent and more detailed description of the origins of the lottery.

[4] Quote by the minister of the Council and Chamber of Indias Don Ciriaco González Carvajal.

[5] See Bagues and Esteve-Volart (2016) for a summary of the main features of the lottery and Garvía (2007) for further detail on syndicate play in Spain.

Since its inception, the Spanish lottery system has featured several small lotteries spread throughout the year. However, the one celebrated annually at the beginning of Christmas was by far the most popular. It was not until 1892 when this lottery became known as the "Christmas Lottery" or as it is commonly known, *"El Gordo"*(The Fatty).[6] In 1941, a slightly smaller lottery, known as *"El Niño"* (The Boy), was launched at the end of the Christmas holiday season. Since then, it has been a longstanding holiday tradition for Spaniards to participate in both lotteries every Christmas holiday, with a participation rate of 75.9 percent of the Spanish adults according to survey data in Gómez Yáñez et al. (2018). Throughout this paper, we use the term "the lottery" to refer to both of the Christmas lotteries.

The culmination of all of these events has led to the Christmas Lottery as it is today: the largest lottery worldwide in terms of expenditures and an important holiday tradition in Spain. Every year millions of viewers tune in to see the drawing of the lottery numbers on live television, and reporters flock to winning towns to interview the lucky winners.

2.2. Clustering of prizes in the same town: It is tradition in Spain for family and friends to play the same lottery number so that if their number is selected, they can all celebrate together. As a consequence, when a given number is drawn, the winners tend to be geographically concentrated.

This setting differs from other lotteries in which one person usually holds a unique ticket number and wins the entire jackpot if that number is drawn. As mentioned above, the Spanish lottery design supports syndicate play. Each of the 100,000 lottery numbers, ranging from 00000 to 99999, has a fixed amount of tickets of that number, and each ticket is entitled to a fixed prize amount if their number is drawn. For example, in 2006, the grand prize for each of the 1,500 winning tickets was 300,000 euros, for a total combined prize of 450 million euros. Each ticket-holder enjoyed a cash windfall of approximately ten times the Spanish per capita income. Because the expected prize value is fixed for each ticket, this allows friends and family to play the same number without competing with one another.

Because copies of each number are limited, the government has developed a system to allocate tickets to the vendors.[7] Players often opt to buy the same number as their social network. Because of this, the government allocates only a subset of possible

[6] December 21st, 2014, Levante-EMV *Europa Press*. Valencia: Editor *Prensa Ibérica*.

[7] The government tightly controls ticket vendors, and the vendor network expands gradually over time as the government releases new licenses.

numbers to each lottery vendor and gives them many copies of each number.[8] For example, a vendor in Madrid might get all tickets of the number 15487, and anyone who wishes to buy that number would have to visit this particular vendor. Recently, the government has introduced the option to buy tickets online. Nonetheless, online sales are not very popular and represented less than 3% of total ticket sales in 2017 (Gómez Yáñez et al., 2018). Thus by construction, many tickets of the winning number end up in the same location, which leads to geographically-clustered winners.

2.3. High lottery participation: Since people like to play the Christmas lottery together, there is strong social pressure to play, which drives a high participation rate among Spanish adults. Unlike other lotteries, which often attract a very selected sample of players, the average lottery player in Spain is very similar to the average Spaniard. Lottery players are equally split across men and women and distributed across social classes in Spain(Gómez Yáñez et al., 2018). The main differences between Spanish lottery players and the general population are that adults under the age of 35 and immigrants are less likely to play.

2.4. Many large prizes each year: Because the participation rate is so high, the lottery pays out many large prizes each year, up to ten times per capita income to over one thousand people for the grand prize. For example, in the town of Almazán in 2006, around 20% of the total population received a share of the main prize. We even have cases of small towns where almost everyone wins and gets reported in the New York Times. [9]

In some years, we have multiple winning towns instead of just one. The reason for this is that in addition to the main prize, *El Gordo* has two large runner-up prizes, and *El Niño* also has one large runner-up prize. Therefore, several towns could experience these large wealth shocks in any given year. Also, tickets of the same number are often split across towns; for example, when lottery vendors from two towns both request the same specific number.[10] This results in a smaller prize per town but a larger number of winning towns in these years, giving us several "treated" towns to study and variation in the prize side.

[8]Some communities have been purchasing the same number over many years, and the government attempts to accommodate this when distributing tickets.

[9]https://www.nytimes.com/2012/02/01/world/europe/tiny-village-of-sodeto-wins-big-in-spains-lottery.html

[10]Some numbers tend to be in higher demand for idiosyncratic reasons, for example numbers that end in 13 or numbers that are similar to calendar dates.

The unique setting of the lottery gives us an ideal natural experiment to study the causal effects of wealth on local economic activity. The following section describes how we collect data on lottery wins and town-level outcomes.

3. Data and Sample Selection

Studying the effects of the lottery requires prize and outcome data on winning towns over time. We collect data from newspaper reports to identify 288 winning towns across Spain over the past three decades and combine this with several administrative datasets on town-level economic outcomes.

3.1. Lottery Data: *Lottery wins.* We use newspaper reports to identify winning towns and the amount of prizes awarded. For each prize, newspapers record in which town or towns the winning tickets were sold, the number of winning tickets sold, and whether the winners live in that town or a nearby town.[11] We cross-validate our data by comparing reports from four major newspapers in Spain. From 1991 to 2016, we observe 288 unique winning towns with top lottery prizes ranging between 50,000 and 400,000 euros per ticket and an average of 250 winning tickets per winning town. Using newspapers rather than official sources is essential as it is quite common, especially for people from small towns, to travel to other towns or even capitals such as Madrid to buy tickets that are later sold at their home town. Travelling introduces a reporting bias in official sources that favors municipalities with larger populations or famous lottery vendors such as "La Bruixa d'Or" in Sort.[12]

Figure 1 shows that winning towns appear to be randomly distributed across Spain, as expected due to the randomness of the lottery. Almost every province won at least once over the last 25 years.[13] We also see that the dispersion in prize per capita is large. While the median total prize value is equivalent to 2 percent of a town's GDP, many towns win less than 1 percent, and some towns win as much as 16 times their GDP.[14]

[11] For example, newspaper data may report that of the 1,600 tickets of the winning number, 1,000 were sold in the town of Calatayud, while the remaining 600 were sold in Cuenca. See appendix figure A.11 for a sample newspaper report.

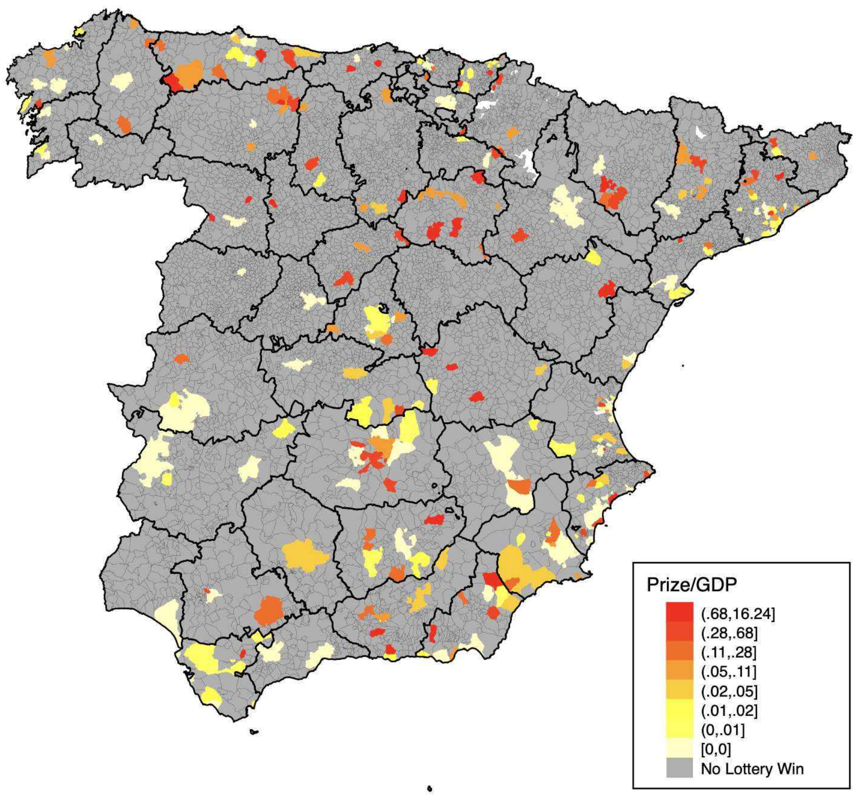
[12] Sort is a town in the province of Lleida which became famous for selling the first prize of *"The Boy"* in 1991. Since its name means "luck" in Catalan, it soon became one of the most successful vendors in the country. Furthermore, many associations and NGOs also use the lottery to raise funds by adding a donation to the ticket price. Many of these exchange numbers with other organizations to increase the variety of numbers.

[13] Some towns won the lottery multiple times, and for these cases, we keep the first observed win.

[14] We construct a rough estimate of a town's GDP by taking the GDP per capita of Spain in a given year and multiplying that by the number of people living in the town of interest in that year. Data on GDP per capita in Spain comes from Prados de la Escosura (2017).

Plotting total prizes per capita over time (figure 7a) shows that the real prize value has been increasing, with a greater frequency of larger wins in later years. This trend can be attributed to the fact that lottery play has been growing in recent years, and as more people play the lottery, the government increases the total prize amount. We also see that in most years, we identify multiple winning towns due to multiple prizes and ticket numbers being split across towns.

Figure 1: Map of Lottery Winners Across Spain, 1991-2016



Notes: This figure shows a map of winning towns across Spain from 1991-2016. Winners appear randomly spread across Spain, which one would expect given random selection through the lottery. Winning towns are shaded according to the relative size of the win, defined as the total prize won in the town divided by the town's estimated GDP. Light gray lines indicate municipal boundaries, and thick black lines indicate province boundaries. Islands are not included.

Lottery expenditures. We obtain administrative data from the *Sociedad Estatal Loterías y Apuestas del Estado* (SELAE), the government organization that runs the lottery, on town-level lottery ticket sales, which we use to estimate a town's probability of winning the lottery. In this data, which spans from 1991 to 2017, we observe each town's total annual lottery ticket sales. We often observe small towns with no ticket expenditures in the administrative data since they do not have official lottery vendors. Frequently in these cases, residents go to nearby towns to purchase tickets instead.[15] As mentioned in the previous section, residents can also buy tickets online, but these purchases remain unpopular and represent a small fraction of total purchases.[16]

With this data on lottery wins and ticket sales, for each winning town we can find counterfactual control towns that had a similar probability of winning and estimate the causal impact of the lottery. Next, we describe the economic indicators we collect to study local economic activity over time.

3.2. Outcome Variables: Our outcome data allows us to follow many facets of the economic development of winning towns. We collect information on consumption, property values, business activity, and demographics from various administrative datasets.

The most obvious outcome that one would expect to increase due to a wealth shock is consumption. A large body of research shows that people increase their consumption in response to a cash stimulus.[17] We assess changes in consumption by collecting information on car and truck registrations.

Another durable good that people may consume more in response to a wealth shock is housing. We know from the urban economics literature that increases in local wealth might translate into higher real estate prices and increased home sales. To capture changes in real estate dynamics, we use property data from local governments in Spain, which keep track of property valuations for tax purposes. These datasets contain information on the number of buildings, home sales, rural land plots, and the value of rural and urban land. While the valuations are not equivalent to the listed market price, they consider several parameters, such as property quality and market price.[18]

In addition to consumption data, we observe business growth and employment data to measure changes in the local economy. A wealth shock could impact local business activity, for example, by relieving credit constraints or increasing local demand, which in either case would lead to business growth. For this reason, we combine

[15] This limitation does not apply to identifying winning towns. Newspapers report where winners live, even in those cases where towns do not have a vendor.

[16] This lack of popularity is not surprising given that social pressure is the main driver for participation, which arguably is absent in online purchases.

[17] See for example Hausman (2016).

[18] Fernández (2004) points out that one caveat of these valuations is that in later years they have not fully captured the increase in real estate prices as it can take several years to reflect movements in the market.

different official sources to obtain the annual number of business licenses, banks, and monthly data on employment and unemployment.

Finally, we focus our attention on demographic dynamics. It is not immediately evident how winning the lottery might impact population growth, if at all. Many winners could use their recent wealth to move to more prosperous locations, reducing a winning town's population size. On the other hand, a boosted local economy could attract new migrants and workers. Increased wealth may also lead to increased fertility, causing the population to increase over time. We obtain data on annual population and migrant inflow and outflow from official town registries and vital statistics data on births, deaths, and marriages.

Taken together, these outcomes allow us to understand the many dimensions in which lottery wealth might impact a town's economy.

4. Short Run Analysis

Each year the lottery generates a natural experiment where some towns are randomly treated while many others are not. While the lottery itself is random, towns that sell more tickets are more likely to win. These purchasing differences could correlate with economic activity and potentially bias our results. To address this, we match winning towns to non-winning towns that had similar lottery expenditures and populations in the year prior to the lottery win.

Comparing these towns with a dynamic difference in difference design, we find that the lottery significantly increases local consumption but does not necessarily translate into persistent economic growth. After a lottery win, there is an increase in the consumption of durable goods such as cars, trucks, and housing, persistent for at least two years after the lottery win. Despite the increase in consumption, firm growth and employment decrease, suggesting a slowdown in business activity. Finally, we do not detect a significant change in the total population in the short run, but we observe a decrease in new migrants counterbalanced by increasing births.

4.1. Matching towns based on probability of winning: To ensure that the only difference between winning towns and controls is due to chance, we match towns based on the number of tickets purchased and population prior to each lottery win. This generates a sample of control towns that provide a valid counterfactual of a lottery win.

Table 1: Balance table

	Winner Mean	Control Mean	Std Error	P-value	Obs
Population	8.97	8.96	0.07	0.90	730
Tickets per cap.	5.19	5.47	0.55	0.62	730
Log of Births	4.25	4.24	0.08	0.92	730
Log of Deaths	4.31	4.27	0.06	0.41	730
Log of Total In-migrants	5.54	5.50	0.09	0.69	726
Log of Total Out-migrants	5.39	5.36	0.08	0.76	730
Log of Marriages	3.48	3.45	0.08	0.68	730
Log of Employment	7.90	7.85	0.11	0.68	409
Log of Cars	8.09	8.07	0.07	0.86	730
Log of Trucks	6.74	6.80	0.06	0.36	730
Log of Firms	5.47	5.46	0.07	0.94	730
Log of Banks	1.33	1.32	0.07	0.89	493
Log of Value Rural Prop.	8.10	8.31	0.11	0.06	553
Log of Count Rural Prop.	8.27	8.28	0.14	0.96	554
Log of Value Urban Prop.	11.93	11.97	0.11	0.68	578
Log of Count Buildings	8.71	8.70	0.07	0.92	538

Notes: This table shows results from a balance test between winning towns and their matched controls. We report standard errors and p-values for the β term in the equation $y_m = \beta \text{Winner}_m + \varepsilon_{mt}$, where y_m is outcome y for town m in event time -1, and Winner_m is a dummy for whether or not town m won the lottery. Because some towns have multiple controls, control towns are given weights $1/n$, where n refers to the total number of controls for a given winning town. The number of observations changes for different covariates because not all covariates are observed for the full-time period from 1990 to 2016. All variables are reported in log terms, except for tickets per capita.

Among winning towns, we restrict to the 126 towns that won relatively large prizes in the lottery, where the total prize to the town is equivalent to at least 5 percent of the town's estimated GDP. We chose this cutoff to exclude towns that won relatively small prizes that are unlikely to have an effect. For example, due to its size, Madrid often sells a small fraction of the winning tickets, making it a "winning" town, even though the prize may be equivalent to less than .001 percent of Madrid's GDP. For this reason, we define winning towns using the 5 percent cutoff.[19]

We use coarsened exact matching (CEM) to match winning towns to non-winning towns based on lottery ticket purchases for that year's lottery and population in the four years prior to a lottery win (Iacus et al., 2009).[20] CEM divides towns into bins based on town characteristics that we select and finds control towns within those bins. This method allows winning towns to be matched to multiple control towns, thus increasing the power of our analysis. Out of 8,000 towns in Spain, only a small number of towns ever win large prizes in the lottery, giving us many potential "control" towns for comparison. To exclude extremely small towns, we drop towns that have missing data on population or lottery ticket expenditures from 1991 to 2016 and those with zero births, deaths or marriages during this time period.

This process yields 56 winning towns matched to 671 non-winners from 1991 to 2016. Balance results are reported in table 1. Our sample is balanced across almost all variables of interest in the period prior to the lottery win, except that non-winning towns have slightly higher rural land value than winning towns. The lack of pretends in most outcomes is reassuring for our empirical analysis, validates our matching strategy, and indicates that the lottery appears to be indeed exogenous. Since we only consider population and lottery expenditure when matching, balance across other outcomes solely relies on the lottery's randomness.

4.2. Difference in difference design: We use a dynamic difference in difference design with fixed effects to compare outcomes of towns that won the lottery to matched towns that never won, focusing on the four years before and three years after a lottery win (including the year of the win).[21] Our main specification is as follows:

[19] This cutoff approximately corresponds to the median GDP shock in our sample of winners.

[20] Population and tickets per person are converted to log terms prior to matching. We allow for "control" towns to be matched to multiple winning towns.

[21] We also report results from the static difference in difference equation $y_{mt} = \gamma_m + \mu_c + \beta(\text{Post}_t \times \text{Winner}_m) + \varepsilon_{mt}$ in appendix figure 9.

$$y_{mt} = \gamma_m + \mu_c + \sum_{t=-4}^{-2} \beta_t(\text{Period}_t \times \text{Winner}_m) + \sum_{t=0}^{2} \beta_t(\text{Period}_t \times \text{Winner}_m) + \varepsilon_{mt} \quad (1)$$

where y_{mt} is the value of outcome y for town m in event time t, γ_m and μ_c are town and calendar year fixed effects, and Winner_m is an indicator for whether or not town m won the lottery between 1991 and 2016. The term Period_t is an indicator for event time, where $t = 0$ corresponds to the first year that the lottery could have an impact, i.e. when winners receive the money.[22]

In this equation, we interact winning status with event time so that $\text{Period}_t \times \text{Winner}_m$ is equal to one for winning towns in year t relative to the lottery win. The β_t terms then estimate the effect of winning the lottery in year t relative to a lottery win. Here, the $\beta_{t<0}$ terms can be used as a test for pretrends, and if towns are well-matched, we should not see any difference between control and treated towns prior to a lottery win.

Because some towns are matched to more controls than others, we use weights to ensure that each match group is weighted equally. We assign each winning town a weight equal to 1 and give each control town a weight equal to $1/n$, where n is equal to the number of control towns for a given winning town.

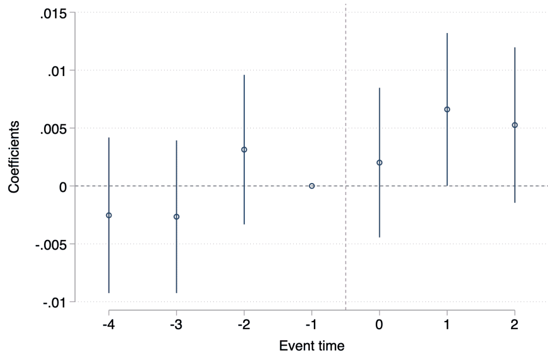
We restrict each specification to a balanced sample of towns with 4 years of pre-data and three years of post-data (including the year of the lottery win) for the outcome of interest. Because not all of our outcome data includes all towns for the entire time period, this results in our sample changing for outcomes from different administrative datasets. The missing data is often caused by region-level differences in reporting data and not by selection at the town level. This is important to keep in mind when linking results across samples. We do this to maximize power since not all towns have data on all outcomes for the entire period.

4.3. Results: Using the specification above, we focus on how the lottery affects towns in four dimensions: consumption, property values, business activity, and demographics. Our analysis shows that the lottery has a large impact on these locations, yet it does not necessarily lead to persistent economic growth.

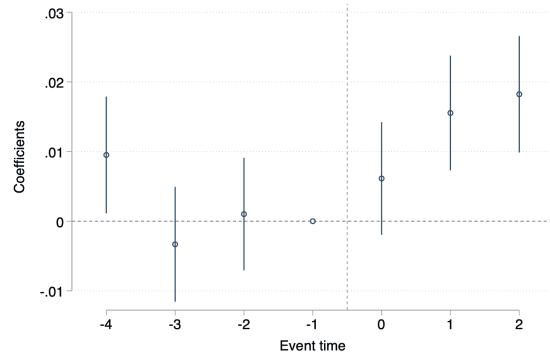
[22] *El Gordo* and *El Niño* occur in December and January of each year, respectively, and winners often do not receive the cash prizes until January or February. For this reason, if a town wins *El Gordo* in December of 2010 or *El Niño* in January of 2011, event time zero is 2011 because that is the year that the winners receive the money.

Figure 2: Consumption and Real Estate Effects

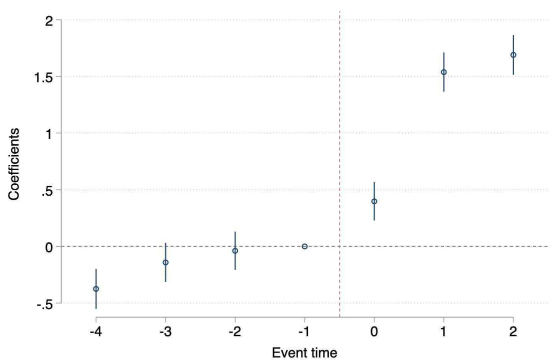
(a) Cars



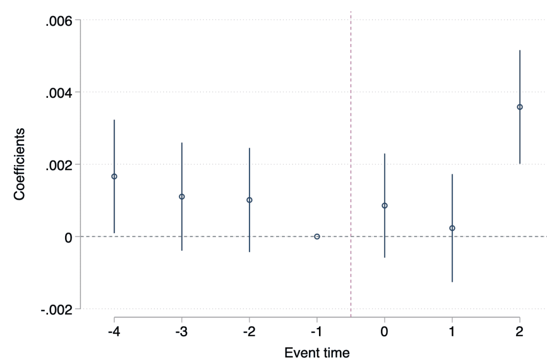
(b) Trucks



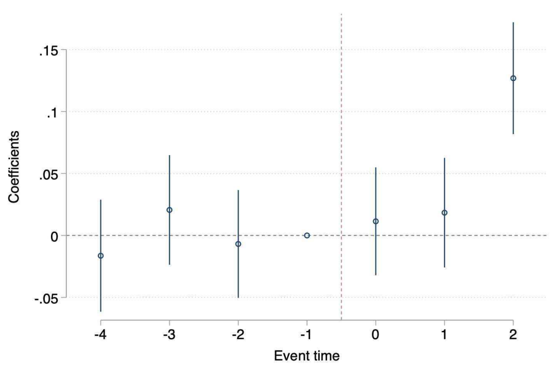
(c) Lottery Expenditure



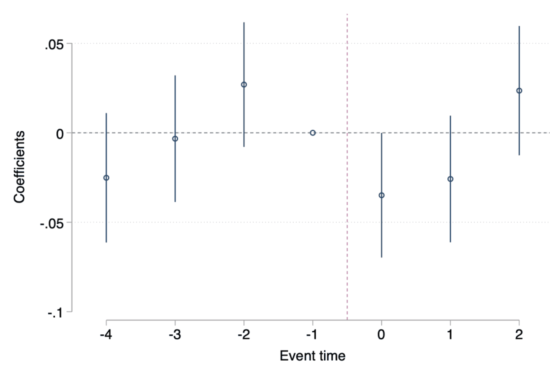
(d) Used Home Sales Per Cap.



(e) Rural Land Value



(f) Urban Land Value



Notes: This figure plots estimates of the β_t coefficients from equation 1, which give us the effect of winning the lottery on outcomes of interest relative to event time. All variables are in log terms except for home sales per capita. Each point estimate has its corresponding 95% confidence interval. We do not find any significant pretends for up to three years before a lottery win. We report the full output in tables 7 and 8 in the appendix.

Consumption. Consistent with previous literature on wealth shocks, we find that people in winning towns increase their consumption due to the lottery. In figure 2, we see that relative to controls, the total count of cars and trucks increases by 1 percent for cars and 2 percent for trucks in the year after the lottery win. These increases occur gradually, with differences becoming significant only after the first year and persisting for at least two years (figures 2a and 2b). This gradual increase could be due to the planning required for large purchases. Furthermore, anecdotal evidence from residents of towns where large prizes were won suggests they might be wary of spending large amounts in the first year. Since our variable captures the total count, not the flow, we interpret it as a lower bound for purchases. For example, the total count will not reflect a lottery winner getting rid of their old car and upgrading to a more luxurious one.

Lottery expenditure skyrockets with a 150% increase in the following years. Although we use this outcome primarily to identify appropriate controls, it also reveals an increase in consumption for these locations. While some of this increase is likely driven by people from surrounding locations purchasing tickets in "lucky" towns, anecdotal evidence from lottery vendors' interviews suggests that some of this increase comes from local demand. These estimates also validate our empirical strategy as we find no significant pretends in lottery expenditures for at least three years prior to the lottery event (figure 2c).

Real estate. In addition to the increased consumption of durable goods, people also demand more land and housing. In figure 2e, we see that rural property values increase by 13 percent in the year after the lottery win. Although urban property values do not increase significantly, we do observe an increase in secondhand home sales, signaling a more active housing market.[23] These effects may signal increases in both consumption and investment, for example, if people are buying vacation homes in the countryside or buying apartments to rent out. We observe no increase in urban property value or buildings, reported in TablepropertyDynamicDDtable in the appendix. If anything, urban property values decrease temporarily after a win, and the number of buildings does not change significantly. Thus the lottery does not appear to increase the size of the real estate market, but it does result in reallocation within the market.

Our evidence suggests that the stark effect on rural land value is not driven by boosted land productivity, although we find signs of some rural land investment.

[23]While assessed urban property values do not increase, this does not mean that home prices are not increasing since assessed property values are only weakly correlated with housing prices.

Figure 9 in the appendix shows the results of the event study on land productivity using the decennial agrarian census. We observe a slight decrease in land productivity and a small increase in the percentage of land with orchards. These results suggest that some landowners might be shifting towards more capital-intensive crops that might take longer to become productive, as orchards require a large initial investment and several years to start producing. Anecdotal evidence also suggests increased leisure as a potential motive for some of the land investments.[24]

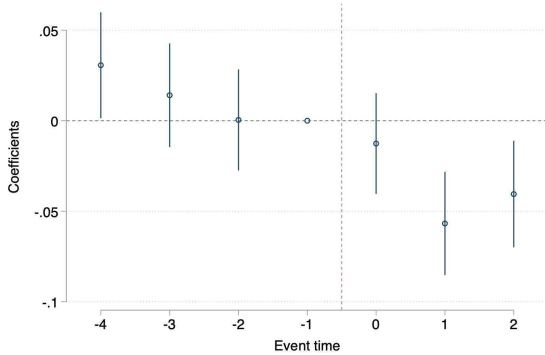
Business Activity. Despite the increase in consumption, firm growth and employment decrease, suggesting a slowdown in business activity. Figure 2 shows that winning towns have 4 percent fewer firms and 6 percent lower employment in the year after a lottery win. While the impact on firms is short-lived and more noisily estimated, we observe that employment falls one year after the lottery win and remains low two years later. Although employment decreases, we do not observe an increase in unemployment (Table 7 in the appendix), implying that people are exiting the labor force in line with previous studies on individual lottery winners where winners reduce their labor supply (Imbens et al., 2001).

How do we reconcile the slowdown in business activity with the increase in consumption shown above? Higher purchases of tradable goods such as cars and trucks might not necessarily benefit local businesses because these are often not produced locally. In fact, papers that looked at the effects of the lottery at the regional level suggest an increase in business activity (Bermejo et al., 2020), potentially due to such effects.

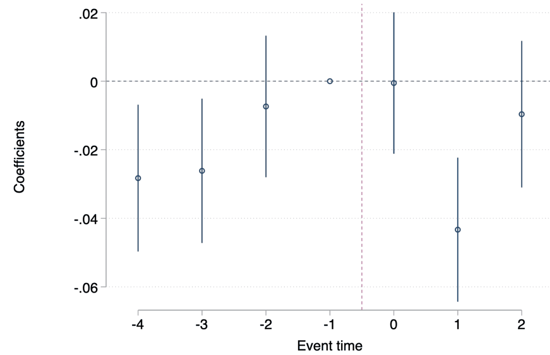
[24]We conducted several interviews in the town of Grañén, one of the largest lottery winners in recent years. Many farmers in the area had invested in costly modern irrigation systems that greatly reduced labor input without notable gains in productivity. Several mentioned how they used to wake up early to water their crops, while now they can automate the whole process through their phones, suggesting the primary rationale of the investment was additional leisure.

Figure 3: Economic Activity and Demographic Effects

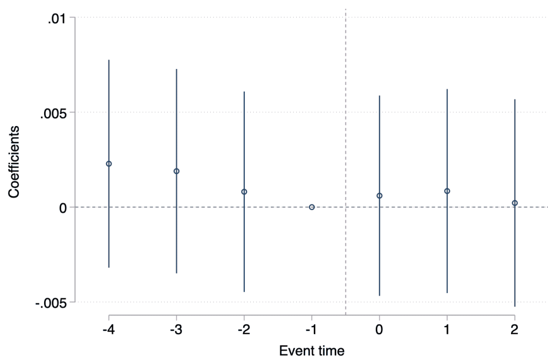
(a) Employment



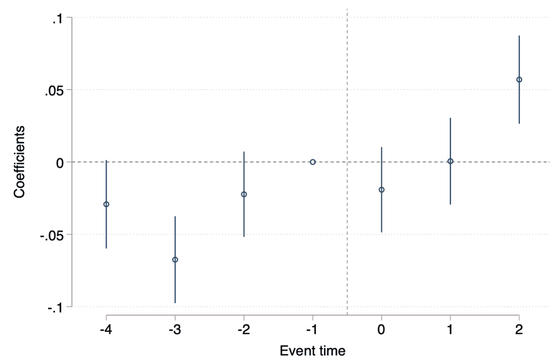
(b) Firms



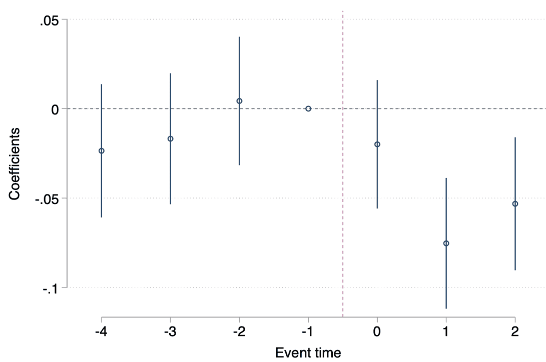
(c) Population



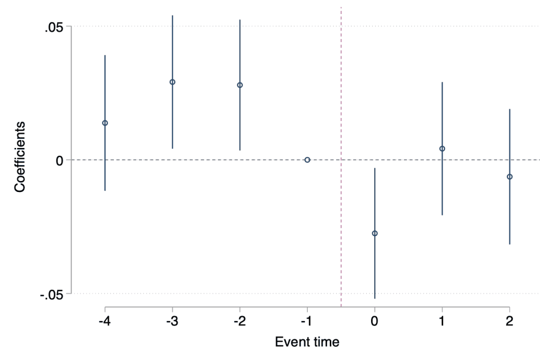
(d) Births



(e) Migrant Inflow



(f) Migrant Outflow



Notes: This figure plots estimates of the β_t coefficients from equation 1, which give us the effect of winning the lottery on outcomes of interest relative to event time. All variables are in log terms. Each point estimate has its corresponding 95% confidence interval. We report the full output in tables 7 and 9 in the appendix.

Population. A slowdown in economic activity could translate into changes in population. For example, people may take their wealth and move to more prosperous locations, or higher prices in winning towns might deter new migrants. While the overall population is not affected in the years after a lottery win, we observe many changes in demographic dynamics. Fewer people move into winning towns, with migrant inflow dropping 8 percent in the year after a lottery win (figure 3e). This drop in migration suggests that winning towns become less attractive to new migrants either due to the slowdown in economic activity and fewer job opportunities or from towns becoming less affordable. Regardless of the cause, this drop in migration reduces the number of working-age adults at these locations. In contrast, we do not see lottery winners using their newly found wealth to move to more prosperous locations; migrant outflow remains relatively unchanged in the aftermath of a win.

A 6 percent increase in births counterbalances the downward effect on the population.[25] Although the evidence for the upward effect on the population is less robust due to winning and non-winning towns having some differences in the pre-period, these estimates support the finding that the total population does not change. The increase in births and decrease in deaths is also consistent with the literature on the effect of wealth on health and fertility.[26] The rapid increase in births, even without economic growth, suggests that the lottery relieves binding financial constraints for individuals looking to start a family. It is unclear whether this increase in births dominates the decrease in migrants in the long run. We further explore this question in section 7, where we follow towns for several decades.

As a whole, our results show no signs of positive economic impact in the short run. If anything, indicators such as the number of firms and employment indicate a slowdown. Many winners seem to use their earnings to purchase durables such as trucks or rural land without meaningful impact on local growth. Our matching strategy manages to obtain samples balanced on average in the pre-periods, as table 1 shows. Nonetheless, we interpret some results cautiously, such as births and migrant outflow, due to some pretrends in the dynamic analysis.

5. Robustness

In this section, we present several alternative analyses and specifications to assess the robustness of our results. We first present an alternative analysis, not relying on a matching strategy, where we compare towns that won relatively large prizes to

[25] We also report in appendix table 9 results for the number of deaths, which show an unprecise 2 percent decrease in deaths.

[26] González (2013) finds an increase in fertility following a universal child benefit program in Spain. Apouey and Clark (2015) finds improvements in mental health for lottery winners in the UK, and Cheng et al. (2018) finds a higher take-up of private insurance.

towns that won relatively small prizes. Then, we focus on our matching strategy and test different time bandwidths to see how these influence our estimates. Finally, we re-run our main analysis with standard errors calculated using a permutation test, re-randomizing treatment status.

5.1. Comparing towns that won large vs. small prizes: To assess the robustness of our matching strategy, we run an alternative analysis comparing towns that won large prizes with those that won small prizes. In addition to the randomness of which town wins the lottery, this analysis relies on additional randomness by prize won. Since the lottery awards several prizes each year, and winning numbers often happen to be split across locations, prize size varies significantly.[27] Hence, we use small winners as an alternative control for large winners under the assumption that very small wins have a limited impact on a town.

However, a caveat of this analysis is that tickets of a given lottery number are limited. This feature implies that larger towns are more likely to win relatively smaller prizes than small towns. For example, even if Madrid wins the totality of the larger prize, it would only represent a small fraction of its GDP. With this limitation in mind, our analysis provides valuable additional evidence of the lottery's effect without relying on matching winning towns.

We run our main difference in difference specification from equation 1, this time labeling towns that won relatively large prizes as treated towns and towns that won relatively small prizes as controls.

As in our main specification, we find that towns that won larger prizes experience increased consumption and a decrease in business activity, as shown in table 10. We observe a slight increase (although less significant) in car and truck purchases following a lottery win and a decrease in firms and employment. For land and property assets, we observe in table 11 once again a large and significant increase in rural land values two years after the lottery win. Similarly, we replicate a large and persistent drop in inflow migration two years after the lottery shock.

The lack of differences in pretends in most of our outcomes shows that big and small lottery winners do not differ significantly in the years prior to a win, despite our initial caveat about the limited tickets. Furthermore, the big vs. small winners

[27] In our panel of winning towns, some locations only have one or two winning tickets with a negligible impact on the town's GDP. Other localities instead sell the totality of the first prize, representing 2 or 3 times the local GDP.

comparison indicates that our main results cannot simply be attributed to our matching strategy or that those winning towns are inherently different from nonwinners. Rather, it is the money from the lottery itself that drives its effects. This evidence suggests heterogeneous effects by prize size, which we further explore in section 6.

5.2. Changing time bandwidths: Next, we test the robustness of our matching strategy by expanding our time frame to include additional post periods. Additional years help us determine whether effects are persistent or transient, but since we are using a balanced panel, it also reduces our sample due to lack of sufficient post data. We include additional years by restricting our data to the sample of winning towns with four or five years of post data (in addition to four years of pre-data) and use coarsened exact matching to find control towns.

Despite the smaller sample size, our main results are robust to including additional years of post data, as shown in appendix figures A.13a and A.13b. If anything, the effect on rural land value increases over time. Also, we find that the negative effect on the number of rural plots becomes large and significant, suggesting consolidation of rural land.

5.3. Permutation Test: Our main matching strategy creates a group of control towns with the same probability of winning and a similar population size as each winning town. Therefore, using these groups, we can test the significance of our results against the null that the lottery has no effect by re-randomizing treatment status within each group and redoing our dynamic difference in difference analysis. We perform this procedure 10,000 times to obtain a distribution of estimates across permutations. By observing where our original treatment effect estimates fall in this distribution, we can assess how likely our results are to arise due to randomness.

If our estimates are at the distribution's tails, it would indicate that the lottery does significantly affect these locations. Indirectly, this same procedure also tests the robustness of any pre-trends present in the previous section. Hence, the permutation test's goal is two-fold: to assess the robustness of our results and test whether pre-trends are due to randomness or are inherent to our sample.

Figures A.14a and A.14b present the permutation test results for two of the most significant coefficients in our main analysis: migration in t+1 and rural value in t+2. In both cases, we see a small percentage of permutations having a larger estimate than our original sample (0.026 and 0.007, respectively). Similar figures confirm our results on trucks, firms, employment, unemployment, rural plots, and home sales.[28] This further confirms the lottery's impacts in these municipalities. At the same time, only a handful of the previous pre-trends are still present in the permutation.[29]

Overall, all the robustness tests and alternative analyses presented in this section replicate most of our main results and confirm the lottery's impact on winning locations. Consumption of durables and rural land values increase while firms, employment, and migrant inflow all decrease. Despite their sizable magnitude, the wealth shocks associated with the lottery do not translate into persistent or even temporary economic growth.

6. Heterogeneity

In previous sections, we have shown that, on average, the lottery appears to cause an increase in consumption and a slowdown in overall economic activity. However, despite the vast variation in the prize amounts won by each town, our main analysis groups all large prize winners together. This section explores this variation and looks for heterogeneity based on the lottery's prize size. If the primary driver of our effects is the increase in wealth associated with winning the lottery, as opposed to non-pecuniary effects, we would expect towns that won relatively larger prizes to experience larger effects in general.

Conceptually, we can interpret each lottery win as an independent experiment since whether or not a town wins in a given year does not depend on any relationship with previous winners. Therefore, using our big winners' sample is equivalent to running 56 independent experiments over several years. Using an event study design, we obtain a treatment effect estimate for each winning town by comparing changes in its outcomes to those of its matched controls.[30] We then plot the point estimates for all the treated towns to see if these are either increasing or decreasing based on the prize per capita.

With the caveats of the small sample size and the noisiness of our estimates in mind, we find limited evidence that towns that won larger prizes experience larger effects. In most of our primary outcomes, the gradient of prize per capita coincides with the sign of the estimates from the difference in difference analysis; as prize per

[28] Tables A.13, A.14, and A.15 in the appendix report the results of the permutation test for all of our outcomes of interest.

[29] These coefficients are births in t-3, firms in t-4 and t-3, banks in t-3, and unemployment in t-2.

[30] For this analysis, we focus on the differences in outcomes two years after a lottery win compared to the year prior to the win.

capita increases, results become more pronounced. Figure 10 shows how migrant inflow and employment are centered around zero for towns that won relatively small prizes. However, the effects of the lottery become more negative and larger in magnitude as the relative prize size increases. Similarly, rural value and truck purchases become more positive as prize per capita increases, with trucks experiencing a more pronounced increase. Another outcome following the same pattern is home sales per capita, with a clear positive slope.

This analysis shows that larger lottery prizes lead to more significant effects and suggest wealth is one of the main drivers. Nonetheless, figure 10 shows considerable heterogeneity among all prize groups; we observe towns that won relatively small prizes and nevertheless experienced relatively large effects.[31] Therefore, there is room for non-pecuniary effects like the joy of winning or earnings distribution among the locals to have an impact. However, testing these hypotheses is beyond the scope of our analysis.

7. Long Run Analysis

How do the effects of the lottery play out in the long run? In this section, we expand our sample to cover every winning town since the beginning of the 20th century. While our previous analysis finds evidence of short-term changes in population dynamics, specifically migration and births, their impact on the overall population might require many years to become detectable. Expanding our sample allows us to track winning towns for many decades and assess the long-term impacts on population dynamics. At the same time, we can explore how the lottery's effects interact with the broader macroeconomic context. In this respect, the Spanish case is particularly well-suited. Over the last century, Spain experienced considerable variation in economic conditions: the Spanish Civil War and post-war period, several years of economic autarchy and isolation followed by a couple of decades of rapid economic growth in the early 60s.[32]

7.1. Sample: Our long-run sample includes all the towns that won any top prizes of El Gordo or El Niño from 1900 to 2017.[33] We include only the first observed win for winning towns, as many large cities won multiple times during this period.

[31] In appendix figure A.15, we also plot the estimated effect of winning the lottery for each town sorted by population and find that the effect tends to be smaller for larger towns, in line with the fact that more populous locations generally win smaller prizes in the lottery.

[32] For more details, see Figure 8 where we plot the Spanish GDP for the 20th century using data from Prados de la Escosura (2017).

[33] We exclude towns that won prior to 1900 due to a lack of population data in the pre-period.

We combine data on winning towns with data on population from Spain's decennial census from 1880 to 2011. We calculate each prize as a share of that town's GDP by taking the total prize won and dividing that by the estimated GDP for the town in event time zero, using the same estimating method as in the short-term analysis.

In total, we observe 482 unique winning towns with a median prize value equivalent to 15 percent of a town's GDP, higher than the median prize value of 5 percent of GDP in more recent years. The number of winning towns for each decade and the prize as a fraction of GDP for each winning town is shown in figure 7b. From this plot, we observe that while most towns won prizes equivalent to less than 5 times their GDP, some towns won prizes much larger than that, up to 15 times their GDP.

7.2. Matching: As in our previous analysis, we match winning towns to similar towns that never won based on population and ticket expenditures. However, we use population data from the decennial census instead since annual population data does not extend past 1986. We make similar adjustments to match based on ticket expenditures. Annual data on ticket expenditures only goes back to 1990, but in 1942 a report was published on lottery play (Nacional, 1942), available at the Spanish National Library archives, which we digitized to create our dataset. This report includes data on the distribution of ticket numbers across Spanish towns for the 1941 Christmas lottery. For each of the 39,000 numbers, we observe which administrations received tickets of that number and their location. Some of these numbers were assigned to more than one administration, but unfortunately, the report does not mention the proportions. Hence, rather than imposing assumptions on these splits, we count the total distinct numbers that all the administrations in a given town received and use this measure as a proxy for lottery play[34] which we include in our matching of the long-run sample.[35]

We restrict our sample to towns we observe in the data at least three decades before a lottery win and one decade following a win. We then match towns based on population in the pre-period and the 1942 ticket distribution. This method yields 190 towns that won relatively large prizes (greater than 5 percent of GDP) matched to 3,316 controls. One limitation of our strategy is that we can only match based on ticket expenditures in 1942. While this might be an accurate approximation for wins

[34]Another possibility is using the total number of administrations in a given location as a proxy for lottery expenditure. However, there is considerable heterogeneity in ticket sales per administration as some locations sell much more than others.

[35]While many towns did not receive any number; they can still win since their inhabitants can still buy tickets elsewhere. In those cases, as previously mentioned, the newspapers' reports correctly identify the location of the winners.

around that period, it might perform worse for later decades and reduce the match quality. We discuss how this could potentially affect our findings in the next section.

7.3. Empirical Analysis: We first look for visual evidence of divergent population trends for winning towns compared to their controls and use the small winners' sample as a placebo. Figures 4a and 4b show binned scatterplots of the population in each decade relative to the lottery win. We define event time in decades rather than years, with event time zero equal to the beginning of the decade in which the lottery was won. Thus if a town won the lottery in 1927, 1920 would be event time zero, and 1930 would be event time 1. We observe a modest increase in population after the lottery win for big winners, with the effect persisting for at least 40 years. Reassuringly, we find no signs of different trends for towns that won relatively small prizes. As expected, towns are well-matched in population for the 30 years of the matching pre-period; however, population trends seem to diverge as we extend to earlier decades. Thus we take this evidence cautiously, as the controls selected may not be adequate for the winning towns in some periods.

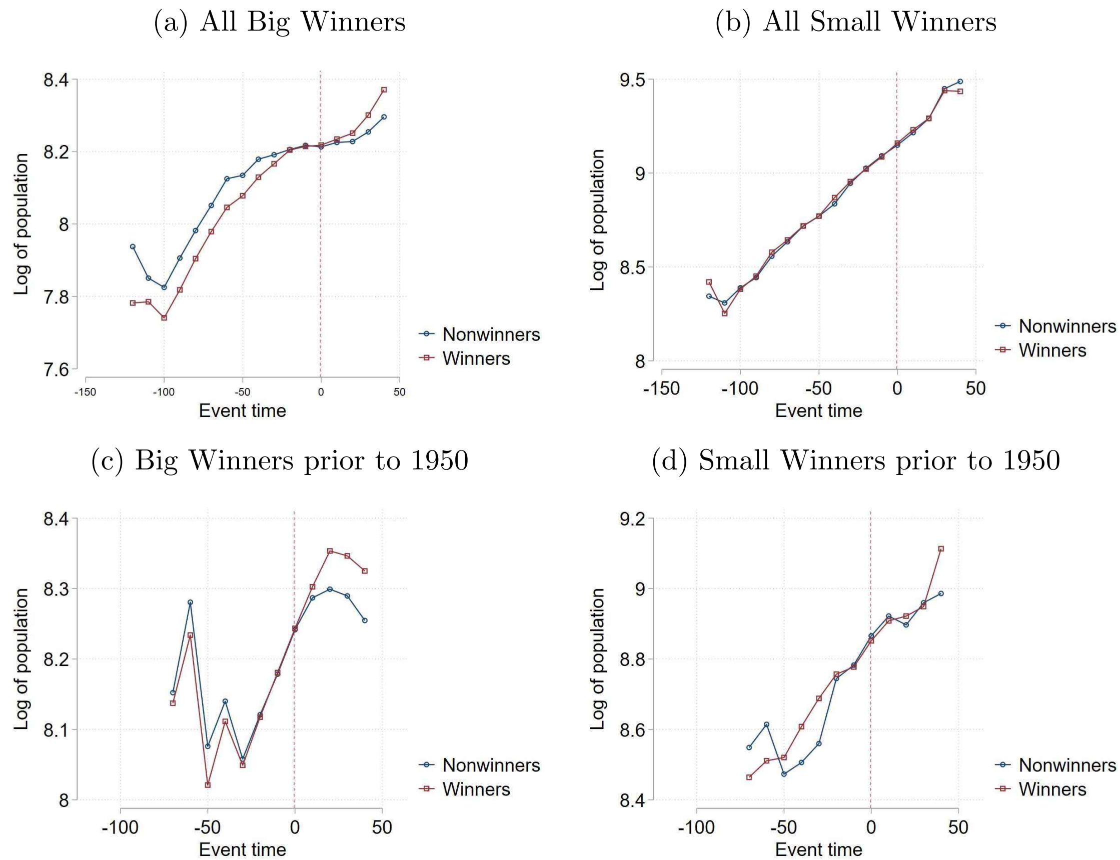
We focus on towns that won prior to 1950 since these towns are likely better matched to similar towns based on the 1942 lottery ticket data. Results are shown in Figures 4c and 4d. Focusing on this subsample of towns and their matches, we observe that big winners appear to be very well-matched in the pre-period. Big winners prior to 1950 also seem to experience population divergence, and once again, we do not find a similar pattern for small winners during this period.

We assess the statistical significance of these trends by running the following OLS:

$$y_m = \psi_s + \beta \times \text{Winner}_m + \varepsilon_{mt} \tag{2}$$

where y_m is outcome y for town m in event time +20, ψ_s is matched group fixed effects, and Winner_m is a dummy for whether or not town m won the lottery. We estimate this equation separately for big and small winners in both of our considered samples.

Figure 4: Long run population effects



Notes: In this figure we plot a binned scatterplot of the log of population for winning towns and their matches relative to the decade of the lottery win. The panel of towns is balanced from year -30 to +10 and unbalanced after that period. Towns are matched using population data from years -20 to 0. We observe that winning towns appear to have larger populations than nonwinners in the time period after a lottery win, although we also observe that these towns appear to be on different population trends prior to the matching period. As a placebo, these differences do not appear for towns that won small prizes.

We find a 7.5% population increase for the whole sample of big winners (p.value=0.088) 20 years after the decade of the lottery win. When restricting to big winners prior to 1950, we find a 5.4% population increase (p.value=0.061). However, these effects do not persist 40 years later (p.values are 0.192 and 0.169, respectively). In all cases, we find no significant effects for our placebo group, the small winners.

Altogether, this evidence suggests that the lottery might have caused a divergence in population growth, persistent for at least a couple of decades. In addition, we observe that pre-trends vary once we split the sample, suggesting the possibility of cohort effects or differences in matching quality.[36] Despite these results, we still do not know why these wealth shocks lead to population growth and how these effects depend on the specific economic context: Were population increases starker in times of economic expansion or during severe recessions?

Next, we explore cohort heterogeneity by splitting our sample into 20-year winning bins and measuring the effects on each cohort's population 20 years later. Figure 5a shows that the average effect on the population 20 years later is close to zero for most cohorts, with one exception. For the cohort that won between 1940 and 1960, the lottery significantly and positively affected the population 20 years later. These towns had almost a 17 percent larger population in the post-period than towns that did not win (p.value=0.002). In annualized terms, this effect implies approximately a 0.8 percent faster yearly growth for two decades.

This population divergence is quite persistent. Looking at differences 60 years later, we find winning towns are a whopping 36% more populous (p.value 0.008), implying a growth differential of 11% each decade compared to the controls. This growth rate is slightly lower than our estimate for the first two decades, suggesting moderate mitigation in the very long run. However, the estimated growth rates are not statistically different from each other.[37]

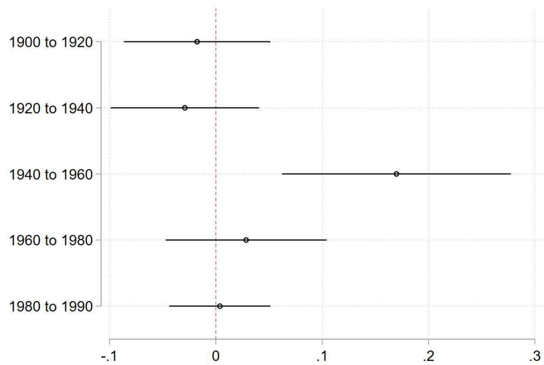
Why do we observe a large population divergence only for towns that won between 1940 and 1960? While we can only speculate at this time, we suspect this can be attributed to the fact that these towns won in the direct aftermath of the Spanish Civil War. Figure 8 shows this was a period marked by severe economic destruction followed by economic stagnation. It is plausible that winning towns were able to use the lottery winnings to recover from the damage caused by the civil war, which prepared them to take advantage of the wave of growth in Spain that began in the 1960s.

[36] Since our panel is unbalanced, towns with more than 60 years of pre-data won the lottery after 1940. As discussed previously, controlling only for ticket expenditure in 1942 might lead to poor quality matches for winners in later decades.

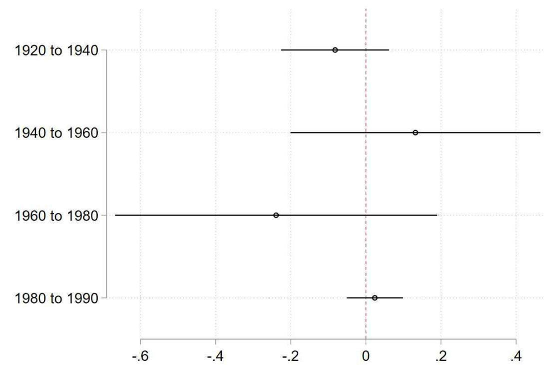
[37] An F-test testing the equality of growth rates estimated after 20, 40, and 60 years yields a p.value of 0.4586.

Figure 5: Population cohort effects

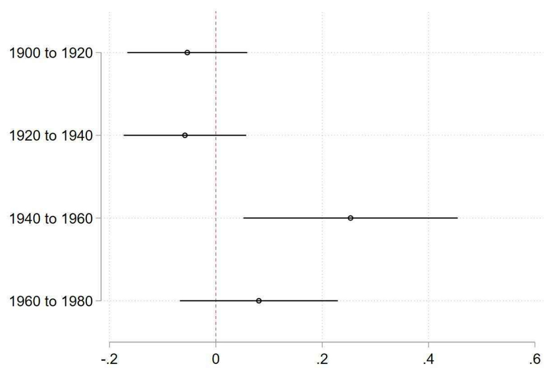
(a) Big Winners 20 years later



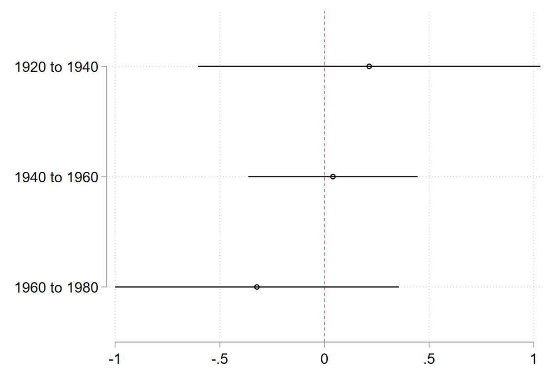
(b) Small Winners 20 years later



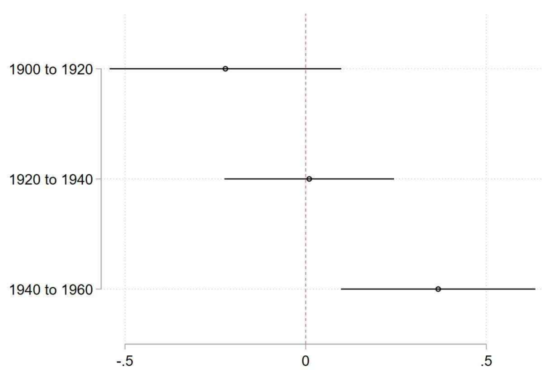
(c) Big Winners 40 years later



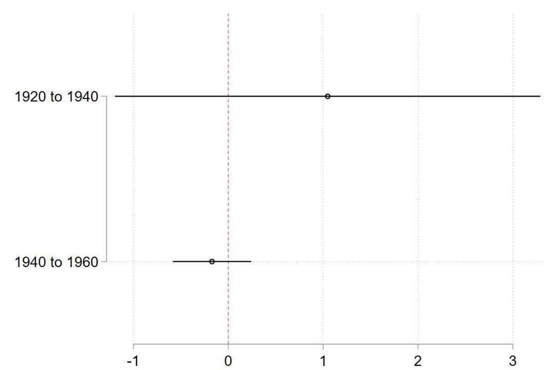
(d) Small Winners 40 years later



(e) Big Winners 60 years later



(f) Small Winners 60 years later

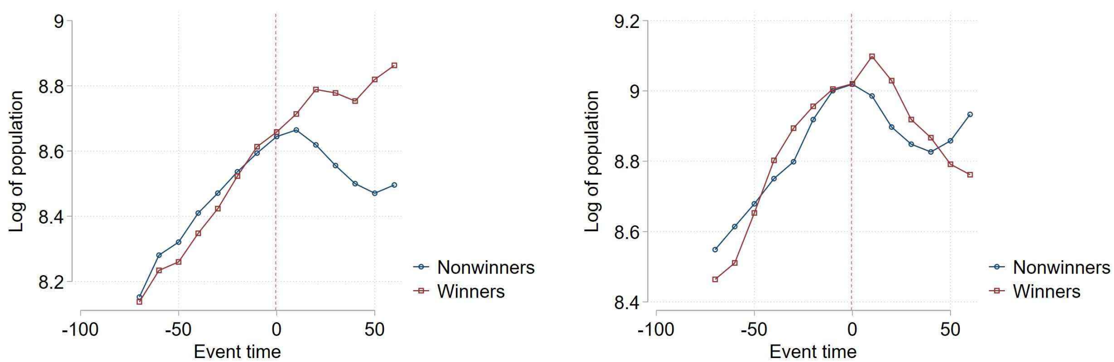


Notes: In this figure we plot the effect of winning the lottery on population 20, 40, and 60 years later for cohorts of towns that won in various decades from equation 2. The X-axis plots the estimated effect on log of population and the corresponding 95% confidence interval. We observe that for most cohorts, the effect on the population is around zero. However, for towns that won between 1940 and 1960, the effect is large and positive 20,40, and 60 years later. As a placebo, we run the same regressions for small winners and find no significant differences. For the 1900-1920 cohorts, there are no observations of small winners.

We provide suggestive evidence of this channel in Figure 6a, where we plot population data for the 1940-60 cohort. As expected by our estimates, we observe a large and persistent population divergence immediately following the lottery win. However, this divergence seems driven by the control towns losing population rapidly rather than the winners growing faster. Previous differences between winning and control towns are unlikely to explain this pattern. Our matching strategy works remarkably well for this subsample, as we do not find any differences for the 70 years before the win.

Figure 6: Long run population effects

(a) Big Winners 1940-1960 (b) Small Winners 1940-1960



Notes: In this figure we plot a binned scatterplot of the log of population for winning towns and their matches relative to the decade of the lottery win. The panel of towns is balanced from year -30 to +10 and unbalanced after that period. Towns are matched using population data from years -20 to 0. We observe that winning towns appear to have larger populations than nonwinners in the time period after a lottery win. These effects seem to persist for at least 60 years later. Small winners have no significant population differences after a lottery win.

The population decrease for the control towns is not surprising given the historical context. During this period, many Spaniards migrated abroad, primarily to France (Alted, 2012) and Latin America (Palazón Ferrando, 1992), and towards urban areas (Capel, 1967).[38] In addition, this pattern could also be explained by changes in fertility or mortality rates. However, both rates do not show large decreases during this period (Cabré et al., 2002). Hence, we speculate that changes in migration patterns may be behind the rapid population drop for control towns.

Whatever the reason for the persistent population effects in these towns may be,

[38] For example, two cases studied by historians are Barcelona (Vilá Valentí, 1959) and Sabadell (Corbera, 2006), which both received a large influx of migrants from the Spanish south.

our analysis suggests that macroeconomic and historical context may interact with the effects of wealth shocks in significant ways. Towns that won during one of the worst economic downturns in Spanish history kept growing and became more populous in the long run, with no signs of this difference fading out for at least 60 years.

8. Conclusion

This paper has examined the role of large and abrupt wealth transfers in shaping local economic activity. Using the Spanish Christmas Lottery as a natural experiment, we provide causal estimates of wealth's effect on various measures of economic activity.

The unique features of the Spanish Christmas Lottery, in which winners are clustered together in the same town, permit us to observe effects above and beyond what one would expect from an individual lottery. Our evidence suggests an increase in consumption and leisure from the lottery winners, consistent with other wealth shocks and lottery literature. Many winners consuming more could cause an increase in local demand, boosting local business activity. On the other hand, exits from the labor market, as winners supply less labor, could slow down economic activity. We find evidence that despite the increase in consumption, the overall effect on the local economy is negative: firm count and employment measures decrease in the years after a lottery win.

In addition, we find that the lottery significantly impacts those who do not receive the wealth shocks. These large wealth shocks affect the real estate market, raising property values and increasing home sales at the town level. A more active housing market, combined with a slowdown in economic activity, makes the town less attractive to new migrants. This is confirmed by the data, where we observe a large drop in migration, up to 8% in the year after a lottery win. Less migration for these locations, some of them already facing a declining population, could severely impact population growth in the long run.

These results raise important concerns to take into account regarding wealth transfer programs. Our evidence suggests that policies such as targeted transfers and universal basic income might dampen economic growth. In the Spanish context, where the magnitude of these transfers is quite large, we show that reduction in employment might offset increases in consumption and slow down economic activity. This decrease in economic activity could impact non-recipients as well. In addition, wealth transfers can lead to an appreciation of real estate prices that would also impact non-recipients. Research in developing countries finds different effects, with cash transfers leading to local growth (Angelucci and De Giorgi, 2009; Egger et al., 2019). This difference may be due to the fact that developed economies have better-functioning credit markets and points to the importance of context when trying to anticipate the effect of wealth transfers.

It is important to emphasize that wealth transfer policies are often implemented for welfare and equity reasons and not necessarily to promote economic growth. While we do not measure welfare directly, people in winning towns consume more goods and leisure, indicating a higher quality of life. Furthermore, we find that many people in the town use their newfound wealth to get married and have children, which may be another positive indicator of their welfare.

Our results suggest that wealth transfers can also be an effective government tool to promote fertility. As many developed countries struggle with aging populations, we show that wealth transfers can counteract this trend. Winning towns experience a 6% increase in births two years after a lottery win. However, it is unclear whether this is a persistent effect, in addition to the optimal size for these transfers.

Finally, our historical evidence highlights the importance of economic context in measuring the effects of wealth transfers. We find large and persistent population divergences for towns that won in the aftermath of the Spanish Civil War. Lottery wins prevented these locations from losing population, potentially due to outflow migration, and allowed them to keep growing. In contrast, non-winning towns experienced a long-lasting decline that took decades to overcome.

Despite the uniqueness of the Spanish context and its noticeable differences with other wealth transfers, like relief checks to the unemployed, we believe these long-term insights have important policy implications. In the last years, we have seen many countries implementing large stimulus packages in order to prevent COVID-19 from causing long-term damage to their economies. Even more recently, states like California are discussing anti-inflation relief checks for more than $10 billion. While the magnitude and timing of such policies differ from those of the lottery, our historical evidence suggests that large wealth transfers in times of great economic distress might help prevent short-term shocks from becoming chronic. Conversely, wealth transfers might prove ineffective outside those specific economic contexts. Periods of harsh economic conditions may well be when wealth transfers have the greatest impact.

9. Bibliography

Philipp Ager, Leah Platt Boustan, and Katherine Eriksson. The intergenerational effects of a large wealth shock: White southerners after the civil war. Technical report, National Bureau of Economic Research, 2019.

José Altabella and Francisco Rodríguez Cirugeda. *La Lotería Nacional de España:(1763-1963).* Talls. de la Fábrica Nacional de Moneda y Timbre, 1962.

Alicia Alted. *La voz de los vencidos: El exilio republicano de 1939.* Aguilar, 2012.

Manuela Angelucci and Giacomo De Giorgi. Indirect effects of an aid program: how do cash transfers affect ineligibles' consumption? *American Economic Review*, 99 (1):486–508, 2009.

Benedicte Apouey and Andrew E Clark. Winning big but feeling no better? the effect of lottery prizes on physical and mental health. *Health economics*, 24(5):516–538, 2015.

Rabah Arezki, Valerie A Ramey, and Liugang Sheng. News shocks in open economies: Evidence from giant oil discoveries. *The quarterly journal of economics*, 132(1): 103–155, 2017.

Manuel Bagues and Berta Esteve-Volart. Politicians' luck of the draw: Evidence from the spanish christmas lottery. *Journal of Political Economy*, 124(5):1269–1294, 2016.

Aymeric Bellon, J Anthony Cookson, Erik P Gilje, and Rawley Z Heimer. Personal wealth, self-employment, and business ownership. *The Review of Financial Studies*, 34(8):3935–3975, 2021.

Vicente J Bermejo, Miguel A Ferreira, Daniel Wolfenzon, and Rafael Zambrana. Entrepreneurship and regional windfall gains: Evidence from the spanish christmas lottery. 2020.

Hoyt Bleakley and Jeffrey Lin. Portage and path dependence. *The quarterly journal of economics*, 127(2):587–644, 2012.

Leah Platt Boustan, Matthew E Kahn, Paul W Rhode, and Maria Lucia Yanguas. The effect of natural disasters on economic activity in us counties: A century of data. Technical report, National Bureau of Economic Research, 2017.

Joseph S Briggs, David Cesarini, Erik Lindqvist, and Robert Östling. Windfall gains and stock market participation. Technical report, National Bureau of Economic Research, 2015.

Anna Cabré, Andreu Domingo i Valls, and Teresa Menacho. Demografía y crecimiento de la población española durante el siglo xx. 2002.

Horacio Capel. Los estudios acerca de las migraciones interiores en españa. *Revista de Geografía*, pages 77–101, 1967.

David Cesarini, Erik Lindqvist, Matthew J Notowidigdo, and Robert Östling. The effect of wealth on individual and household labor supply: evidence from swedish lotteries. *American Economic Review*, 107(12):3917–46, 2017.

Jacelly Cespedes, Xing Huang, and Carlos Parra. More money, more options? the effect of cash windfalls on entrepreneurial activities in small businesses. *The Effect of Cash Windfalls on Entrepreneurial Activities in Small Businesses (February 11, 2021)*, 2021.

Terence C Cheng, Joan Costa-Font, and Nattavudh Powdthavee. Do you have to win it to fix it? a longitudinal study of lottery winners and their health-care demand. *American journal of health economics*, 4(1):26–50, 2018.

J Anthony Cookson, Erik P Gilje, and Rawley Z Heimer. Shale shocked: Cash windfalls and household debt repayment. Technical report, National Bureau of Economic Research, 2020.

Martí Marín Corbera. Franquismo e inmigración interior: el caso de sabadell (1939-1960). *Historia social*, pages 131–151, 2006.

Donald R Davis and David E Weinstein. Bones, bombs, and break points: the geography of economic activity. *American Economic Review*, 92(5):1269–1289, 2002.

Dennis Egger, Johannes Haushofer, Edward Miguel, Paul Niehaus, and Michael W Walker. General equilibrium effects of cash transfers: experimental evidence from kenya. Technical report, National Bureau of Economic Research, 2019.

Andreas Fagereng, Martin Blomhoff Holm, and Gisle James James Natvik. Mpc heterogeneity and household balance sheets. *Available at SSRN 3399027*, 2019.

Dolores Aguado Fernández. La vivienda, los precios de mercado y el catastro. *Indice: Revista de Estadística y Sociedad*, (4):12–13, 2004.

Bengt Furaker and Anna Hedenus. Gambling windfall decisions: Lottery winners and employment behavior. *UNLV Gaming Research & Review Journal*, 13(2):1, 2009.

Roberto Garvía. Syndication, institutionalization, and lottery play. *American Journal of Sociology*, 113(3):603–652, 2007.

JA Gómez Yáñez, JI Cases Méndez, C Lalanda, and G Gusano. Percepción social sobre el juego de azar en españa (ix), 2018.

Libertad González. The effect of a universal child benefit on conceptions, abortions, and early maternal labor supply. *American Economic Journal: Economic Policy*, 5(3):160–88, 2013.

Joshua K Hausman. Fiscal policy and economic recovery: The case of the 1936 veterans' bonus. *American Economic Review*, 106(4):1100–1143, 2016.

Stefano M Iacus, Gary King, and Giuseppe Porro. Cem: software for coarsened exact matching. 2009.

Guido W Imbens, Donald B Rubin, and Bruce I Sacerdote. Estimating the effect of unearned income on labor earnings, savings, and consumption: Evidence from a survey of lottery players. *American Economic Review*, 91(4):778–794, 2001.

Damon Jones and Ioana Marinescu. The labor market impacts of universal and permanent cash transfers: Evidence from the alaska permanent fund. Technical report, National Bureau of Economic Research, 2018.

Moon Jung Kim and Soohyung Lee. Can stimulus checks boost an economy under covid-19? evidence from south korea. *International Economic Journal*, 35(1):1–12, 2021.

Lorenz Kueng. Excess sensitivity of high-income consumers. *The Quarterly Journal of Economics*, 133(4):1693–1751, 2018.

Peter Kuhn, Peter Kooreman, Adriaan Soetevent, and Arie Kapteyn. The effects of lottery prizes on winners and their neighbors: Evidence from the dutch postcode lottery. *American Economic Review*, 101(5):2226–47, 2011.

Lotería Nacional. Anuario [texto impreso] lotería nacional. 1942.

Salvador Palazón Ferrando. La emigración española a américa latina durante el primer franquismo (1939-1959). interrupción y reanudación de una corriente tradicional. 1992.

Leandro Prados de la Escosura. *Spanish economic growth, 1850-2015*. Cham: Palgrave Macmillan, 2017.

Stephen J Redding, Daniel M Sturm, and Nikolaus Wolf. History and industry location: evidence from german airports. *Review of Economics and Statistics*, 93(3): 814–831, 2011.

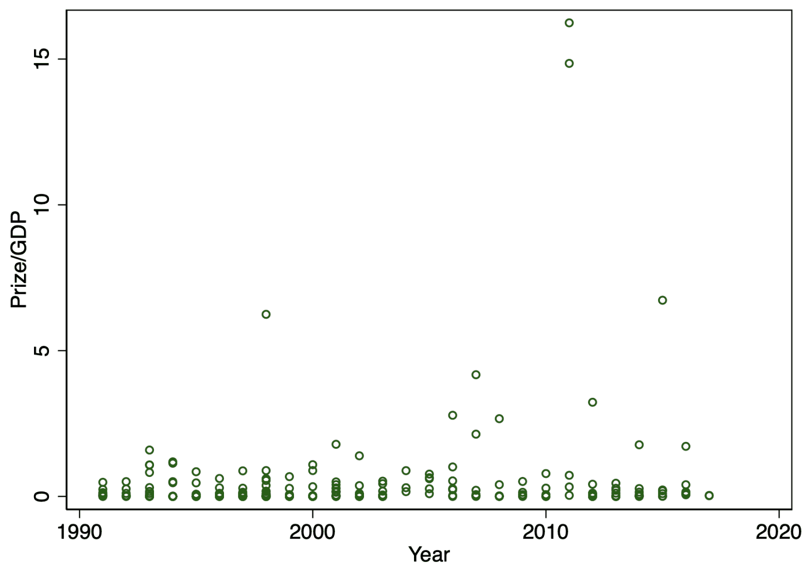
Matthew D Shapiro and Joel Slemrod. Did the 2001 tax rebate stimulate spending? evidence from taxpayer surveys. *Tax policy and the economy*, 17:83–109, 2003.

Matthew D Shapiro and Joel Slemrod. Did the 2008 tax rebates stimulate spending? *American Economic Review*, 99(2):374–79, 2009.

Juan Vilá Valentí. La aportación murciana al crecimiento poblacional de barcelona. In *Anales de la Universidad de Murcia. Filosofía y Letras*. Murcia: Universidad, Secretariado de Publicaciones, 1959.

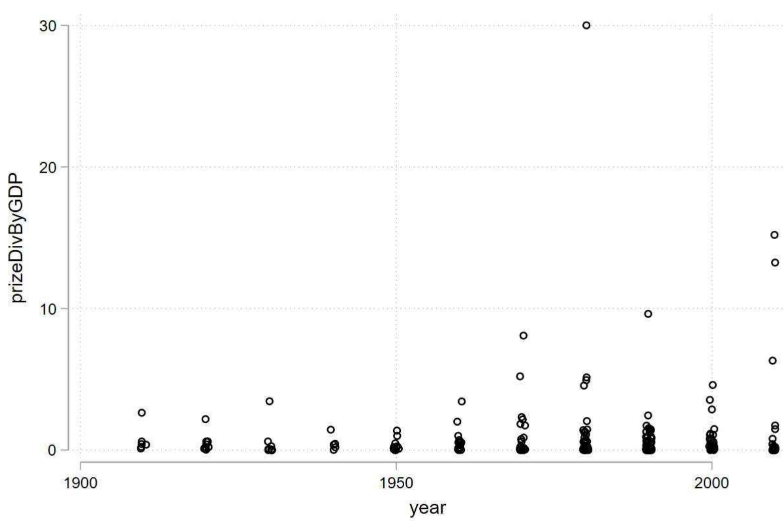
10. Additional Figures and Tables

(a) Prize as a fraction of GDP Over Time 1990-2016



Notes: This figure plots the winning towns each year by their prize as a share of their estimated GDP. Extremely large prizes are more prevalent in later years.

(b) Prize as a fraction of GDP Over Time 1910-2010



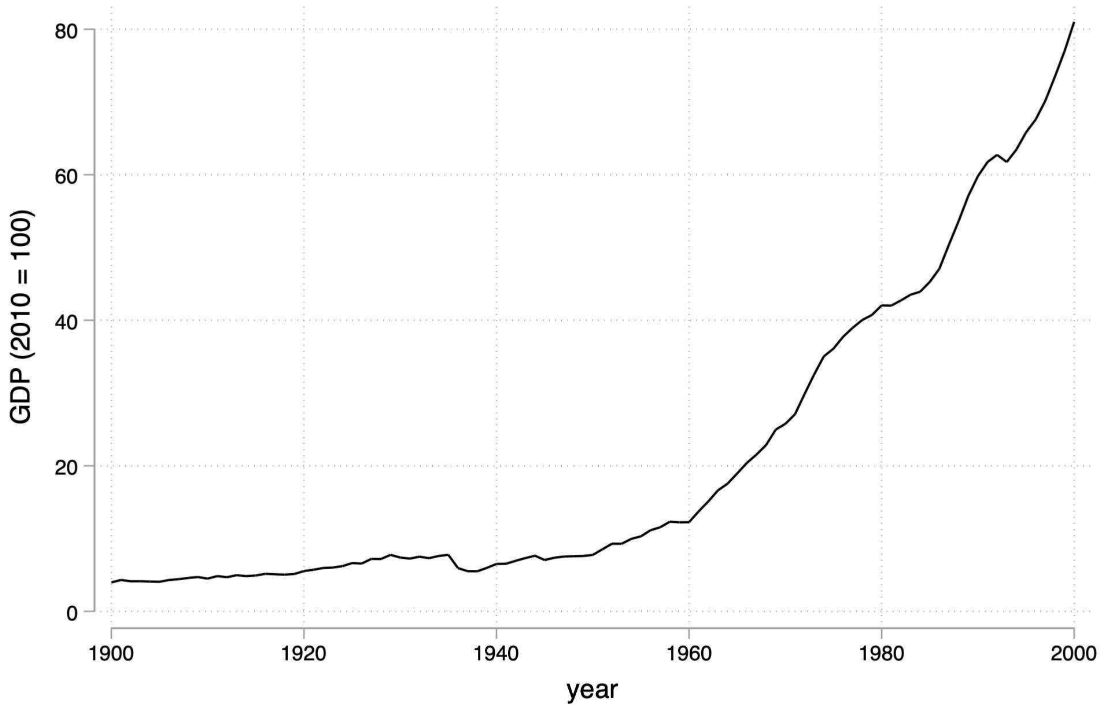
Notes: This figure plots the number of winning towns each decade by the size of the prize as a fraction of a town's estimated GDP.

Table 2: Overview of Data Elements

Type	Population	Details	Years
Lottery wins	All	Number of winning tickets sold in each town, whether or not tickets were sold to residents of the town, prize per ticket.	1991 to 2016
Lottery Expenditures	All	Total lottery ticket sales in that year for each town.	1991 to 2017
Cars and Trucks	All	Annual data on the number of car and truck registrations in each town from INE.	1991 (cars only), 1992 to 2017
Assessed Property Values	All towns in 48 of 52 provinces	Tax-assessed property values from Spanish tax records. Land is classified as drural or urban. Each town is assessed once every several years. Assessed values take into account the quality of the property and market price, but are often far below market price. Also includes the number of rural and urban properties, and local property tax rates.	1990 to 2018
Land Uses & Productivity	All	Decennial data from the agrarian census on land usage and productivity.	1991 to 2015
Property Transactions	All	Quarterly administrative data on the number of property sales, subdivided by new and secondhand properties.	2004 to 2019
Business Licenses	3,400 towns (missing small towns)	Annual data on the total number of business licenses (required to establish a firm).	1992 to 2014
Banks	3,350 towns (missing small towns)	Total number of banks in each town, from the National Institute of Statistics in Spain.	1992 to 2014
Employment	All	Monthly employment data by sector for each town, from INE.	1999 to 2018 (December only), 2003-2018 (all months)
Unemployment	All	Monthly unemployment data by sector, gender, and age group from INE.	2006 to 2016
Population (Annual)	All	Annual population data from Padrón municipal registry.	1986-2016
Population (decennial)	All	Decennial population data from the census.	1900 to 2011
Migration	All	Data on count of migrant inflow and outflow, in addition to nationality and age of migrants, from the *Estadísticas de Variaciones Residenciales*.	1988 to 2016
Vital Statistics	All	Data on births, deaths, and marriages from INE.	1975 to 2016

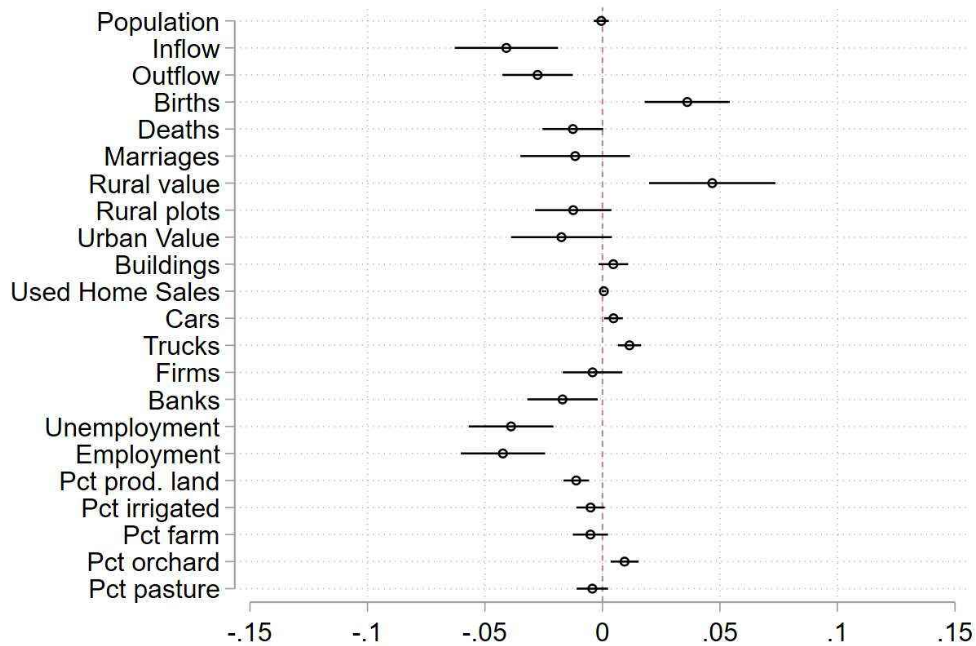
Notes: INE refers to the National Institute of Statistics in Spain.

Figure 8: Spanish GDP Over Time



Notes: In this figure we plot spanish GDP growth over time from 1900 to 2000 using data from Prados de la Escosura (2017). GDP in 2010 is normalized to 100. Here we observe relatively slow GDP growth prior to 1960, after which GDP begins to rapidly increase.

Figure 9: Static difference in difference coefficients



Notes: This figure presents results from a static difference in difference estimating the effect of winning the lottery on various outcomes of interest in the post period for Big Winners. Each point estimate has its corresponding 95% confidence interval.

Table 3: Static Difference in Difference Estimates: Population

	Population	Inflow	Outflow	Births	Deaths	Marriages
Treated x Post	-0.0005	-0.0409	-0.0276	0.0361	-0.0126	-0.0116
	(0.0016)	(0.0112)	(0.0076)	(0.0092)	(0.0066)	(0.0119)
Observations	4928	4851	4928	4928	4928	4928

Notes: This table shows point estimates from equation $y_{mt} = \gamma_m + \mu_c + \beta(\text{Post}_t \times \text{Winner}_m) + \varepsilon_{mt}$ estimated for big prize winners and matched controls.

Table 4: Static Difference in Difference Estimates: Land and Property Assets

	Rural Value	Rural Plots	Urban Value	Buildings
Treated x Post	0.0467	-0.0124	-0.0174	0.0046
	(0.0137)	(0.0083)	(0.0109)	(0.0032)
Observations	3598	3598	3612	3605

Notes: This table shows point estimates from equation $y_{mt} = \gamma_m + \mu_c + \beta(\text{Post}_t \times \text{Winner}_m) + \varepsilon_{mt}$ estimated for big prize winners and matched controls.

Table 5: Static Difference in Difference Estimates: Business outcomes

	Cars	Trucks	Firms	Banks	Unemp.	Emp.
Treated x Post	0.0047	0.0115	-0.0042	-0.0170	-0.0389	-0.0424
	(0.0020)	(0.0025)	(0.0065)	(0.0076)	(0.0092)	(0.0091)
Observations	4879	4928	4879	2674	4088	1428

Notes: This table shows point estimates from equation $y_{mt} = \gamma_m + \mu_c + \beta(\text{Post}_t \times \text{Winner}_m) + \varepsilon_{mt}$ estimated for big prize winners and matched controls.

Table 6: Static Difference in Difference Estimates: Land Productivity

	Prod. Land	Non-Irrigated	Farm	Orchard	Pasture
Treated x Post	-0.0112	-0.0050	-0.0051	0.0094	-0.0043
	(0.0028)	(0.0031)	(0.0038)	(0.0030)	(0.0034)
Observations	2856	2842	2842	2842	2842

Notes: This table shows point estimates from equation $y_{mt} = \gamma_m + \mu_c + \beta(\text{Post}_t \times \text{Winner}_m) + \varepsilon_{mt}$ estimated for big prize winners and matched controls.

Table 7: Dynamic Difference in Difference Estimates: Business outcomes

	Firms	Banks	Cars	Trucks	Employment	Unemployment
treatedXtMin4	-0.03***	-0.01	-0.00	0.01**	0.03**	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
treatedXtMin3	-0.03**	-0.04***	-0.00	-0.00	0.01	-0.03**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
treatedXtMin2	-0.01	-0.00	0.00	0.00	0.00	-0.03
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
treatedXt0	-0.00	-0.01	0.00	0.01	-0.01	-0.05***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
treatedXtPlus1	-0.04***	-0.04***	0.01**	0.02***	-0.06***	-0.04***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
treatedXtPlus2	-0.01	-0.04***	0.01	0.02***	-0.04***	-0.08***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	4879	2674	4879	4928	1428	4088

Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms. Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

Table 8: Dynamic Difference in Difference Estimates: Land and Property Assets

	Rural Value	Rural Plots	Urban Value	Buildings	Home Sales
treatedXtMin4	-0.02	0.00	-0.03	-0.01	0.00**
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
treatedXtMin3	0.02	-0.01	-0.00	-0.00	0.00
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
treatedXtMin2	-0.01	0.00	0.03	-0.00	0.00
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
treatedXt0	0.01	-0.01	-0.03**	0.00	0.00
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
treatedXtPlus1	0.02	-0.02	-0.03	0.00	0.00
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
treatedXtPlus2	0.13***	-0.01	0.02	0.00	0.00***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)
Observations	3598	3598	3612	3605	875

Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms except for used home sales, which is in per capita terms. Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

Table 9: Dynamic Difference in Difference Estimates: Population

	Population	Inflow	Outflow	Births	Deaths	Marriages
treatedXtMin4	-0.00	-0.02	0.01	-0.03*	-0.02	0.01
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
treatedXtMin3	-0.00	-0.02	0.03**	-0.07***	0.02**	0.07***
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
treatedXtMin2	0.00	0.00	0.03**	-0.02	-0.02*	0.02
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
treatedXt0	0.00	-0.02	-0.03**	-0.02	-0.02	0.00
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
treatedXtPlus1	-0.00	-0.08***	0.00	0.00	-0.02**	-0.02
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
treatedXtPlus2	0.00	-0.05***	-0.01	0.06***	-0.01	0.05***
	(0.00)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
Observations	4928	4851	4928	4928	4928	4928

Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms. Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

Table 10: Big vs. Small Winners: Business outcomes

	Firms	Banks	Cars	Trucks	Employment	Unemployment
bigPrizeXtMin4	-0.03*	0.02	-0.01	0.01	0.04**	-0.04
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
bigPrizeXtMin3	-0.02	-0.02	-0.01	-0.01	0.03	-0.04
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
bigPrizeXtMin2	-0.00	-0.00	0.00	-0.00	-0.00	-0.03
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
bigPrizeXt0	-0.00	-0.01	0.01	0.01	-0.00	-0.03
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
bigPrizeXtPlus1	-0.04**	-0.02	0.01	0.02*	-0.02	-0.01
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.03)
bigPrizeXtPlus2	-0.01	-0.01	0.01	0.02*	-0.04*	-0.03
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.03)
Observations	943	779	937	945	589	839

Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms.Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

Table 11: Big vs. Small Winners: Land and Property Assets

	Rural Value	Rural Plots	Urban Value	Buildings	Home Sales
bigPrizeXtMin4	-0.01	-0.03	0.01	0.00	0.00*
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
bigPrizeXtMin3	0.03	-0.02	0.02	0.00	0.00
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
bigPrizeXtMin2	-0.01	-0.00	0.04	-0.00	0.00
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
bigPrizeXt0	0.02	0.00	-0.04	0.00	0.00
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
bigPrizeXtPlus1	0.03	-0.00	-0.03	-0.00	0.00
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
bigPrizeXtPlus2	0.14***	0.01	0.02	-0.00	0.00
	(0.05)	(0.02)	(0.04)	(0.01)	(0.00)
Observations	879	879	879	861	335

Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms except for used home sales, which is in per capita terms. Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

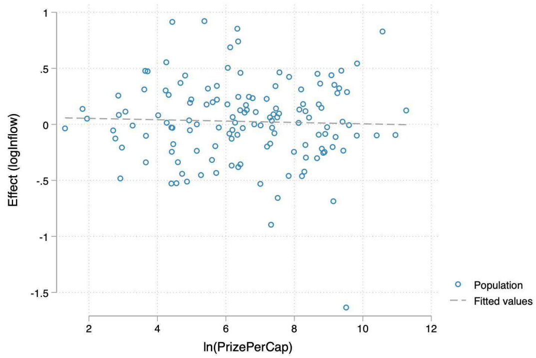
Table 12: Big vs. Small Winners: Population

	Population	Inflow	Outflow	Births	Deaths	Marriages
bigPrizeXtMin4	-0.00	0.01	0.00	-0.01	-0.02	0.03
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
bigPrizeXtMin3	-0.00	0.01	0.02	-0.04	0.02	0.09**
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
bigPrizeXtMin2	-0.00	0.01	0.02	-0.01	-0.02	0.03
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
bigPrizeXt0	0.00	-0.01	-0.02	-0.02	-0.03	0.01
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
bigPrizeXtPlus1	0.00	-0.09**	0.01	-0.01	-0.03	-0.03
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
bigPrizeXtPlus2	0.01	-0.09**	0.00	0.04	-0.00	0.05
	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.04)
Observations	945	944	945	945	945	945

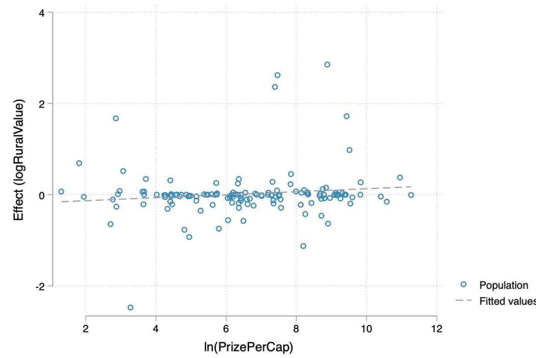
Notes: This table shows point estimates from equation 1 for the effect of winning the lottery each year after a lottery win estimated for a balanced panel of big winners with 4 years of pre data and 3 years of post data. Variables are in log terms. Year and town fixed effects included. Standard errors in parenthesis. $*p < 0.10, **p < 0.05, ***p < 0.01$

Figure 10: Effect Estimates by Prize

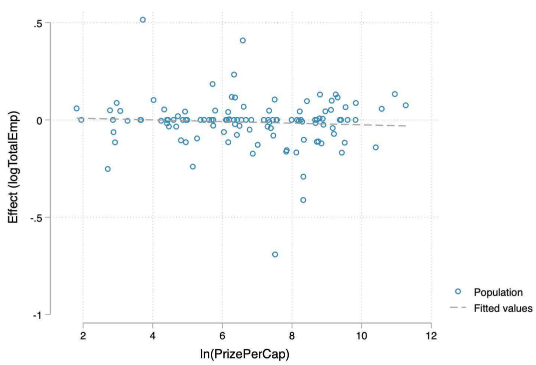
(a) Log Inflow



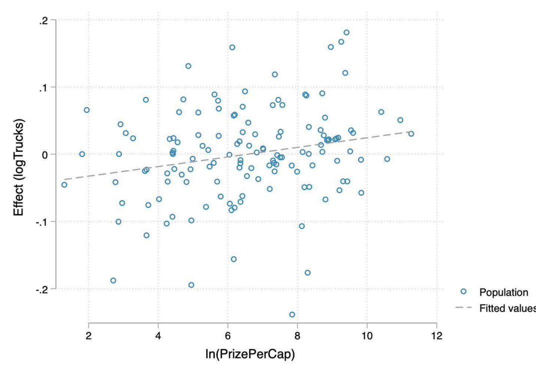
(b) Log Rural Value



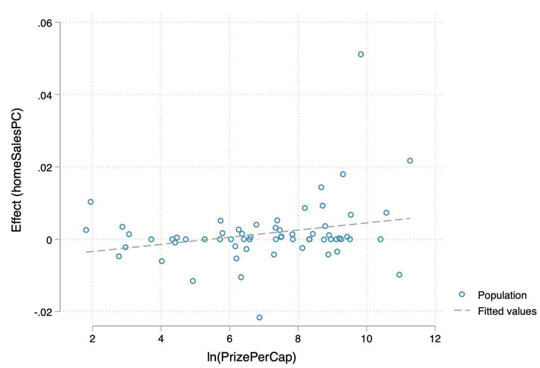
(c) Log Employment



(d) Log Trucks



(e) Home Sales PerCapita



Notes: In these figures we plot the individual estimates for each winning town based on the log prize per capita. All variables are in logs except for home sales, which is in per capita terms. For most outcomes we observe a small gradient in the same direction of our main estimates, suggesting that larger prizes lead to larger treatment effects.

Figure A.11: Sample Newspaper Report

47.884

Una comparsa reparte el 'gordo' en El Campello

EL PAÍS

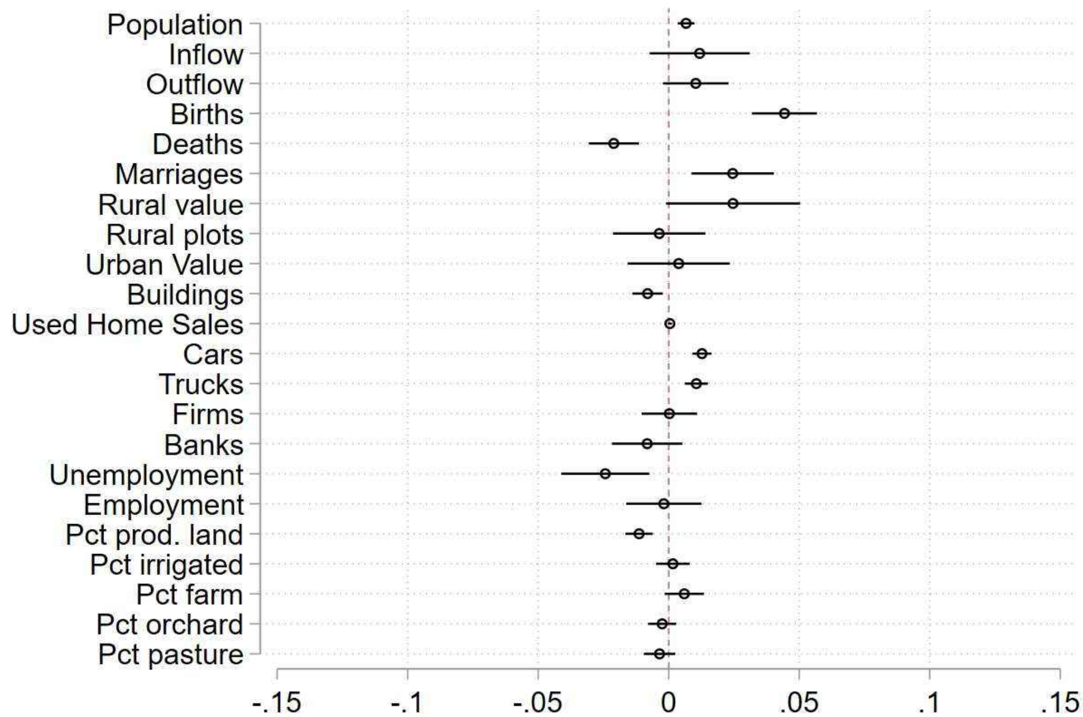
23 DIC 1993

El gordo de Navidad fue cristiano. Los integrantes de la comparsa Jaume I de El Campello (Alicante) distribuyeron 700 décimos el *gordo* en participaciones para recaudar fondos destinados a las estas en las que cada año se enfrentan a los moros. El próximo año, los cristianos estarán mejor pertrechados, porque les han correspondido cerca de 21.000 millones, distribuidos principalmente entre los 90 festeros -con edades comprendidas entre los 14 y los 35 años- y sus familiares y amigos. Todos son ahora millonarios. La lotería de ayer salió princialmente rural. El Campello (12.000 habitantes) se llevó el *gordo* casi en exclusiva (un natural de allí *trasladó* 2.500 millones a Terrassa, Barcelona). La localidad granadina de Padul (6.500 habitantes) centró el reparto del *vicegordo*. *Y* Sariñena, un pueblo oscense de 4.000 habitantes, recibió el tercero, del que sólo dejó escapar un pellizco a Barcelona. En los cuartos y los quintos, Barcelona y Madrid hicieron valer su poder estadístico 8s on las provincias que más juegan), pero se colaron de rondón Muskiz, de Vizcaya (cuarto premio), Ferrol y la localidad aragonesa donde cayó el gordo en 1992: Calatayud (el quinto premio).

* Este artículo apareció en la edición impresa del Jueves, 23 de diciembre de 1993

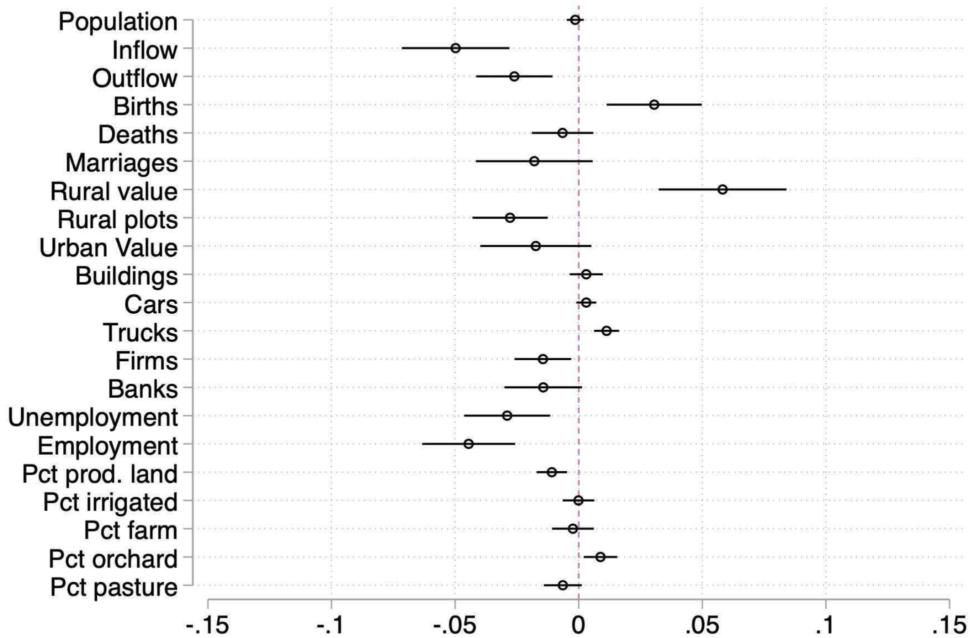
Notes: This figure shows a screenshot of a sample newspaper article on towns that won the lottery from the newspaper *El País* in 1993.

Figure A.12: Static Difference in Difference Weighted by Population



Notes: This figure presents static difference in difference results for our outcomes of interest where each group of matched treated and control towns are weighted by the population of the treated town in the year prior to the lottery win.

(a) Static difference in difference, 4 post years



Notes: This figure presents static difference in difference results for our outcomes of interest when we expand our bandwidth to include four years of post data.

(b) Static difference in difference, 5 post years

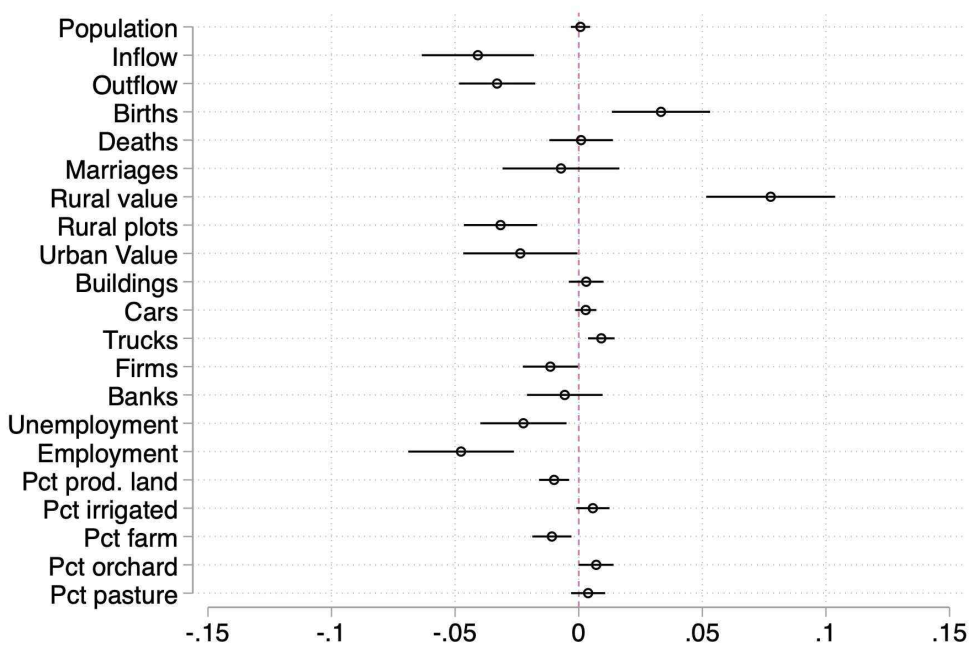
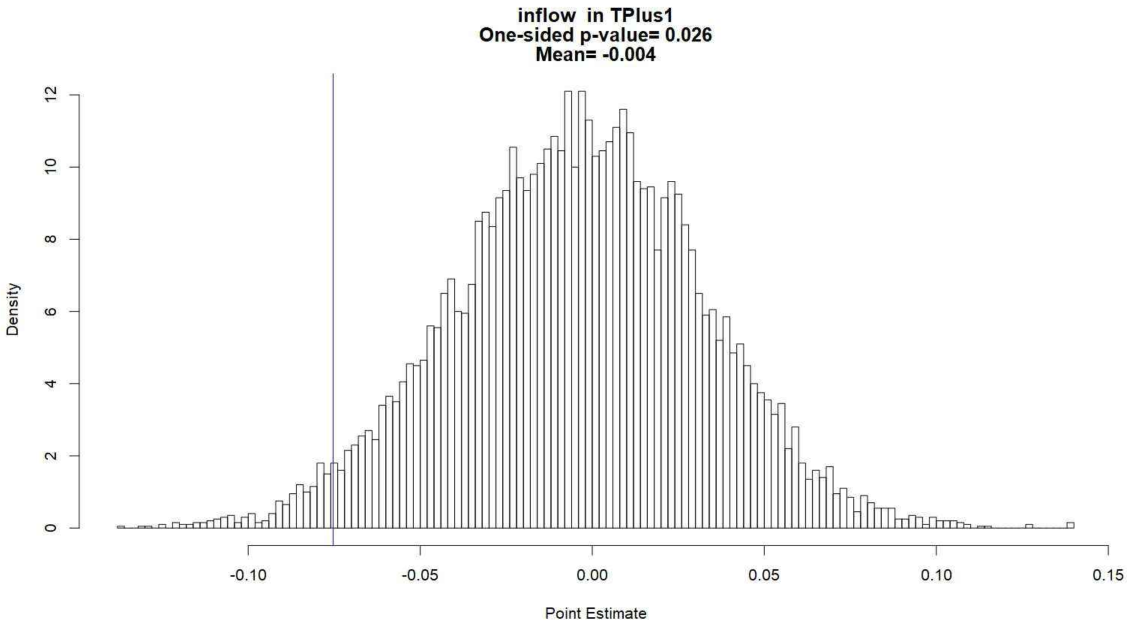
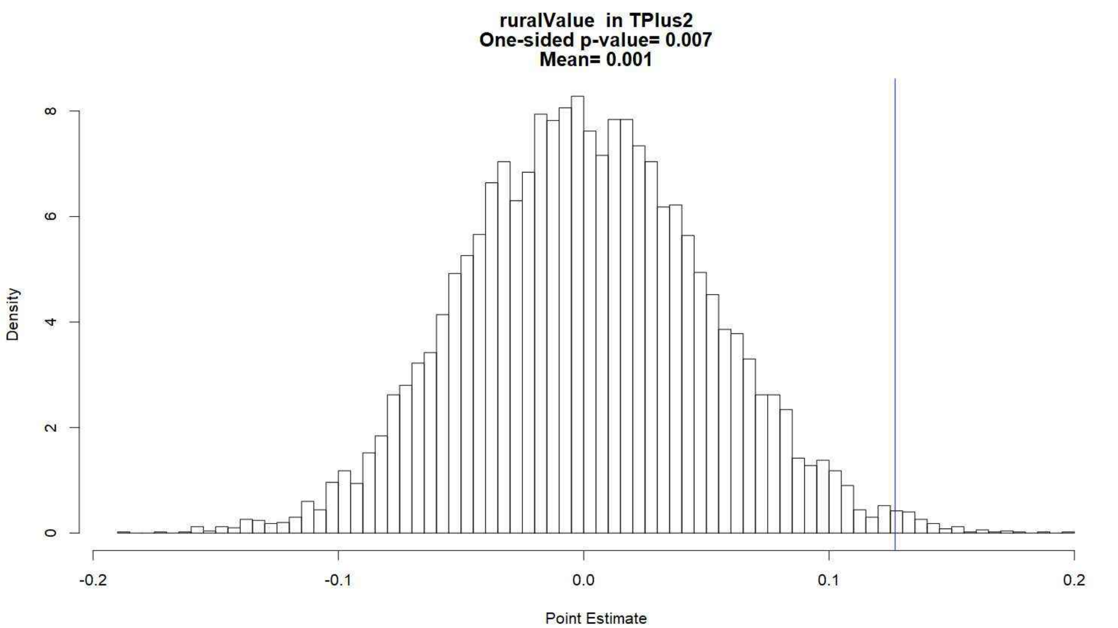


Figure A.14: Long run population effects

(a) Permutation Histogram, Population inflow T+1



(b) Permutation Histogram, Rural Value T+2



Notes: This figure presents the distribution of estimates from 10,000 permutations of treatment assignment for our two largest coefficients. Vertical lines represent our original estimates. We report a one-sided p.value and the mean of the distribution.

Table A.13: Permutation Test: Population

	Population	Inflow	Outflow	Births	Deaths	Marriages
treatedXtMin4	0.000	-0.024	0.014	-0.029	-0.015	0.006
	[0.473]	[0.307]	[0.583]	[0.186]	[0.288]	[0.56]
treatedXtMin3	-0.003	-0.017	0.029	-0.067	0.023	0.066
	[0.311]	[0.443]	[0.668]	[0.027]	[0.785]	[0.677]
treatedXtMin2	0.000	0.004	0.028	-0.022	-0.021	0.025
	[0.466]	[0.55]	[0.64]	[0.131]	[0.268]	[0.721]
treatedXt0	0.001	-0.02	-0.027	-0.019	-0.016	0.004
	[0.426]	[0.056]	[0.195]	[0.06]	[0.389]	[0.166]
treatedXtPlus1	-0.001	-0.075	0.004	0.001	-0.024	-0.018
	[0.189]	[0.026]	[0.46]	[0.475]	[0.144]	[0.277]
treatedXtPlus2	0.000	-0.053	-0.006	0.057	-0.005	0.055
	[0.25]	[0.15]	[0.356]	[0.807]	[0.557]	[0.726]
Permutations	10,000	10,000	10,000	10,000	10,000	10,000

Notes: This table shows the results of our permutation test. We report our original point estimates and the corresponding one-sided p.values in brackets from the 10,000 permutations. Variables are in log terms.

Table A.14: Permutation Test: Business Outcomes

	Firms	Banks	Cars	Trucks	Employment	Unemployment
treatedXtMin4	-0.028	-0.007	-0.003	0.01	0.031	-0.002
	[0.048]	[0.405]	[0.576]	[0.884]	[0.893]	[0.436]
treatedXtMin3	-0.026	-0.036	-0.003	-0.003	0.014	-0.032
	[0.026]	[0.062]	[0.409]	[0.55]	[0.685]	[0.186]
treatedXtMin2	-0.007	-0.003	0.003	0.001	0.000	-0.034
	[0.359]	[0.448]	[0.552]	[0.691]	[0.381]	[0.093]
treatedXt0	-0.001	-0.014	0.002	0.006	-0.013	-0.054
	[0.673]	[0.34]	[0.569]	[0.795]	[0.056]	[0.017]
treatedXtPlus1	-0.043	-0.035	0.007	0.016	-0.057	-0.039
	[0.032]	[0.107]	[0.67]	[0.943]	[0.051]	[0.055]
treatedXtPlus2	-0.01	-0.035	0.005	0.018	-0.041	-0.078
	[0.374]	[0.157]	[0.489]	[0.866]	[0.092]	[0.008]
Permutations	10,000	10,000	10,000	10,000	10,000	10,000

Notes: This table shows the results of our permutation test. We report our original point estimates and the corresponding one-sided p.values in brackets from the 10,000 permutations. Variables are in log terms.

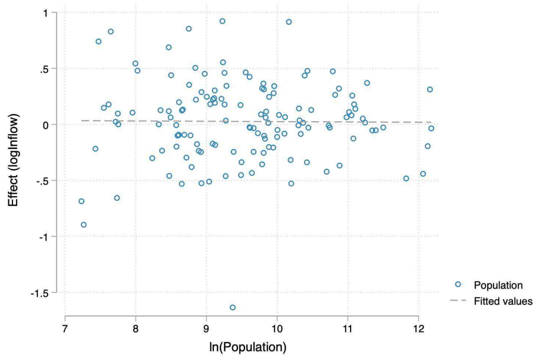
Table A.15: Permutation Test: Land and Property Assets

	Rural Value	Rural Plots	Urban Value	Buildings	Home Sales
treatedXtMin4	-0.016	0.004	-0.025	-0.007	-0.001
	[0.399]	[0.78]	[0.303]	[0.31]	[0.861]
treatedXtMin3	0.021	-0.012	-0.003	-0.004	0.001
	[0.546]	[0.676]	[0.327]	[0.314]	[0.38]
treatedXtMin2	-0.007	0.001	0.027	-0.002	0.000
	[0.333]	[0.584]	[0.629]	[0.372]	[0.284]
treatedXt0	0.011	-0.009	-0.035	0.003	0.000
	[0.701]	[0.114]	[0.198]	[0.458]	[0.587]
treatedXtPlus1	0.018	-0.021	-0.026	0.000	0.000
	[0.854]	[0.035]	[0.286]	[0.432]	[0.724]
treatedXtPlus2	0.127	-0.013	0.024	0.002	0.003
	[0.993]	[0.232]	[0.628]	[0.496]	[0.95]
Permutations	10,000	10,000	10,000	10,000	10,000

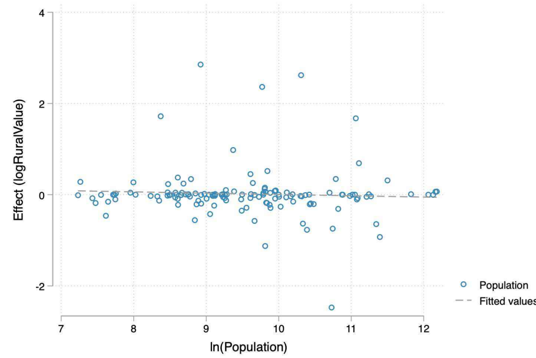
Notes: This table shows the results of our permutation test. We report our original point estimates and the corresponding one-sided p.values in brackets from the 10,000 permutations. Variables are in log terms.

Figure A.15: Effect Estimates by Prize

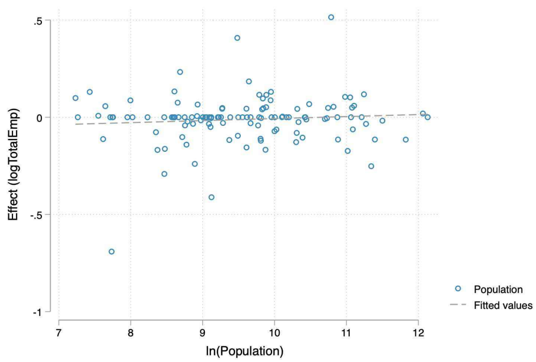
(a) Log Inflow



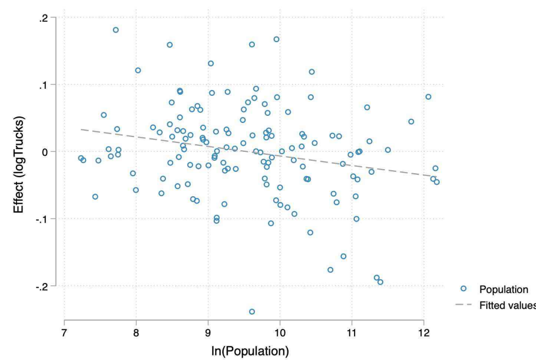
(b) Log Rural Value



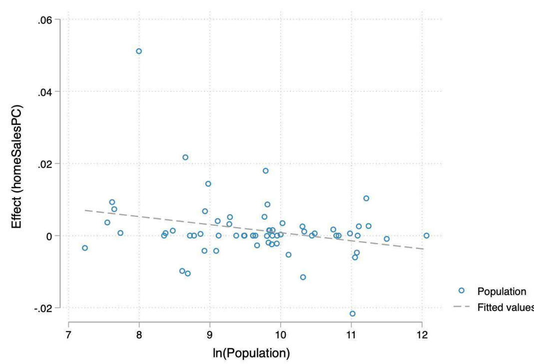
(c) Log Employment



(d) Log Trucks

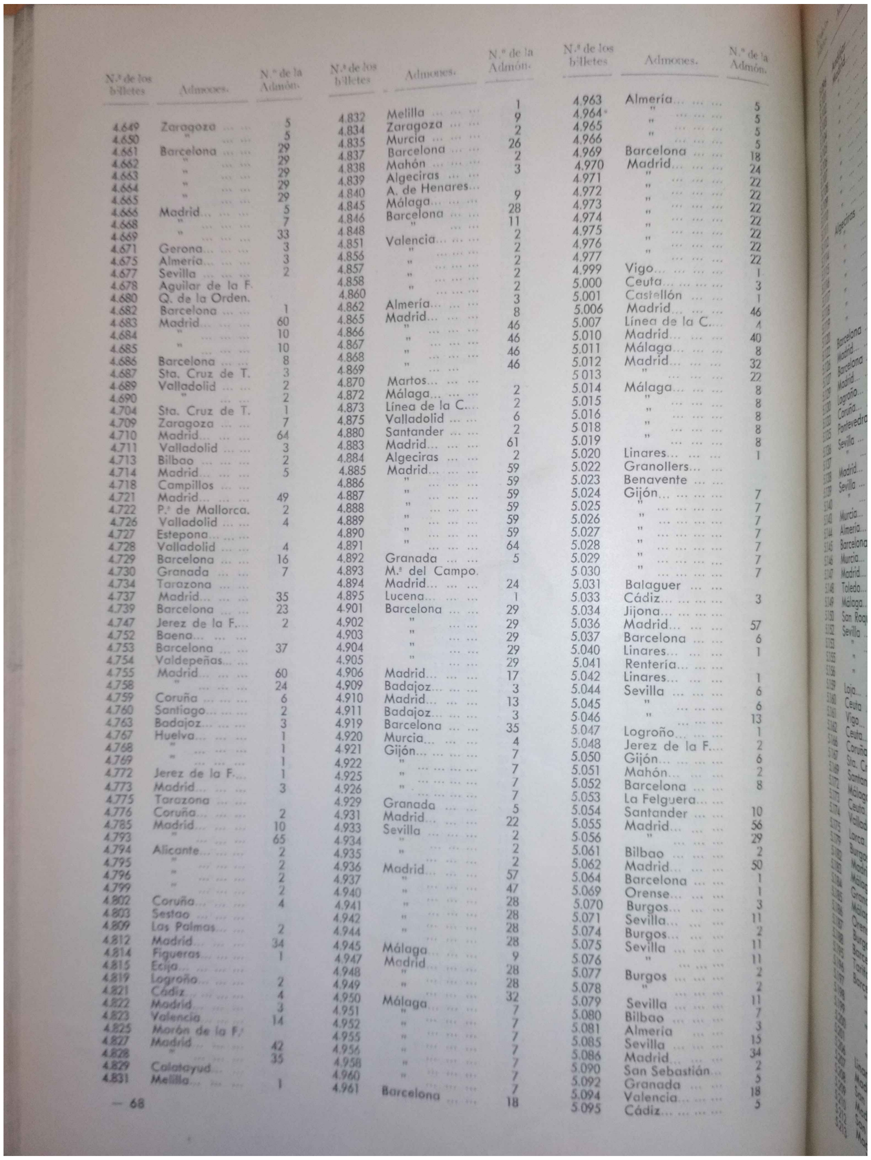


(e) Home Sales PerCapita



Notes: In these figures we plot the individual estimates for each winning town based on the log population. All variables are in logs except for home sales, which is in per capita terms.

Figure A.16: Sample page from 1942 lottery yearbook



N.º de los billetes	Admones.	N.º de la Admón.
4.649	Zaragoza	5
4.650	"	5
4.661	Barcelona	29
4.662	"	29
4.663	"	29
4.664	"	29
4.665	"	29
4.666	Madrid	5
4.668	"	7
4.669	"	33
4.671	Gerona	3
4.675	Almería	3
4.677	Sevilla	2
4.678	Aguilar de la F.	
4.680	Q. de la Orden.	
4.682	Barcelona	1
4.683	Madrid	60
4.684	"	10
4.685	"	10
4.686	Barcelona	8
4.687	Sta. Cruz de T.	3
4.689	Valladolid	2
4.690	"	2
4.704	Sta. Cruz de T.	1
4.709	Zaragoza	7
4.710	Madrid	64
4.711	Valladolid	3
4.713	Bilbao	2
4.714	Madrid	5
4.718	Campillos	
4.721	Madrid	49
4.722	P.ª de Mallorca.	2
4.726	Valladolid	4
4.727	Estepona	
4.728	Valladolid	4
4.729	Barcelona	16
4.730	Granada	7
4.734	Tarazona	
4.737	Madrid	35
4.739	Barcelona	23
4.747	Jerez de la F.	2
4.752	Baena	
4.753	Barcelona	37
4.754	Valdepeñas	
4.755	Madrid	60
4.758	"	24
4.759	Coruña	6
4.760	Santiago	2
4.763	Badajoz	3
4.767	Huelva	1
4.768	"	1
4.769	"	1
4.772	Jerez de la F.	1
4.773	Madrid	3
4.775	Tarazona	
4.776	Coruña	2
4.785	Madrid	10
4.793	"	65
4.794	Alicante	2
4.795	"	2
4.796	"	2
4.799	"	2
4.802	Coruña	4
4.803	Sestao	
4.809	Las Palmas	2
4.812	Madrid	34
4.814	Figueras	1
4.815	Écija	
4.819	Logroño	2
4.821	Cádiz	4
4.822	Madrid	3
4.823	Valencia	14
4.825	Morón de la F.	
4.827	Madrid	42
4.828	"	35
4.829	Calatayud	
4.831	Melilla	1
4.832	Melilla	1
4.834	Zaragoza	9
4.835	Murcia	2
4.837	Barcelona	26
4.838	Mahón	2
4.839	Algeciras	3
4.840	A. de Henares	
4.845	Málaga	9
4.846	Barcelona	28
4.848	"	11
4.851	Valencia	2
4.856	"	2
4.857	"	2
4.858	"	2
4.860	"	2
4.862	Almería	3
4.865	Madrid	8
4.866	"	46
4.867	"	46
4.868	"	46
4.869	"	46
4.870	Martos	
4.872	Málaga	2
4.873	Línea de la C.	2
4.875	Valladolid	6
4.880	Santander	2
4.883	Madrid	61
4.884	Algeciras	2
4.885	Madrid	59
4.886	"	59
4.887	"	59
4.888	"	59
4.889	"	59
4.890	"	59
4.891	"	64
4.892	Granada	5
4.893	M.ª del Campo.	
4.894	Madrid	24
4.895	Lucena	1
4.901	Barcelona	29
4.902	"	29
4.903	"	29
4.904	"	29
4.905	"	29
4.906	Madrid	17
4.909	Badajoz	3
4.910	Madrid	13
4.911	Badajoz	3
4.919	Barcelona	35
4.920	Murcia	4
4.921	Gijón	7
4.922	"	7
4.925	"	7
4.926	"	7
4.929	Granada	5
4.931	Madrid	22
4.933	Sevilla	2
4.934	"	2
4.935	"	2
4.936	Madrid	57
4.937	"	47
4.940	"	28
4.941	"	28
4.942	"	28
4.944	"	28
4.945	Málaga	9
4.947	Madrid	28
4.948	"	28
4.949	"	32
4.950	Málaga	7
4.951	"	7
4.952	"	7
4.955	"	7
4.956	"	7
4.958	"	7
4.960	"	7
4.961	Barcelona	18
4.963	Almería	5
4.964	"	5
4.965	"	5
4.966	"	5
4.969	Barcelona	18
4.970	Madrid	24
4.971	"	22
4.972	"	22
4.973	"	22
4.974	"	22
4.975	"	22
4.976	"	22
4.977	"	22
4.999	Vigo	1
5.000	Ceuta	3
5.001	Castellón	1
5.006	Madrid	46
5.007	Línea de la C.	4
5.010	Madrid	40
5.011	Málaga	8
5.012	Madrid	32
5.013	"	22
5.014	Málaga	8
5.015	"	8
5.016	"	8
5.018	"	8
5.019	"	8
5.020	Linares	1
5.022	Granollers	
5.023	Benavente	
5.024	Gijón	7
5.025	"	7
5.026	"	7
5.027	"	7
5.028	"	7
5.029	"	7
5.030	"	7
5.031	Balaguer	
5.033	Cádiz	3
5.034	Jijona	
5.036	Madrid	57
5.037	Barcelona	6
5.040	Linares	1
5.041	Rentería	
5.042	Linares	1
5.044	Sevilla	6
5.045	"	6
5.046	"	13
5.047	Logroño	1
5.048	Jerez de la F.	2
5.050	Gijón	6
5.051	Mahón	2
5.052	Barcelona	8
5.053	La Felguera	
5.054	Santander	10
5.055	Madrid	56
5.056	"	29
5.061	Bilbao	2
5.062	Madrid	50
5.064	Barcelona	1
5.069	Orense	1
5.070	Burgos	3
5.071	Sevilla	11
5.074	Burgos	2
5.075	Sevilla	11
5.076	"	11
5.077	Burgos	2
5.078	"	2
5.079	Sevilla	11
5.080	Bilbao	7
5.081	Almería	3
5.085	Sevilla	15
5.086	Madrid	34
5.090	San Sebastián	2
5.092	Granada	5
5.094	Valencia	18
5.095	Cádiz	5

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Notes: This image corresponds to page 68 of the 1942 lottery yearbook. We observe for every possible lottery number the location and the administration where that number was sent to. In total, there are 39.939 number entries.