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The Sentimental Propagation of Lottery Winnings: Evidence from the Spanish Christmas Lottery

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We leverage a unique natural experiment, the Spanish Christmas lottery, to investigate the impact of highly geographically clustered winnings on macroeconomic aggregates, and on sentiment and durable consumption, using survey evidence. Lottery winnings induce significant demand effects, especially during recessions, reducing unemployment and increasing job creation and CPI prices. Albeit not receiving wins, households in winning provinces become more optimistic on impact and significantly increase their durable consumption (for furniture and vehicles) six months after the shock. We propose this lottery as an unconventional fiscal policy tool for increasing aggregate revenues and stimulating local demand without crowding out aggregate activity.

JEL Codes: D12, E21, E32, E62

Keywords: Randomized natural experiment, transitory income shocks, sentiment and consumption responses.

1 Introduction

How the economy responds to transitory income shocks is a recurrent question in macroeconomics and public finance. In the framework of the permanent income hypothesis, starting from Poterba (1988), there is a vast literature investigating how changes in current and future income affect individual consumption behavior. Yet, few studies analyze the macroeconomic effects of transitory income shocks since it is difficult to identify such shocks in the data. This difficulty calls for the search of "natural experiments": Poterba (1988) and Misra and Surico (2014) study tax rebates and estimate the response of expenditures to such transitory income variations. Parker et al. (2013) study the economic stimulus payments of 2008, exploiting variation from the randomized timing of disbursement. Romer and Romer (2016) construct a series of legislated increases in social security benefits in the U.S. from 1951 to 1991 and show that they have a significant positive effect on consumption upon impact. Parraga Rodríguez (2016) extends their framework and estimates transfer multipliers.

This paper uses the exceptional nature of the Spanish Christmas lottery to estimate jointly the individual and aggregate effects of transitory income shocks that are shared among many people living in the same province and accentuates the role of consumer confidence for the transmission of these shocks[1].

The Spanish Lottery, held every Christmas since 1812, has three characteristics that are different from other lotteries: (i) Large size and quantity of prizes each year, (ii) Clustering of prizes to individuals living in the same Spanish province and (iii) High level of participation. Each winner of the first prize, known as *El Gordo* (the fatty), receives around €20,000 per euro played, and the standard ticket costs €20. Moreover, winners of the second and third top prizes receive €6,250 and €2,500 per euro played, respectively. The top prizes represent around half of the total payout assigned to prizes. Importantly for our experiment, winners tend to be geographically clustered. Instead of awarding one big prize to few individuals, as is the case of most lottery schemes, the top prizes are awarded to several thousands individuals sharing the same ticket number. Usually, one lottery outlay sells most (if not all) of the series of a single number in the lottery. The winning provinces receive an income shock equivalent, on average, to 0.2 percent of their GDP. For the provinces that receive the maximum lottery prize per capita, the income shock represents, on average, around 2.9 percent of provincial GDP.[2] Finally, because sharing Christmas lottery tickets is a social tradition, the lottery has an extremely high participation rate that is reflected in the high prizes for the winners.

To examine the dynamic macroeconomic effects of the Spanish lottery income shock we employ

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[1]The response of consumption and hours to lottery income at the individual level has been studied extensively. (See, e.g., Imbens, Rubin and Sacerdote (2001) for evidence using a lottery in Massachusetts in the mid-1980s, Fagereng, Holm and Natvik (2018) using Norwegian data, Lindqvist, Östling and Cesarini (2020), using Swedish data, Oswald and Winkelmann (2019) using German data, Kuhn et al. (2011) using lottery winnings of Dutch Postcode Lottery and Picchio, Suetens and van Ours (2018) using Dutch State Lottery prizes.

[2]The average lottery prize as a share of GDP has been computed using data from 2005-2017. Unfortunately, there is no available GDP data at the province level since 2018.

local projections (See, e.g., Jordà (2005)) and investigate how the per capita lottery prize affects labor market dynamics and CPI prices using monthly Spanish province-level data. We find that lottery wins have significant and economically important stimulative effects at the province level. On average, after a province wins a lottery of 1000 euros per capita the unemployment rate falls sluggishly reaching its maximum fall (-0.3 percentage points) after a year and remains significantly low 20 months after the initial impact. The significant drop in unemployment cannot be attributed to a reduction in participation induced by the wealth effect of the lottery win. We show that the number of short and long-run contracts signed by individuals registered as unemployed in the National Employment Agency and labor market tightness (defined as the ratio of total contracts per number of unemployed) rise significantly and persistently after the lottery prize shock. Furthermore, the price level in the winning province increases persistently reaching its maximum 17 months after the shock and exhibits a slow mean reversion, returning to its pre-shock value after approximately two years. We also explore whether the lottery shocks have effects on the housing market and find that neither rental prices, nor mortgages are significantly affected by the shock in the winning provinces. When we investigate the effects of the lottery wins for different states of the economy, we show that the fall in unemployment after a lottery win is more sizeable and persistent during recessions. On the other hand, we do not detect a differential effect of lottery wins on CPI prices in expansions versus recessions.

We next collect individual-level data on consumer confidence about current and future economic conditions and for realized and intended durable consumption expenditures based on monthly surveys conducted by the Center of Sociological Research (CIS). Each month around 1,000-1,500 nationally representative households across Spain are asked questions related to their past and intended consumption behavior[3] and their current views and expectations about their own personal finances, as well as about their employment status considering the Spanish economic conditions and the overall economic outlook of Spain. Following the University of Michigan Survey, we construct aggregate indices of confidence for the current (ICC) and expected macroeconomic conditions (ICE) and show using local projections that they also react positively and significantly on impact to lottery wins.

To validate further our conclusions on the sentimental effects of lottery wins, we use binary choice and ordinal regression models to study the effects of the lottery win on individual sentiment and consumption behavior. Lottery wins change significantly consumer sentiment at the individual level. Households become temporarily more optimistic about their current and future income and employment and tend to update upwards their expectations about the evolution of the Spanish economy if they reside in a province that won the lottery. In line with the results found in the existing literature (see, e.g., Kuhn et al. (2011) and Attanasio et al. (2020)), we also find that households in winning provinces increase significantly their consumption of durable goods, in particular, the consumption of furniture and vehicles - relative to household residing

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[3]Realized durable consumption spending is available for four categories (a) car and motorbikes; (b) furniture; (c) large appliances and (d) small appliances.

out of these provinces - six months after the lottery win[4]. The responses to lottery wins are heterogeneous. Younger, low-income, and less-educated households are more "sentimental" to the arrival of the lottery in their province and tend to envisage brighter future for themselves and the aggregate economic conditions in Spain. In accordance with their higher confidence levels, younger households are also significantly more likely to buy a car or motorbike after a lottery win. Finally, confirming the aggregate responses, we show that the effects of the lottery wins on sentiment are stronger during recessionary periods.

Positive sentiment seems to trigger the consumption responses: When we examine jointly individual confidence and consumption intention responses, we show that individuals who become more optimistic are significantly more likely to increase their durable consumption responses after a lottery shock (see also Gillitzer and Prasad (2018) and Lagerborg (2019)). We claim that the mechanism behind the propagation of lottery wins works through sentiment: lottery wins boost sentiment and positive sentiment spurs economic activity. To discard alternative explanations through other channels, we first document that surveyed households do not report a significant increase their ability to pay bills after a lottery win, indicating that the consumption increase is caused by a surge in sentiment rather than an increase in income. The fact that the increase in sentiment is not driven by the income shock is also reflected in the very low average probability of being a winner in the winning province (0.015 percent), which implies that it is very unlikely that the household respondents in the survey are actually lottery winners. Hence, the consumption effects of the lottery wins we report seem to be driven by sentiment and not income changes. We also show that results are not driven by a redistribution mechanism that transfers resources from rich to poor provinces in Spain.

Yet, an alternative transmission mechanism might be at place in which lottery wins work as news about changes in regional economic fundamentals. The Spanish Christmas lottery and in particular its top prize, *El Gordo*, has a long history in Spain, and people probably understand that if a town in their region wins the lottery, this will probably stimulate the regional economy. In order to discard such an interpretation of our results, we first notice that sentiment increases significantly for questions related to the evolution of the Spanish economy as a whole. If winning the lottery carries news about a possible expansion in the region, rational agents should not expect this expansion to affect the rest of Spain. Hence, the positive reaction of expectations about the Spanish economy can only be attributed to increased optimism rather than news about regional fundamentals. This is further confirmed when we look at business confidence indices for the seven autonomous communities with a unique province. The Business Confidence Indicators survey collects the opinions of managers of establishments regarding the progress of their business for the past quarter and, more importantly for our purposes, their expectations for the coming quarter.[5] The response of the business expectations index to the lottery wins is

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[4]Using proxies for non-durable consumption expenditure, such as google searches for restaurants and the retail trade index, we show that non-durable consumption also increases significantly in the winning provinces.

[5]Unfortunately business confidence data is available at quarterly frequency and at the autonomous community level. However, there are seven communities in Spain with a unique province (Asturias, Baleares, Cantabria, La

flat indicating that the expansionary effects of lottery wins are rather stemming from increases in local consumption demand.

Although the existing literature suggests that changes in transfers have no effects on employment and output in representative-agent models with Ricardian equivalence, here we show that the "transfers" that we consider can generate significant demand effects through sentiment changes. Oh and Reis (2012) propose a model with uncertainty, imperfect credit markets, and nominal rigidities in which such transfers are expansionary both because of a neoclassical wealth effect and a Keynesian aggregate demand effect. Our results suggest a new mechanism through which transfer shocks might propagate into the economy through sentiment. Our findings square well with the theory developed in Pappa, Ravn and Sterk (2021) on sentiment-driven cycles and are also consistent with the results of Lagerborg, Pappa and Ravn (2020) who investigate the macroeconomic effects of negative shocks to sentiment in the US economy.

We are not the first to use the data from the Spanish Christmas Lottery to address economic issues. Bagues and Esteve-Volart (2016) use lottery prizes to identify random increases in provincial income and study how it affects electoral outcomes. They also report significant expansionary effects of lottery wins using annual data and show that the incumbent party tends to obtain relatively more votes in those provinces that won the prize in election years. Bermejo et al. (2021) also use annual data and find that firm and job creation rises significantly in winning provinces, suggesting that the money windfalls induce supply side effects, especially in recessions and for firms that are financially constrained. Relative to the these studies, we use more granular and monthly data and bring evidence on the effects of lotteries on sentiment apart from and their macroeconomic consequences. Moreover, our results support that the expansion in the winning provinces is demand-driven and operates through sentiment. Kent and Martinez (2020) also investigate how lottery wins impact local economic activity. By means of historical annual data since 1900, they find that consumption increases in those towns that won the lottery, which is consistent with our results. However, they find evidence supporting that lottery wins lead to a slowdown in economic activity and deter new migration to towns that won the big prizes in recent decades. By contrast, we rather focus on the short-run effects of lottery prizes on demand and consumer sentiment by using more recent monthly data.

The evidence we report has relevant implications for economic theory and actual policy making. Despite the cheerfulness that the lottery evokes throughout Spain nowadays, its roots are related to bleak events. The very first Christmas lottery took place in Cádiz in 1812, when the government set it up as a way to raise money for the Spanish troops fighting against Napoleon's armies[6]. The Spanish Christmas Lottery represents an important source of government rev-

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Rioja, Madrid, Murcia and Navarra). We use these provinces to investigate the effects of lottery wins on business expectations. We first confirm our previous findings at the quarterly frequency for those regions and subsequently investigate the reaction of business confidence.

[6]Also, in Colonial America lotteries have been used as a source of revenue to help fund the colonies (See, Millikan (2011)). According to the National Conference of National Legislatures, the revenue from all state lotteries relative to total state revenues ranges between 0.8 and 2 percent in US states.

enues, so it should be of interest to public-finance economists. In particular, the government revenues derived from this lottery scheme average approximately 0.1 percent of national GDP in the 2005-2020 sample and represent on average 0.3 percent of total government revenues. Our study highlights the role of lotteries as a mean to stimulate demand and improve economic sentiment apart from its role as an effective tax collection device. Given the exceptional shocks that hit recently the world economy and the surge in public debt, together with the need of new stimulative policy tools to fight recessions and rise tax revenues, one could view the lottery designed by the Spanish SELAE (State Lottery and State Betting Society) for Christmas as a new unconventional policy instrument. In effect, such policy could catch two birds in one shot: increase tax revenues voluntarily and stimulate consumption and consumer confidence in the winning regions. One would expect the aggregate effects of the lottery to be negative, since most individuals do not receive it, the lottery should act as a tax that reduces economic activity in the rest of Spain. We show that consumption does not fall significantly in the non-winning provinces when we regress durable consumption responses on lottery expenditures at the province level and we do not detect any negative spillover effects. Moreover, the high participation rate for this lottery should also address concerns about the regressive nature of lotteries as a tax.

The remainder of the paper is structured as follows. Section 2 describes the dataset. Section 3 introduces the methodology and presents the results on the effects of lottery wins on macroeconomic variables at the province level. Section 4 presents the methodology and results of the analysis on the effects of lottery wins on individual sentiment and consumption responses. Section 5 discusses alternative hypothesis for the propagation of lottery shocks and robustness checks. Section 6 rationalizes our proposition of using the Spanish Christmas lottery as an unconventional policy tool and Section 7 concludes. An Online Appendix gathers further results discussed in the main text, as well as the outputs of several robustness checks.

2 Data

2.1 Spanish Christmas Lottery

The Spanish Christmas Lottery (*Lotería de Navidad*) is a national lottery scheme which is held every Christmas since 1812, being considered as one of the biggest lottery events worldwide. The draw takes place on December 22nd of each year and it is organized by the National Lottery and Gambling Agency (*Loterías y Apuestas del Estado*).

Christmas Lottery tickets have five-digit numbers and are available at a cost of €200. The amount of numbers played between 2005 and 2010 was 85,000 numbers, and increased to up to 100,000 numbers since 2011 and each number is printed multiple times in so-called *series* (an average of 170 series per number were printed every year since 2005). Because the €200 tickets may be too expensive for many purchasers, each of the tickets is split into 10 identical

sub-tickets (or fractions) sold for €20. Each one of these fractions is known as *décimo* (1/10 of the value of the total ticket). It is very common to buy a share of a *decimo*, called a *participación* (participation in English), through local associations, workplaces, sport teams, etc. These shares usually cost between €1 and €5.

Lottery tickets are sold in official lottery outlays located throughout the country.[7] Out of the total lottery emission, 70% is distributed as prizes while the remaining 30% is devoted to commissions paid to outlets, internal revenue, and administration costs. There are three main prizes: the top prize, popularly known as *El Gordo*, which awards to each fraction holder of the winning number €20,000 per euro played, and the second and third prize which reward winners with €6,250 and €2,500 per euro played, respectively. This means that all holders of a *decimo* of the top prize winning number would win €400,000. The individuals holding a *decimo* of the second or third prize winning number would win €125,000 and €50,000, respectively. The top prizes represent around half of the total payout assigned to prizes. There are also several smaller prizes ranging from €300 to €1 per euro played. Usually one lottery outlay sells most (if not all) of the series of a single number. The Spanish Christmas Lottery constitutes a collective game, meaning that Spaniards like to share *decimos* with relatives, friends and co-workers. This implies not only that most of the winners of a lottery number usually live in the same area (province or village) but also that the main top prizes end up being distributed as smaller prizes to several individuals living in the same location.

2.1.1 Lottery Data

Data on prizes and expenditure on Christmas Lottery by province were assembled using information from the National Lottery and Gambling Agency (*Sociedad Estatal Loterías y Apuestas del Estado*) and the dataset constructed by Bagues and Esteve-Volart (2016). Although holders of winning tickets can cash out the corresponding lottery prize on the same day of the draw (December 22nd), we impute reception of lottery prizes to next January as it usually takes time to actually receive the money transfer (bank transaction costs, bank holidays, etc.) For that reason we use observations regarding the gross income distributed by the three main top prizes in each province, ranging from January 2005 to 2020. We do not observe the remaining several smaller prizes that are also awarded with Christmas Lottery. However, given the random nature of the event it can be assumed that their geographical distribution is proportional to the lottery expenditure by province (see also, Bagues and Esteve-Volart (2016)). We compute the after-tax revenue derived from the top lottery prizes and obtain a measure of net lottery-prize revenue per capita. We also observe the expenditure on Christmas lottery per capita at the province level over the same time period.

Panel A of Table 1 presents descriptive statistics for the Christmas lottery at the province level. The average individual pays out 58 Euros to the lottery and receives on average 19.9 Euros and

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[7]Since 2015 lottery prizes can also be purchased online. However, the lottery online sales only represent about 1% of the total sales.

their probability of winning is 0.007%. These numbers reveal that the choice to participate in the lottery is more sentimental than rational to start with. Panel B summarizes the Christmas lottery expenditure and top prizes per capita in the winning provinces. The average expenditure per capita in those Spanish provinces is around €61, while the average lottery prize is around €42 per capita and the probability of being a winner in a winning province is 0.015%.

Table 1: Summary Statistics - Christmas Lottery data at the province level

	Mean	St. dev.	Min.	Max.	N
	(1)	(2)	(3)	(4)	(7)
A Christmas Lottery: *All provinces*					
Top prizes pc (in euros)	19.96	168.18	0.00	3414.72	750
Number awarded tickets (in 1000 pers.)	0.07	0.37	0.00	4.61	750
Top prizes (% of GDP)	0.08	0.76	0.00	14.81	650
Expenditure pc (in euros)	58.37	29.04	17.17	222.19	750
B Christmas Lottery: *Winning provinces*					
Top prizes pc (in euros)	41.47	240.74	0.02	3414.72	361
Number awarded tickets (in 1000 pers.)	0.15	0.53	0.00	4.61	361
Top prizes (% GDP)	0.20	1.16	0.00	14.81	278
Expenditure pc (in euros)	60.72	28.36	20.80	222.19	361
C Christmas Lottery: *Winning provinces with max prize pc*					
Top prizes pc (in euros)	722.49	966.83	70.74	3414.72	15
Number awarded tickets (in 1000 pers.)	1.66	1.45	0.09	4.61	15
Top prizes (% GDP)	3.35	4.41	0.22	14.81	13
Expenditures pc (in euros)	70.43	29.42	36.85	128.51	15

Top prizes and expenditures per capita are computed using data from May 2005 - Jan 2021. Top prizes (% of GDP) are computed using data from 2005 to 2018

Panel C of Table 1 reports summary statistics for those provinces that were awarded the maximum prize per capita in each year of our sample period. In these winning provinces, the average top lottery prize represents around 3.4% of provincial GDP and about €722 in per capita terms. The expenditures per capita reflect the high participation of Spaniards in the lottery while the variation in the rewards per capita suggests that for some cases the monetary transfers received by the winners are substantial. The numbers in this last table might justify the Spaniards choice to participate in the lottery. Conditional on living in a province that won the maximum prize per capita, the probability of having a winning ticket varies between 0.009% and 0.461%. Hence, as often argued by Spanish people, the participation in the lottery is justified by the fact that in case you do not participate you feel more like a loser. What we want to point out for the sake of our analysis is that the fraction of households within a "winning" province that actually won the lottery is really very small. We will return to this observation later in the following subsections.

Finally, the Spanish Christmas Lottery represents an additional tool for the government to raise revenue. Together with the 30% of the total lottery emission that is kept to pay commission to outlets, internal revenue and administration costs, the government also collects revenue from lottery winners as gambling winnings are taxable income in Spain[8]. Total government revenues raised from Christmas Lottery events that took place between December 2004 and December

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[8]Before 2013, winnings derived from gambling were not considered taxable income by the Spanish law. In 2013, the Spanish government introduced a flat tax of 20% for any gambling winnings above €2,500. The tax-exempt amount changed in 2018 from €2,500 to €10,000. It changed again from €10,000 to €20,000 in 2019. For more information, visit: https://www.agenciatributaria.es

2019 represented on average about 0.1% of GDP and 0.3% of total government revenues, respectively.[9]

2.2   Macroeconomic Data

Data on unemployment and labor contracts by province is obtained at monthly frequency from the National Employment Agency (*Servicio Público Estatal de Empleo*). Provincial and national CPI, number of mortgages and population is obtained from the Spanish Statistical Office (*Instituto Nacional de Estadística*). We obtain also monthly data on employment by province from Social Security Statistics (*Seguridad Social Estadísticas, SSE*). According to Spanish law, any employer must register their employees with the Spanish Social Security authorities. We use the data available by SSE to recover employment dynamics at the province level. We construct series for the unemployment rate coming from the two distinct data sources. According to the constructed data, the average weighted unemployment rate at the province level is 20.7 percent, while at the national level this number equals 17.5 percent for the period under consideration. We believe that this divergence is due to measurement errors in the data on employment provided by the SSE and, for that reason, we also use the ratio of unemployed over province population as an alternative measure for tracking down the dynamics of the labor market and present results for the responses of logged unemployment. For the aggregate unemployment rate series at monthly frequency for Spain we retrieve data from the OECD indicators database. The data has been seasonally adjusted using the Seasonal and Trend decomposition provided by Loess (STL decomposition). See the Online Appendix B for more complete data definitions and sources.

2.3   Sentiment and Consumption Data

We collect individual-level data on Spanish confidence and consumption attitudes from monthly surveys conducted by the Center of Sociological Research, which follows closely the methodology adopted by the University of Michigan's Survey of Consumer Confidence, (*Centro de Investigaciones Sociológicas-CIS*) from April 2013 to January 2020 for which individual unit responses as well as a full range of individual characteristics are available. We start our sample in April 2013 because survey respondents were not reporting their household income before that date. Each month around 1,000-1,500 nationally representative households across Spain are asked questions related to their consumption of durable goods and own personal finances and employment status as well as about the economic situation of the Spanish economy.

The questions that concern consumers' assessment of their current and expected own financial and employment status and the state of the Spanish economy are summarized below:

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[9]Note that these figures represent an upper bound on the revenue raised by the government, since part of the 30% of the total lottery emission does not completely go to Internal Revenue but rather to commissions paid to lottery outlets and administration costs. See Online Appendix A.1 for further details on the computation of the total government revenues derived from this lottery event as well as its evolution over the time period considered.

1. **Q1S (*Q1F*)** Would you say that your household economic conditions are better off, worse off, or just about the same compared to six months ago (*in six months from now?*)?

2. **Q2S (*Q2F*)** Would you say that the current economic situation of Spain would allow you to improve your employment status, would worsen your employment status, would have no impact on your employment status compared to six months ago (*in six months from now?*)?

3. **Q3S (*Q3F*)** Would you say the current state of the Spanish economy is better, worse, or about the same compared to six months ago (*in six months from now?*)?

For each of these six questions, the surveyed households can either give a positive, neutral or a negative answer. We code the answers in ascending order in the regressions.

Surveyed individuals are also asked whether they have purchased any durable goods during the past six months or whether they intend to buy durables in the next six months. We construct the following indices to measure the responses of durable consumption:

1. **(DC)** denotes durable consumption and takes value 1 if the household has purchased at least one durable good in the past six months.

2. **(FDC)** denotes future durable consumption and takes values from 1 to 3 if the household expects their consumption on any durable good to decrease, remain the same or increase in one year from now.

Moreover, households are asked to specify what type of durable goods they have purchased. To take advantage of this information we construct indices for the following durable goods categories: (i) car and motobikes **(DCcar)**; (ii) furniture **(DCfurn)**; (iii) large home appliances **(DCLargeApp)** and (iv) small appliances **(DCSmallApp)**. For each of these categories the index takes the value 1 if the household has purchased at least one of these items.

We additionally retrieve socio-economic information on each interviewed household– such as age, gender, marital status, employment status, income quantile and education level. For the sake of brevity, we provide details on the individual characteristics data and also present tables describing the percentage of positive, neutral and negative answers by households' socio-economic characteristics and durable consumption and consumer sentiment questions, in the Online Appendix (Section C and C.1, respectively). Younger, highly-educated and high-income households are more likely to have purchased a vehicle, furniture, small and large home appliances in the near past. The opposite holds for older, less-educated and lower-income households. As regards consumer sentiment, highly-educated, not-married, employed households tend to be more optimistic regarding their current household income. In contrast, less-educated, poorer and older households tend to give, on average, more negative answers when asked about their current and future economic and financial conditions and about the actual and future evolution of the Spanish economy.

3 Macroeconomic Effects of Lottery Wins

3.1 Effects of Lottery Income Shocks on Macroeconomic Outcomes

We start by analyzing the dynamic effects of the transitory income shocks on the economy of the provinces that won the Christmas Lottery. To control for potentially confounding events, other than lottery wins, that may affect the macroeconomic outcomes in the winning provinces and to provide a more causal interpretation to the results, we follow Jordà (2005) and adopt local projections (LP) for the longest possible sample we have available, that is, 2005M5 - 2020M1. For each variable and each horizon $h \geq 0$ we run the following linear LP model:

$$S_{j,t+h} = \alpha_{j,h} + \beta_h \text{LotteryPrize}_{j,t} + \delta_h \text{LotteryExp}_{j,t-1} + \sum_{k=1}^{12} \psi_{k,h} X_{t-k} + \sum_{s=1}^{12} \lambda_s M_s + \varepsilon_{j,t+h} \quad (1)$$

where $S_{j,t+h}$ is the variable of interest for province j at time $t + h$, $\text{LotteryPrize}_{j,t}$ is after-tax Christmas Lottery prize per capita (in 1000 euros) in province j at time t and $\text{LotteryExp}_{j,t}$ is the corresponding Christmas Lottery expenditure per capita in province j at time $t - 1$.

We include Christmas Lottery expenditures in our regression since this variable might affect the probability of winning the lottery *in a specific province* and also to identify correctly the treatment effect and make our results comparable to those in previous studies (See Bagues and Esteve-Volart (2016) and Bermejo et al. (2021)). The Christmas Lottery event is random and, thus, the coefficient β_h would identify the causal effect of an exogenous transitory increase in regional income at time t in province j on any regional macroeconomic outcome at time $t+h$ in province j. To make sure our results are not driven by local or aggregate shocks that correlate spuriously with the regional money windfalls, the vector $X_{j,t}$ includes lags of provincial and aggregate unemployment rate and CPI inflation. We also add to our specification province-fixed effects α_j and a set of monthly dummies M_s. All variables are detrended using a fourth order polynomial.[10] Standard errors are robust and clustered at the province level.

The left panel of Figure 1 presents the dynamic responses of the province-level unemployment rate and CPI movements to a thousand euros of per capita lottery rewards (rewards are expressed in constant prices to take into account possible changes in inflation), together with their respective 68 and 90 percent confidence bands. Lottery prizes do not affect the unemployment rate on impact. It takes approximately half a year for the unemployment rate to react to the shock. The impulse response function (IRF) decreases significantly after 10 months reaching its maximum fall of -0.3 percentage points 14 months after the lottery win, while it continues to be below its mean for approximately two years. Provincial CPI prices also respond sluggishly,

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[10]In the Online Appendix D.4 we show that results are similar if we use growth rates or use the HP filter to detrend the data, and if we use relative unemployment and CPI prices in the baseline specification. Given the discrepancy of the unemployment rate data, we also present results of the same set of regressions for the log of the total number of unemployed population instead of the unemployment rate in Online Appendix D.2. In accordance with our baseline, the number of unemployed significantly drops after six months and reaches its maximum 13 months after the lottery wins.

lifting significantly seven months after the initial shock and remaining above mean for almost two years after the winning. The maximum increase in the province CPI is around 0.54 units and its quite persistent. Hence, lottery shocks have a significant short-run effect on the real economy that dissipates two years after the initial impact.
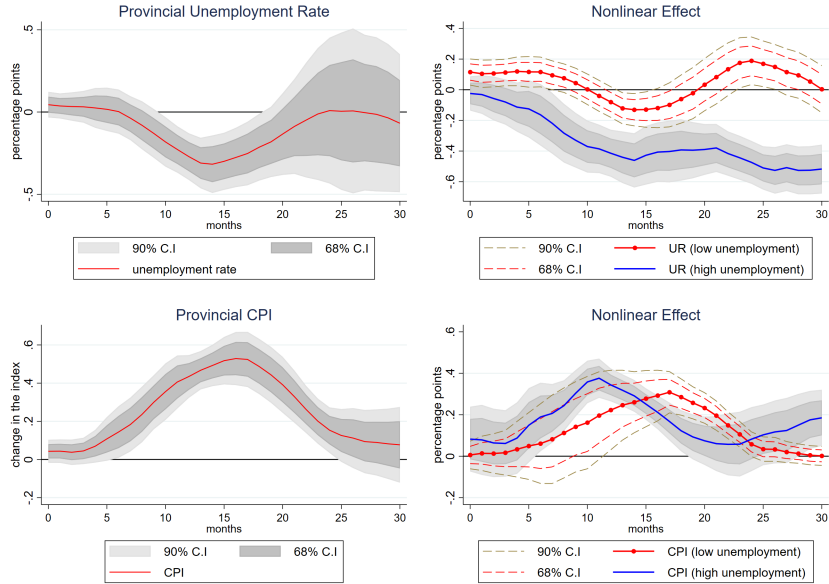
Figure 1: Effect of Christmas Lottery prizes on unemployment rate and CPI

Impulse responses to Christmas Lottery prizes. The left panel presents the responses in the linear LP model (1), while the right panel presents the responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

This significant drop in the unemployment rate could be attributed to a fall in labor force participation induced by the positive wealth effect as a result of the lottery wins. Since the data for participation is not available at monthly frequency at the Spanish province-level, we use the total number of short and long-run contracts signed by workers registered as unemployed in the National Employment Agency as a close proxy to changes in vacancies. Figure 2 shows that both labor market tightness i.e. the share of total contracts over unemployment), and the share of total contracts over working population increase after the lottery shock, providing further evidence for the improvement in the labor market conditions[11]. In the Online Appendix D.6 we show that short-term contracts are the ones that increase significantly after a lottery shock. This is not surprising given the dual nature of the Spanish labor market (see Dolado, Bentolila and Jimeno (2020)).

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[11]Labor market tightness during the full sample period is on average 49.3 percent with 30.2 s.d. The ratio of total contracts to labor force in on average 9.3 percent with 4.7 s.d.
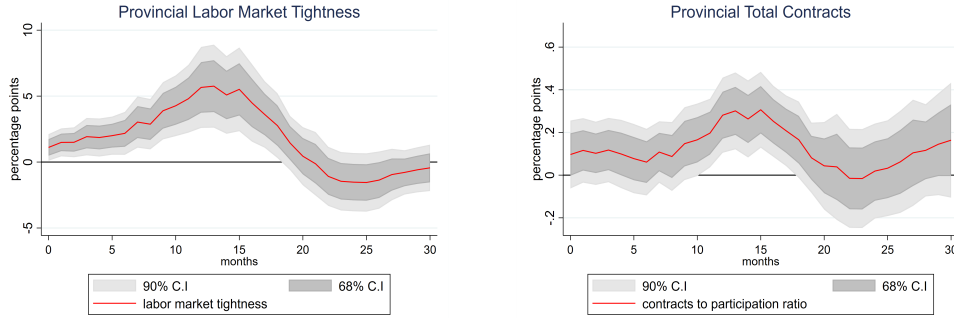
Figure 2: Effect of Christmas Lottery prizes on labor market tightness and labor contracts to participation ratio

Impulse responses to Christmas Lottery prizes. The left panel presents the responses of labor market tightness, while the right panel presents the responses of total provincial labor contracts. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Next, following Bagues and Esteve-Volart (2016) and Kent and Martinez (2020), we investigate the effects of lottery wins on house prices. Bagues and Esteve-Volart (2016) report an insignificant increase of house prices at all horizons, while Kent and Martinez (2020) document a significant increase in rural land values and home sales per capita two years after the shock.
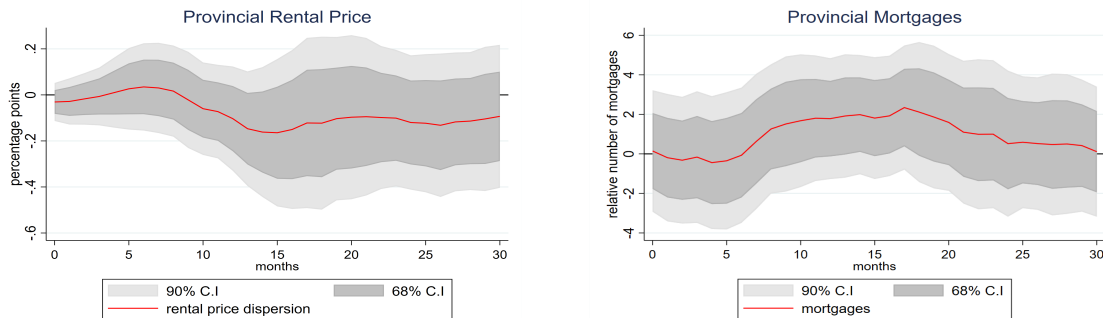
Figure 3: Effect of Christmas Lottery prizes on rental prices and number of mortgages

Impulse responses to Christmas Lottery prizes. The left panel presents the responses of provincial rental prices, while the right panel presents the responses of provincial mortgages defined as the ratio of the number of provincial mortgages to the average number of mortgages in Spain. The sample period covered is 2005M5-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Since we do not have readily available monthly data on house and rental prices at the province level we impute monthly rental prices by using the rental housing price index used to compute monthly provincial CPI for all goods and services. We also have available monthly data on the number of mortgages constituted within a province from INE (*Insituto Nacional de Estadística*). Figure 3 displays the IRFs of the level of rental prices and number of mortgages relative to average number of mortgages in Spain to the lottery win. Contrary to Kent and Martinez (2020), we detect no effect of the shock on rental prices or mortgages at any short-horizon.

Given the fact that transfers are typically used during recessions, as under the recent COVID19 crisis, we investigate whether the temporary income shocks are more stimulative during reces-

sions. In what follows we adapt the empirical model to account for possible state-dependency of the transitory shocks by allowing for time-varying coefficients according to the state of the business cycle. In particular, we use the following state-dependent LP specification for any $h \geq 0$:

$$S_{j,t+h} = I_{t-1}\left[\alpha_{A,j,h} + \beta_{A,h}\, \text{LotteryPrize}_{j,t} + \psi_{A,h}(L)X_{j,t}\right]$$
$$+ (1 - I_{t-1})\left[\alpha_{B,j,h} + \beta_{B,h}\, \text{LotteryPrize}_{j,t} + \psi_{B,h}(L)X_{j,t}\right] + \varepsilon_{j,t+h} \tag{2}$$

where $X_{j,t}$ is all control variables included in the linear specification in Equation (1) (i.e. provincial lottery expenditures, unemployment rate and CPI prices, as well as the overall unemployment rate and CPI for Spain), $\psi(L)$ is the lag operator and I_t is an indicator variable of the state of the economy when the lottery shock hits. This dummy variable equals 1 (i.e $I_t = 1$) whenever the economy enters a state in which the unemployment rate in Spain exceeds 20% which roughly corresponds to recessionary periods.

On the right-hand side of Figure 1 we plot the IRFs to lottery shocks in periods of high unemployment (continuous blue lines) and low unemployment (circled red lines) with the corresponding 90 and 68 percent confidence bands. The beneficial effect of the lottery win on unemployment is significantly larger and more persistent during recessions, while CPI prices react similarly in the two states. Lottery shocks of a thousand euros per capita reduce the unemployment rate in downturns by up to -0.5 percentage points 30 months after the shock in the winning province, while the maximum impact during booms is -0.1 percentage points after 14 months and reverses quickly. Hence, lottery wins are more effective to lift the economy during recessions, generating moderate inflationary pressures in the local economy, while its effect on unemployment during expansions is short lived. Moreover, in the Online Appendix D.3 (See Table 9) we show that the responses of unemployment are statistically different across states for all horizons, while the responses of CPI are not.

Our results in this section confirm partially and extend results of previous studies that analyzed the macroeconomic effects of Christmas lottery wins in Spain. Bagues and Esteve-Volart (2016) using annual data have shown that the lottery wins have a temporary marginally significant impact on unemployment and house prices. We report a more substantial drop in unemployment and no significant rise in house prices. Yet, we also find that labor demand and employment rise and that the money drops also push upwards the provincial CPI level in the winning provinces, while they do not report any significant price effects. Bermejo et al. (2021) using also annual data report a higher firm creation in winning provinces and, in particular, during recessions. The results we present so far are compatible with theirs. Higher firm creation could be what drives the increase in job vacancies and the fall in unemployment we report. In the next section we show that, together with the increase in entrepreneurial activity, a demand effect is clearly operative.

3.2 Effects of Lottery Income Shocks on Aggregate Sentiment

Policymakers and academics both agree that surges in confidence lead to increases in spending and are a major cause of expansions, while recoveries often hinge on restoring confidence in the economy. For example, Akerlof and Shiller (2010) argued that "declining animal spirits" were the main reason for the Great Recession. Hall (1993) and Blanchard (1993) relate the long-lasting negative consumption shock associated with an exogenous shift in pessimism as the driver of the 1990-1991 recession. More recently, Lagerborg, Pappa and Ravn (2020) show that sentiment shocks explain a non-negligible part of cyclical fluctuations and that autonomous changes in sentiments induce cyclical variations.

To investigate whether the transitory income shocks affect aggregate sentiment, we aggregate the answers to the confidence questions across respondents and across questions at the province level to produce two broad indices: the Index of Current Economic Conditions (ICC) and the Index of Consumer Expectations (ICE), following the methodology of the University of Michigan Survey. The ICC is based on answers to the questions concerning consumers' assessment of their own current financial and economic situation as well as the current state of the Spanish economy (i.e., Q1S-Q3S). The ICE summarizes answers to questions about consumers' expectations for their future household finances, their employment status given the Spanish labor market conditions and about the evolution of the Spanish economy as a whole (i.e., Q1F-Q3F).

The Spanish consumer confidence survey is designed to be representative at the national level, but the CIS does not guarantee that the sample will be representative of the population within each separate province during each month. In order to mitigate measurement error in our data set due to sampling variation within the survey at the province level we average over two months responses following Aguiar, Hurst and Karabarbounis (2013). Also, to keep the representativeness of the consumer sentiment indices at the province level, we keep in our sample those monthly observations for which the provincial ICC and ICE are constructed with at least 25 respondents. A representativeness threshold of 25 respondents implies that we have at least 25 survey answers for each of the three questions included in the computation of ICE and ICC, respectively. The details about the construction of these aggregates are refereed to the Online Appendix C.3 for economy of space.

We then analyze, using the same specification as in Equation (1), how lottery wins affect aggregate sentiment in the winning provinces. Due to data availability, we perform this exercise over the shorter sample period 2011M11-2020M1.[12] As shown in Figure 4, winning the lottery rewards strongly affects aggregate sentiment. After a lottery shock, both sentiment indices for current and future economic conditions significantly increase for up to one year. When we distinguish between expansionary and recessionary periods, the responses of both ICC and ICE to lottery wins are strong and statistically significant the first few months after the win during

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[12]In Online Appendix D.5 we present the unemployment rate and CPI responses for the sub-sample 2011M11-2020M1. Our baseline results remain unchanged.

recessions. During expansions, the ICC reaction which measures sentiment about economic current conditions does not respond significantly on impact but improves significantly with a lag, along with the improvements in the real economy, while expectations about future conditions, measured by the ICE, increase significantly on impact and remain uplifted up to one year after the win.
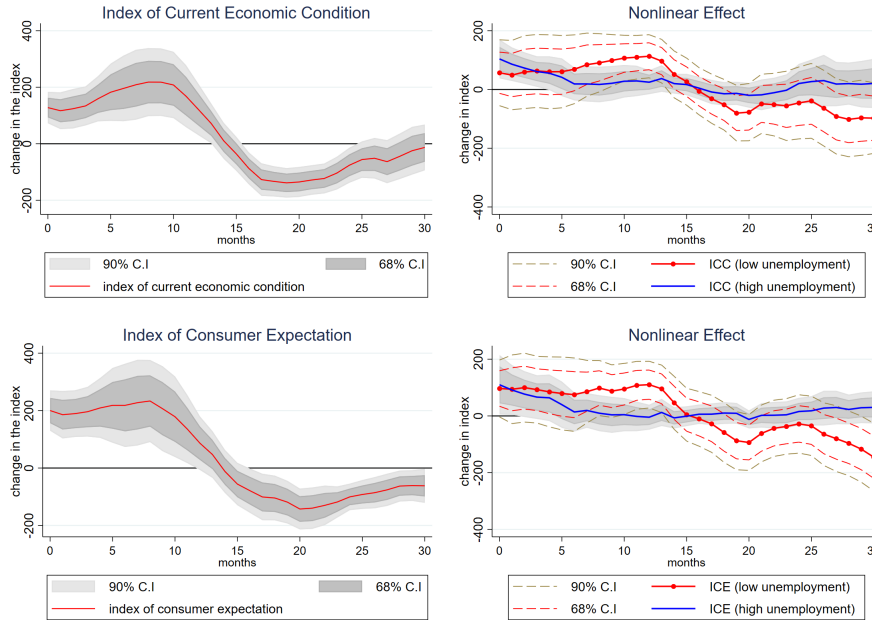
Figure 4: Effect of Christmas Lottery Prizes on the Index of Current Economic Condition and the Index of Consumer Expectation

Impulse responses to Christmas Lottery prizes. The left panel presents the responses in the linear LP model (1), while the right panel presents the responses in the state-dependent LP model (2). The solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. To increase the representativeness of the indices at the regional level, we focus on data with at lease 25 respondents in each province and, for each question, we use responses for two consecutive months. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Since the indices range between 0 and 200, this result shows that winning a lottery prize can change on average the households' sentiment in a province from being completely pessimistic about the economic conditions to being completely optimistic[13]. It is worth highlighting that sentiments react on impact after the shock while both unemployment and CPI price responses are lagged. Hence, loosely speaking, the responses of sentiment lead the cycle (See also Lagerborg (2019))). One might worry that when we perform this exercise we do not control for the fact that lottery expenditure might be endogenous to sentiment. In Online Appendix A.2 we investigate whether the two aggregate sentiment indices affect the per capita lottery expenditure. Results do not support any significant causal relationship between aggregate sentiment and lottery expenditures neither contemporaneously nor any lag effects.

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[13]Similar results hold for the lottery rewards net of expenditure for lottery tickets. See Figure 2 in the Online Appendix D.1

Table 2 reports the first-stage F-statistics for the null hypothesis that the lottery awards has no explanatory power for consumer confidence on impact, one, three, six, and 12 months after the shock, respectively. We report F-test statistics for both ICC and ICE in our sample for the null of standard conditional homoscedasticity and clustered standard errors. The standard F-statistic for ICC is equal to 6.2 on impact, and it surges to 30 one month after the shock, whilst it remains relatively high when we consider further lags. The F-statistic for ICE is higher on impact and remains high for further horizons. These results indicate that lottery wins stimulate average sentiment both about current as well as future economic conditions.

Table 2: F-statistics of the first-stage regression of Christmas Lottery prizes on consumer confidence. Sample 2011M11-2020M1

Horizon (months)	F statistics for ICC	F statistics for ICE
$h = 0$	6.2	10.2
$h = 1$	30	41
$h = 3$	13.9	12.6
$h = 6$	23	10.1
$h = 12$	7.8	9.4

The evidence we bring to light suggests that the sentiment reaction to the transitory income shock is strong and this could partially drive the economic stimulus. Bagues and Esteve-Volart (2016) find that the incumbent party tends to obtain relatively more votes in the provinces that won the lottery, attributing this effect to a temporary increase in happiness that is making voters more lenient toward the incumbent. Their intuition is consistent with our findings. Yet, these authors do not use the surveys we exploit in this study and reach this conclusion by rejecting some alternative hypotheses. We instead provide direct evidence on the effects of lottery awards on economic sentiment.

4 Effects of Lottery Wins on Individual Behavior

In this section we investigate whether aggregate dynamics agree with individual responses for sentiment and consumption behavior in our sample.

4.1 Consumer Confidence

4.1.1 Effects of Lottery Wins on Individual Sentiment

Existing studies suggest that lottery wins associate with high overall life satisfaction that persists for over a decade (See, e.g., Lindqvist, Östling and Cesarini (2020)) and that winning the lottery brings happiness (See, e.g., Oswald and Winkelmann (2019)). Although we do not have information about happiness or life satisfaction in our sample, we do observe sentiment about the economic conditions. In this section we investigate how lottery wins affect individual economic sentiment. In particular, we analyze whether those households living in awarded provinces tend to be more optimistic about their current and future household finances and employment

prospects and about the current and future evolution of the general economic conditions in Spain. In order to study the effects of lottery wins in economic sentiment we adopt the following ordered probit model:

$$c_{i,j,t,s} = \alpha + \beta \text{LotteryPrize}_{j,t,s} + \delta \text{LotteryExp}_{j,t,s} + \gamma X_{i,j,t,s} + \phi Z_{j,t,s} +$$
$$\sum_{j}^{J} \mu_j P_j + \sum_{s}^{S} \lambda_s M_s + \epsilon_{i,j,t,s} \qquad (3)$$

where $c_{i,j,t,s}$ denotes the survey responses of individual i in province j at year t and month s regarding economic sentiment, $\text{LotteryPrize}_{j,s,t}$ is a dummy variable that takes the value of 1 if Christmas Lottery income is awarded in the province j at year t and month s and $\text{LotteryExp}_{j,t,s}$ is the corresponding expenditure on the Lottery in per capita terms.[14]

Although the Christmas Lottery event is genuinely random and, thus, the coefficients β would identify the causal effect of an exogenous variation in regional income on individual sentiment, individual characteristics as well as economic conditions are also relevant in determining sentiment and household consumption (see also Benhabib and Spiegel (2019); Mian, Sufi and Khoshkhou (2015)). To address concerns regarding the endogeneity of household consumption choices with respect to national, local, and individual economic conditions we include as further controls a vector of individual characteristics ($X_{i,j,t,s}$), a vector of regional variables ($Z_{j,t,s}$), which includes the provincial unemployment rate and CPI, as well as a set of dummies for provinces (P_j) that allow us to keep track of the different province-specific trends that might affect local sentiment. The vector of individual characteristics comprises age, gander, marital status, education level, employment status and household income. Finally, we also add a set of monthly dummies (M_s) to capture the component of sentiment related to seasonality in Spain.

Table 3 presents the estimation results of Equation (3) for the answers related to current and future household income (first and second column), current and future employment prospects in Spain (third and forth column) and current and future economic conditions in the Spanish economy (last two columns). The estimates clearly suggest that lottery wins significantly affect consumers' sentiment about current economic conditions and their expectations about future household income and the future prospects of the Spanish economy. Yet, lottery prizes do not affect individuals' confidence about their future employment prospects.

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[14]In Online Appendix F.1 we also present similar results for the case in which $\text{LotteryPrize}_{j,t,s}$ is a categorical value that takes values from 0 to 2 increasing in the size of the lottery shock.

Table 3: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.098**	0.115***	0.164***	0.055	0.084**	0.070*
	(0.041)	(0.034)	(0.045)	(0.046)	(0.036)	(0.038)
Lottery Expenditures	2.170**	0.935*	0.711	-1.914**	-0.938*	-0.941*
	(0.853)	(0.540)	(0.761)	(0.765)	(0.521)	(0.536)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	112047	106086	114776	109441
Pseudo R^2	0.049	0.039	0.023	0.011	0.021	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable are questions Q1C-Q1F. *Lottery Prize Dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery Expenditures* are expressed in 1000 euros per capita. Robust standard errors clustered by province are reported in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish CIS between April 2013 and January 2020

We next examine the persistence of the sentiment responses to the lottery win. For that, we first redefine our treatment variable, $LotteryPrize_{j,t,s}$, to vary only across provinces and over years and interact it with monthly dummies $M_{s,t}$. Thus, our baseline empirical specification in Equation (3) is modified as follows:

$$c_{i,j,t,s} = \alpha + \sum_{s=1}^{11} \beta_s(\text{LotteryPrize}_{j,t} \times M_{s,t}) + \delta\text{LotteryExp}_{j,t,s} + \gamma X_{i,j,t,s} +$$

$$\phi Z_{j,t,s} + \sum_{j}^{J} \mu_j P_j + \sum_{s}^{S} \lambda_s M_s + \epsilon_{i,j,t,s} \qquad (4)$$

The interaction term $\sum_{s=1}^{11} \beta_s(\text{LotteryPrize}_{j,t} \times M_{s,t})$ takes value 1 in those provinces awarded with the Christmas Lottery not only in January but also in the subsequent months after the lottery draw. This captures the dynamic effects of the lottery shock on sentiment for those households living in the winning regions compared to households residing in the non-winning regions[15].

Figure 5 plots the β_s coefficients and their 90% confidence intervals from estimating Equation (4) using an ordered probit model where the dependent variable is each of the six consumer sentiment questions. The positive effect on sentiment for those households living in the winning provinces is instantaneous and dies out after five (six) months for current (future) household income (see Panel 5a). For current employment perspectives, conditional on the labour market of Spain, households increase significantly their confidence, while their expectations about future employment remain subdued and increase significantly only the month after the shock (See Panel 5b). Finally, Panel 5c) shows that Spaniards´sentiment for the current and future state of the Spanish economy increases significantly on impact and one period after the lottery award and

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[15]We deliberately estimate the effects of lottery shocks on confidence up to November because the Christmas Lottery draw takes place every December in our sample.

tones down in the subsequent months.

(a) Household Income (Q1C,Q1F)

(b) Employment Prospects (Q2C,Q2F)

(c) Spanish Economy (Q3C,Q3F)
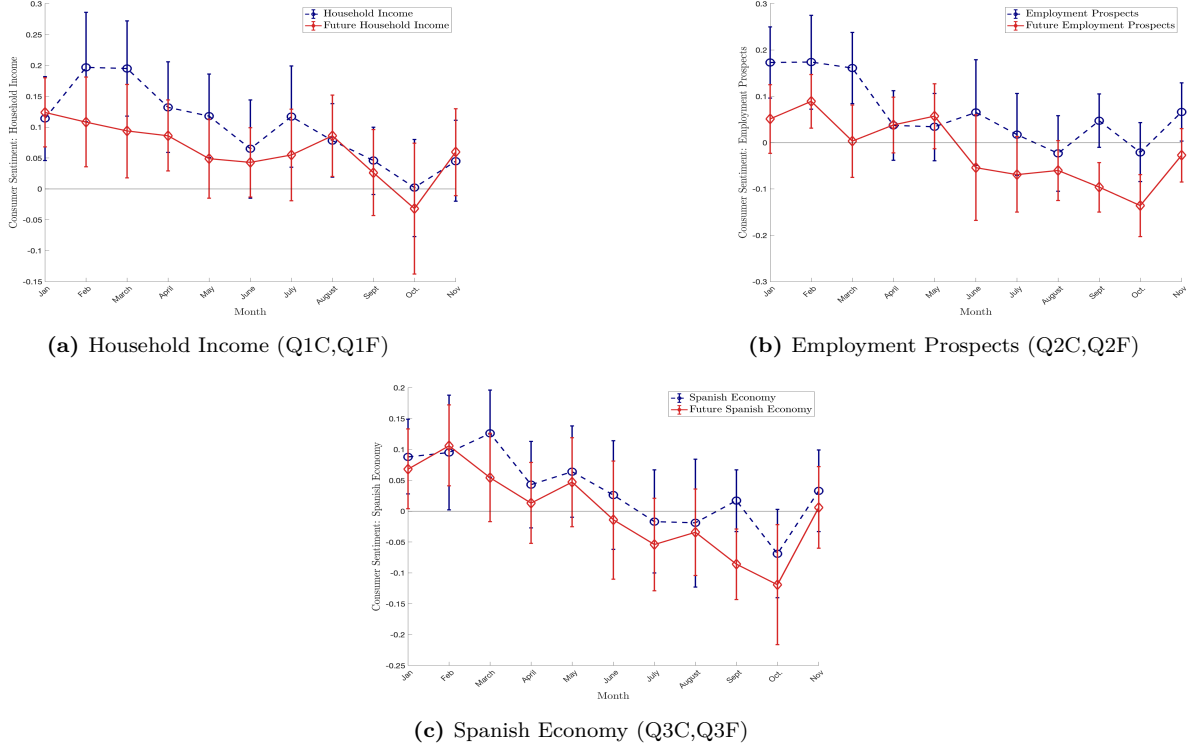
Figure 5: Dynamic effects of Christmas Lottery on consumer sentiment

The Figures plot the β_s coefficients and their 90% CI from estimating equation (4) using a ordered probit model. The dependent variables in Panel 5a Q1C (blue circled line) and Q1F (red diamond line). The dependent variables in Panel 5b are Q2C (blue circled line) and Q2F (red diamond line). The dependent variables in Panel 5c are Q3C (blue circled line) and Q3F (red diamond line) Standard errors are robust and clustered at the province level.

4.1.2 State-dependent Specification

Following the analysis of the previous section, we now explore how the effects of lottery income shocks on consumer sentiments depend on the state of the economy. In particular, we study whether the effect of receiving random lottery wins on consumer confidence becomes stronger during recessions. To this end, we add two extra variables to the baseline specification: a dummy variable that takes the value of 1 if the unemployment rate in Spain is higher than 20% ($\text{Recession}_{t,s}$) and an interaction term between the lottery prize dummy and recession dummy ($(\text{LotteryPrize} \times \text{Recession})_{j,t,s}$):

$$c_{i,j,t,s} = \alpha + \beta \text{LotteryPrize}_{j,t,s} + \delta \text{LotteryExp}_{j,t,s} + \kappa \text{Recession}_{t,s} +$$

$$\gamma \left(\text{LotteryPrize} \times \text{Recession} \right)_{j,t,s} + \psi X_{i,j,t,s} + \phi Z_{j,t,s} + \sum_s^S \lambda_s M_s + \sum_j^J \mu_j P_j + \epsilon_{i,j,t,s} \quad (5)$$

Table 4 presents estimates of Equation 5 for the answers related to current and future household income (first and second column), current and future employment given the economic situation of Spain (third and forth column) and current and future conditions in the Spanish economy

(last two columns). The positive effect of lottery wins on consumer confidence is significantly larger during periods of high unemployment. Naturally, individual sentiment is lower in recessions. For that reason, the sign of the recession dummy coefficient is always significantly negative in Table 4 for the questions related to current economic conditions. Yet, households living in winning provinces become strongly optimistic about their current household income and about employment prospects and the current state of the Spanish economy in times when unemployment is high.

Table 4: Survey evidence on the state-dependent effects of Spanish Christmas Lottery on consumer sentiment

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.011	0.068*	0.047	0.023	-0.006	0.029
	(0.049)	(0.037)	(0.042)	(0.049)	(0.041)	(0.042)
Lottery Expenditures	0.655	0.061	-0.543	-1.815**	-1.550***	-0.977*
	(0.672)	(0.469)	(0.716)	(0.763)	(0.534)	(0.529)
Recession Dummy	-0.286***	-0.163***	-0.232***	0.018	-0.114***	-0.007
	(0.013)	(0.011)	(0.012)	(0.013)	(0.013)	(0.011)
Lottery × Recession	0.073**	0.034	0.194***	0.106***	0.187***	0.114***
	(0.030)	(0.023)	(0.025)	(0.027)	(0.029)	(0.029)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	112047	106086	114776	109441
Pseudo R^2	0.056	0.041	0.027	0.011	0.022	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable are questions Q1S-Q3F. *Lottery Prize Dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery Expenditures* are expressed in 1000 euros per capita. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020

As before, Table 4 also suggests that households living in those lucky provinces become significantly more optimistic when asked about their future employment prospects taking into account the state of the Spanish labor market and the future economic conditions in Spain. By contrast, we do not find evidence suggesting that receiving random income transfers affects positively households' sentiment about their future income during recessions.

4.1.3 Heterogeneous Effects

How individuals react to exogenous variations in income can depend on their characteristics. For example, it might be that some individual traits make individuals more sentimental per se and more susceptible to changes in sentiment. We investigate this hypothesis by allowing for an interaction effect between the lottery prize dummy and individual characteristics and looking at whether these interaction effects matter for explaining consumers' sentiment dynamics in response to the lottery prize shocks.

The results of these regressions are collected in Tables 13 to 15 in the Online Appendix F.2. They suggest that lottery prizes have a positive effect on individuals' confidence, whereas no

evidence is found on heterogeneous effects of the lottery prizes on households responses about current and future household income and current employment prospects (see Tables 13 and 14 in the Online Appendix F.2). That is, the lottery prizes do not seem to affect asymmetrically the different individual groups for these specific set of consumer sentiment questions. Yet, when asked about their future employment prospects given the labor market conditions in Spain, households with older, richer, more educated, and employed members appear to be significantly less optimistic (see Table 14)). The transitory income shocks consistently drive the increases in younger individuals' sentiment. Also, Table 14 in the Online appendix F.2 reveals that the positive effect of the Christmas lottery on sentiment about future employment prospects is stronger for females. This heterogeneity is also reflected on households' expectations about the Spanish economy. Table 15 in the Online Appendix F.2 suggests that the enthusiasm about winning the lottery is shared by all household groups, only higher income and more educated households tend to be less optimistic about the future evolution of the Spanish economy, while only higher income households seem to be less positive about the current state of the Spanish economy in provinces that won the lottery. [16]

According to our results, young, less educated and lower income groups are the groups that react more strongly to the lottery wins. A strong theme emerging from research investigating the relation between social class and emotion is that lower-class individuals score more highly on measures of empathy and are more sentimental. A rationale for this behavior is the tendency for lower social class individuals to be more socially engaged and to have more interdependent social relationships. Kraus, Côté and Keltner (2010) provide results that support the latter hypothesis. In light of this evidence, it could be argued that individuals with such characteristics are more sensitive to positive news in their community, as observed in our empirical exercise.

4.2 Effects of Lottery Income Shocks on Durable Consumption

Since there is no data on consumption at the province level, we investigate whether the surveyed households living in winning provinces are more likely to report durable goods purchases during the subsequent months of the lottery wins. To do so, given that the survey question on durable consumption asks households about any durable goods purchases in the last six months, we adopt the same empirical specification as in Equation (4). This strategy provides us with more flexibility in capturing the timing of household consumption choices after the lottery draw takes place.

Figure 6a plots the marginal effects associated to the β_s coefficients and their 90 percent confidence intervals from a probit model when the dependent variable in Equation (4) is a dummy that takes the value of 1 when households give a positive answer to the question related to durable consumption (DC). The evidence suggests that exogenous variations in local income af-

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[16]Lagerborg (2019) reports that female's sentiment is also affected more significantly by shootings in US schools, while she observes that individuals with higher education and income become relatively more pessimistic as a result of these shootings. We definitely consider a very different shock type and our findings are not directly comparable to hers.

fect significantly household durable consumption. Households living in provinces awarded with Christmas lottery prizes are 4% more likely to report having purchased at least on durable good around six months after the win.

Given the cross-sectional nature of our data we cannot cumulate consumption responses, however, we can take advantage of the question related to future durable consumption (FDC) and try to construct a variable that captures households' cumulative responses to the lottery shocks. To do so we construct a dummy variable that takes the value of 1 when households give a joint positive answer to the question about recent purchases of durable goods (DC) and intended durable consumption (FDC). In particular, the binary variable is assumed to take the value of one if households report to have purchased at least one durable good in the past six months and plan to increase their durable goods purchases in one year from now. This same variable takes value of zero if households report to not have purchased any durable good in the past six months and plan to decrease or maintain their durable goods purchases in one year from now.
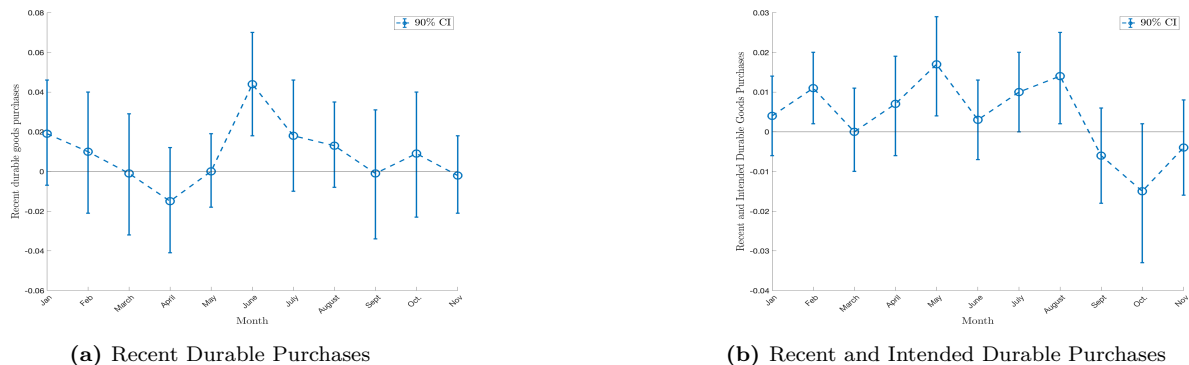
(a) Recent Durable Purchases

(b) Recent and Intended Durable Purchases

Figure 6: Effects of Christmas Lottery on realized and intended household durable consumption

This figure plots the marginal effects associated to the β_s coefficients and their 90% CI from estimating Equation (4) using a probit model. The dependent variable in Panel 6a is DC. The dependent variable in Panel 6b is a binary variable that takes value 1 if households give a positive answers to DC and FDC jointly and 0 otherwise. Standard errors are robust and clustered at the province level

Figure 6b presents the constructed cumulative responses of individual households' durable consumption. Households in winning provinces are between 1-2% more likely to report an increase in their current and intended consumption around five to eight months after the win.

We continue by examining the responses of consumption for the different durable categories available in the survey. Figure 7 reveals that the significant increase in the probability of having purchased at least one durable good reported in Figure 6a is driven by household consumption of furniture and vehicles (see Panels 7a and 7b). In particular, households living in winning provinces are 2.7% more likely to report having purchased a car or motorbike around six months after the win. They are also around 2.9% more likely to report having purchased furniture goods around five to seven months after the win.

The results of our analysis in this section are consistent with the aggregate results and compat-

ible with the view that demand factors are the main drivers of the improvement in economic conditions at the province level. Also they align well with a version of the life-cycle consumption model in which households adjust the timing of durables purchases to smooth consumption (See, e.g., Browning and Crossley (2009)). They are also very consistent with the results of Kuhn et al. (2011) that also report significant effects of lottery wins on car expenditures and other durable expenditures. Furthermore, as in as in Attanasio et al. (2020) who show that wealth shocks are important for accounting for the car purchase dynamics during the Great Recession, we also find that most of the increases in durable consumption are driven by the purchase of vehicles and furniture.

(a) Car or Motorbike
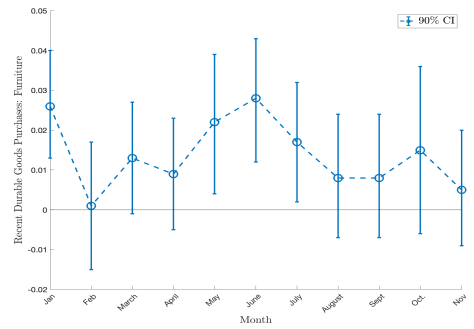
(b) Furniture
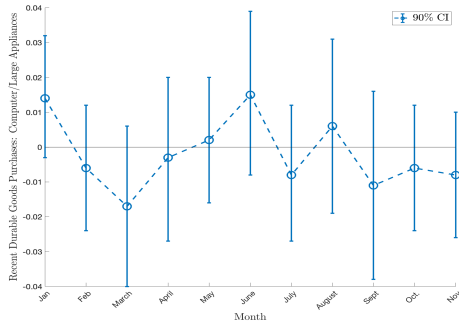
**(c)** Computer or Large Home Appliances
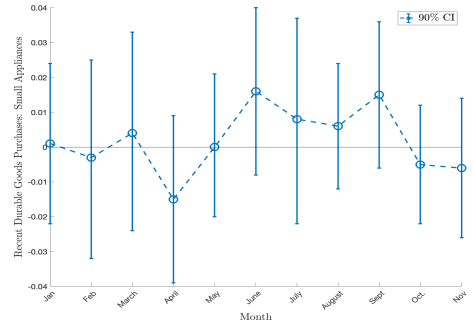
(d) Small Home Appliances

Figure 7: Effects of Christmas Lottery on realized household durable consumption by item
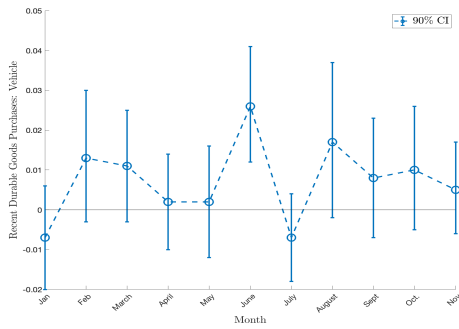
These figures plot the marginal effects associated to the β_s's coefficients and their 90% CI from estimating Equation (4) using a probit model. The dependent variable DCcar (a), DCfurn (b), DCLargeApp (c), DCSmallApp (d) in the past six months. Standard errors are robust and clustered at the province level

4.3 Heterogeneous Effects

The data also allows us to investigate whether the lottery wins effects on household durable consumption depend on the socio-economic characteristics of the households. We can investigate this by examining both the responses of the different groups with respect to the question concerning purchases of durables in the last six months, DC, or by combining the answers to questions DC and FDC (as we have done earlier in Figure 6b) in order to capture the response of consumption by cumulating current and intended consumption responses. We have opted for presenting the latter here and present in the Online Appendix (See Figure 13) the results for

the question related to durables purchased in the last six months .

Figure 8 plots the estimated marginal effects of lottery shocks on household actual and intended durable consumption for different demographic groups. Household durable consumption responses of employed and non-employed households; low and high income households and households with different educational level are not statistically different (see Panel 8a, Panel 8b and Panel 8d).

(a) Employment Status

(b) Household Income

(c) Age Groups

(d) Education Level
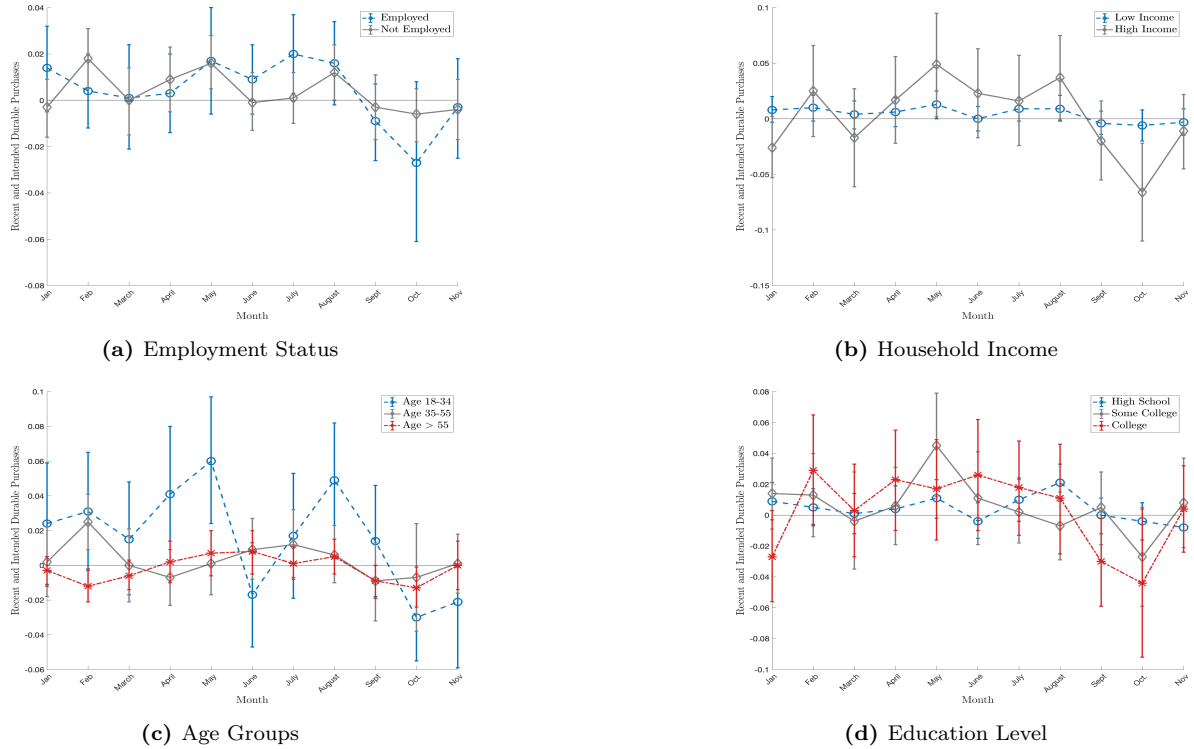
Figure 8: Heterogeneous effects of Christmas Lottery on realized and intended household durable ccnsumption

The figures plot the marginal effects associated to the β_s coefficients and their 90% CI from estimating Equation (4) using a probit model. The dependent variable is a dichotomic variable that takes value 1 if the household gives a positive answer to DC and FDC jointly. Panel 8a restricts the sample to employed individuals (blue circled line) and unemployed or non-active individuals (gray diamond line). Panel 8b to households with monthly household income below or equal to 2700 euros (blue circled line) and above 2700 euros (gray diamond line). Panel 8c plots responses for individuals aged between 18-34 years old (blue circled line), aged between 35-55 years old (gray diamond line) and panel aged above 55 years old (red star line). Panel 8d plots responses for responses for individuals with high school degree or lower (blue circled line), with some college degree (gray diamond line) and with college degree or higher (red star line). Standard errors are robust and clustered at the province level

Panel 8c plots the marginal effects associated to the β_s coefficients and their 90% CI from estimating Equation (4) using a probit model for three different age brackets: [18-34], [35-55] and above 55 years. The significant increase in the probability of acquiring durable goods in the winning provinces in the subsequent months after the lottery win is mostly driven by the consumption behaviour of young households. Young households (18 to 34 years old) are the households that increase their durable consumption significantly after the lottery win.

4.4 Effects of Lottery Shocks on Non-durable Consumption

Due to limited data availability, we are only able to examine the responses of durable consumption to the lottery income shocks. Data on non-durable consumption at the regional level are not publicly available. To investigate how lottery wins affect non-durable consumption we have used two proxies for a specific type of non-durable consumption: retail sales and restaurants.

First, we have collected data from Google searches for restaurants in Google Trends since 2011 at the Spanish regional level and investigated using the same specification as in Equation (1) how the winning of the lottery affects searches for restaurants in the winning provinces. The underlying assumption behind this exercise is that people that intend to go to restaurants search more for restaurants online in the winning regions.
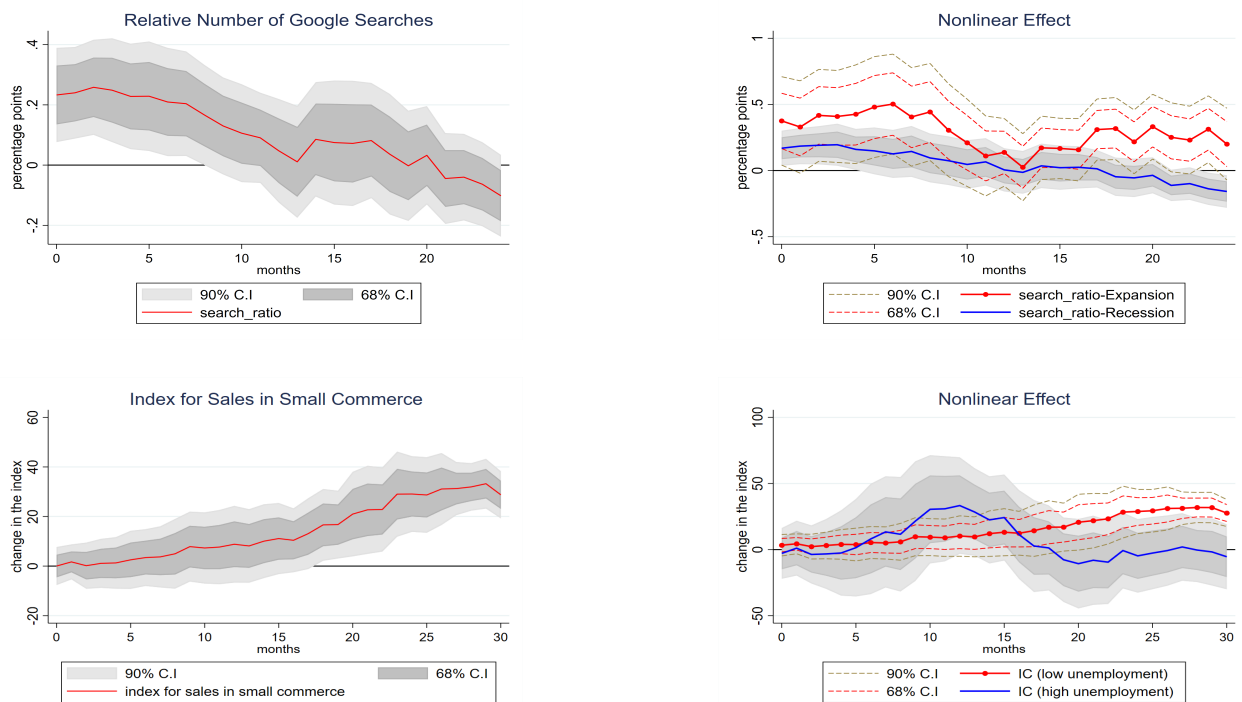
Figure 9: Effects of Christmas Lottery prizes on the relative number of Google searches for restaurants and retail sales

The left panel presents the responses in the linear LP model (1), while the right panel presents the responses in the state-dependent LP model (2). The solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. Relative number of Google searches is defined as the ratio of the number of Google searches in each province to the total Google searches for restaurants in Spain for the sample period 2011M1-2020M1. The sample period for the retail trade index is 2005M5-2020M1 and the reported responses are based on seven communities that have a unique province. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Results are presented in Figure 9 where we plot the IRFs for the number of Google searches in the winning provinces relative to the total searches for restaurants in Spain. Restaurant searches increase by more than two percentage points on average on impact and significantly after the lottery rewards for seven months. When we look at differences between expansions and

recessions, we observe that the lottery win effect is stronger and more persistent in expansions, yet the differences on restaurant searches between expansions and recessions are not statistically significant.

Next, the national statistical institute (INE) collects monthly data for the General Retail Trade Index at constant prices at the autonomous region level. We have investigated how this index changes after lottery wins for seven communities that have a unique province. The bottom panel of Figure 9 presents the linear and state-dependant effect of lottery wins on the Retail Trade Index in those provinces[17]. The retail trade index increases significantly after 17 months in those winning provinces and it does so more rapidly and for ahorter time span during recessions, which provides us additional evidence that the lottery wins spur also retail sales consumption in the winning provinces.

Hence, the evidence presented in this subsection suggests that the increases in consumption after lottery wins is driven by increases in demand for both durable and non-durable items.

4.5 The Joint Response of Sentiment and Consumption

So far, we have shown that lottery wins spur sentiment and consumption expenditures. However, we have not connected the responses of these two variables, as no one else has actually done in the related literature to the best of our knowledge. In this Section, we show that the increase in durable consumption is mostly driven by confidence, taking advantage of the question in the consumer confidence survey about intention to consume durable goods.

In particular, the respondents, apart from being asked about their expectations on their personal finances and employment and the Spanish economy, they are also asked about their future durable consumption plans in the same survey (FDC question). We use this information to create a categorical variable that summarizes the joint response of the surveyed individuals economic expectations and future durable consumption plans responses as follows: for each individual, we construct a categorical variable that takes values 1/2/3 if households respond that their economic expectations and future durable consumption is both lower/same/higher. We create three different categorical variables where we consider the joint responses to questions about intended durable consumption and confidence about future a) household income, b) employment prospects and c) the Spanish economy. As in the previous Section, we use an ordered probit to compute the joint responses of confidence and future durable consumption. Table 5 collects the results of these regressions. The dependent variable in column (1) (and (4)) takes values 1/2/3 if households give jointly negative/neutral/positive answers in the questions relating to their future household income and intended durable consumption. Similarly, column (2) (and (5)) present estimates for the index relating future employment prospects and intended durable consumption and finally columns (3) (and (6)) relate expectations about the Spanish economy with answers about future durable consumption.

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[17]Details about those communities and their response to lottery wins are provided in the next section.

Table 5: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment and future consumption

	(1) Future Durable Cons. & Household Income	(2) Future Durable Cons. & Employment Prospects	(3) Future Durable Cons. & Spanish Economy	(4) Future Durable Cons. & Household Income	(5) Future Durable Cons. & Employment Prospects	(6) Future Durable Cons. & Spanish Economy
Lottery Prize Dummy	0.127***	0.094*	0.092**	0.065	0.020	0.007
	(0.041)	(0.053)	(0.046)	(0.047)	(0.062)	(0.052)
Lottery Expenditures	1.233	-0.508	0.277	0.153	-1.369	-0.723
	(0.838)	(1.209)	(1.079)	(0.829)	(1.215)	(1.078)
Recession Dummy				-0.197***	-0.153***	-0.173***
				(0.014)	(0.017)	(0.015)
Lottery × Recession				0.061	0.113***	0.133***
				(0.040)	(0.035)	(0.037)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	70571	43471	47609	70571	43471	47609
Pseudo R^2	0.049	0.045	0.043	0.053	0.047	0.046

Columns (1)-(6) provide results from an ordered probit. Dependent variable in column (1) and (4) takes values 1 to 3 if households respond in ascending order to Q1F and FDC jointly. Dependent variable in column (2) and (5) takes values 1 to 3 if households respond in ascending order to Q2F and FDC jointly. Dependent variable in column (3) and (6) takes values 1 to 3 if households if households respond in ascending order to Q3F and FDC jointly. *Lottery Prize Dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery Expenditures* are expressed in 1000 euros per capita. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020

The estimates of Table 5 clearly suggest that individuals tend to give positive answers to both questions about their expectations and their consumption plans after a lottery win, indicating that sentiment responses are clearly related to consumption demand in the individual level data. Gillitzer and Prasad (2018) use US data to document a similar causal effect running from sentiment to consumption. Specifically, these authors show that supporters of the winning party after US elections report higher spending intentions than supporters of the losing party.

Moreover, when we interact the lottery prize dummy with a recession dummy, we observe that this effect is driven by overreaction to good news during recessions, especially for expectations for the Spanish labor market and economy. Hence, by matching individual consumer's expectations of future economic conditions (from the consumer sentiment survey) to their spending intentions, we provide direct evidence that lottery shocks affect sentiment and this seems to drive individual consumption responses.

5 Discarding Alternative Interpretations and Robustness

The mechanism we put forward in our analysis works through sentiment. We have shown that lottery wins boost sentiment and consumption and thus, we would like to provide further suggestive evidence that it is positive sentiment that spurs economic activity and no other factor related to economic fundamentals. This is a very difficult task as lottery wins involve monetary transfers for some households and also because these regional windfalls might relate to news

about regional economic fundamentals. In what follows we investigate deeper the propagation mechanism of lottery wins in order to convince the reader that the real effects of lottery wins we report are mainly propagated through sentiment.

5.1 Disentangling Income vs Sentiment Effects from Lottery Wins

Given that lottery wins involve monetary transfers for some households living in the winning province, it is in principal very difficult to disentangle whether the effects we report come from sentiment or from income increases for the lucky inhabitants. As we have highlighted earlier, the probability of being a winner of any of the top Christmas lottery prizes in a winning province is 0.015%, which is very low, implying that the surveyed households are very unlikely to be lottery winners. Fortunately, we have a more direct way to examine whether this is the case in our sample. The Spanish survey of consumer confidence includes a question that allows to investigate whether the positive change in economic sentiment is related to changes in wealth. The CIS asks survey participants the following question about the households' ability to pay bills: *Which of the following assertions describes best the economic situation of your household with respect to your ability to pay bills?*. The answers vary between 1 and 5 with items from 1 "*Struggle to pay bills and have to take debt*" to 5 "*Get easily to the end of the month and manage to save a lot.*" Lottery wins should affect the respondents' answers to this question. In particular, one should expect survey respondents to improve significantly their current ability to pay bills if they happen to be one of the lottery winners in the region. Table 6 presents results for the baseline specification (3) and state-dependent specification (5) when the dependent variable is the question about households ability to cover monthly bills.

Table 6: Survey evidence on the effects of Spanish Christmas Lottery on households' current ability to pay bills

	(1) Current ability to pay bills	(2) Current ability to pay bills
Lottery Prize Dummy	-0.004	-0.023
	(0.031)	(0.034)
Lottery Expenditures	0.009	-0.654
	(0.619)	(0.585)
Recession Dummy		-0.122***
		(0.008)
Lottery × Recession		-0.025
		(0.019)
Month Dummies	Yes	Yes
Province Dummies	Yes	Yes
Individual Characteristics	Yes	Yes
Observations	117244	117244
Pseudo R^2	0.103	0.104

Columns (1)-(2) provide results from an ordered probit where the dependent variable is the ability-to-pay bills question. *Lottery Prize Dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery Expenditures* are expressed in 1000 euros per capita. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Lottery wins do not not alter significantly the ability to pay bills of the surveyed households, suggesting that the results we present for changes in sentiments do not derive from changes

in the wealth of these households. That is, the surge in sentiment does not seem related to increases in wealth of the interviewed households.

5.2 News about fundamentals

Another major concern regarding our findings is the fact that, although lottery wins do not imply monetary transfers for the majority of agents living in the province, they can still bring news about changes in economic fundamentals at the regional level. The Spanish Christmas lottery is an event with a long tradition in Spain and agents in the winning province might expect an increase in the regional economic activity due to the increase in wealth for some individuals living in the province, or precisely because they expect demand conditions to increase. Obviously this concern is more difficult to tackle.

We start investigating this hypothesis by studying data on business confidence that are available at the quarterly frequency for different Spanish autonomous communities. Recall that we have performed our analysis so far using province level monthly data. Luckily there are seven autonomous regions in Spain that have only one province (Asturias, Baleares, Cantabria, La Rioja, Madrid, Murcia and Navarra). We use these provinces to investigate how business confidence reacts to lottery wins. In the Online Appendix (see Figure 11), we show that at quarterly frequency for these seven provinces, our baseline results still hold. That is, consumer confidence about the current and future economic conditions increases in response to the lottery wins significantly.

We next examine how the Harmonised Business Confidence Index from the Spanish Statistical Office *(Instituto Nacional de Estadística)* reacts for those provinces that also constitute an autonomous community. The Business Confidence Indicators survey collects the opinions of the managers of the establishments regarding the progress of their business for the past quarter and their expectations for the coming quarter. Figure 10 presents the responses of the Harmonised Business Expectations Index in those communities to a lottery win. The responses of the business expectation's index is flat and it does not vary significantly in expansions versus recessions, indicating that firms do not change their expectations after a lottery win. This could be because firms do not perceive a substantial increase in local economic fundamentals after a lottery win. It could also be due to the fact that business operate subject to the aggregate economic conditions in Spain and not with the local conditions and for that reason their sentiment is less local. In any case, the unresponsiveness of business expectations supports our mechanism. The expansion seems to be driven by consumers' confidence and local consumption demand and not perspectives about better local economic fundamentals.
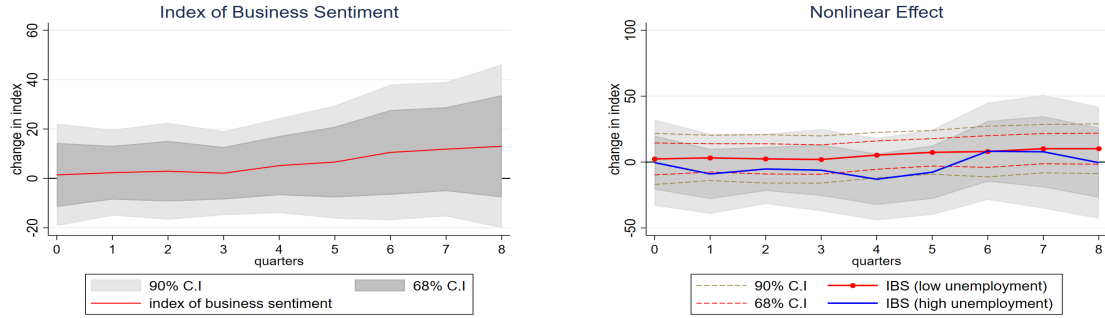
Figure 10: Effects of Christmas Lottery prizes on the Harmonised Business Confidence Index - Seven provinces

Impulse responses to Christmas Lottery prizes. The left panel presents the responses in the linear LP model (1), while the right panel presents the responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. The sample period covered is 2013Q1-2019Q4 due to data availability. Standard errors are robust and clustered at the community level and response functions are smoothed by centered moving average.

Even if lottery wins is good news about economic stimulus at the local level, households, as firms, should not get optimistic about the state of the Spanish economy. Yet, in the observed survey responses at the individual level, the unconditional probability of getting positive responses about the future Spanish labor market and the Spanish economy is 37% and 35%, respectively, while the respective probability of getting positive answers for future personal finances that should be more affected by local conditions is 25% in winning provinces.

To formalize better this argument, we next construct aggregate indices for the individual questions for the personal finances Q1S and Q1F, and the responses regarding employment outcomes given the labor market conditions in Spain Q2S and Q2F and the Spanish economy Q3S and Q3F and investigate how sentiment about those different aspects moves on average after a lottery win. Figure 11 depicts the aggregate responses for each question corresponding to the current economic conditions (first row) and the future economic conditions (second row) to a lottery win. The indices for the current and future employment prospects considering the evolution of the Spanish labor market and the Spanish economy as a whole react significantly to the lottery win. It is also clear that sentiment about current and future Spanish economic conditions reacts much stronger than sentiment about current and future income (compare column one and column three in the Figure). Hence, if the lottery win was a signal about changes in local demand one should expect that respondents when asked about the Spanish macroeconomic conditions to be less reactive. Instead, the data suggests the opposite: survey respondents become more optimistic about the prospects of the Spanish economy relative to the prospects of their personal finances, which should be affected more by local conditions. Hence, the evidence reported in Figure 11 weakens the hypothesis that agents become optimistic because they perceive changes in regional fundamentals after the lottery wins. Section D.7 of the Online Appendix (Table 10) reconfirms these results when examining the first stage F-statistics for the different sentiment questions.

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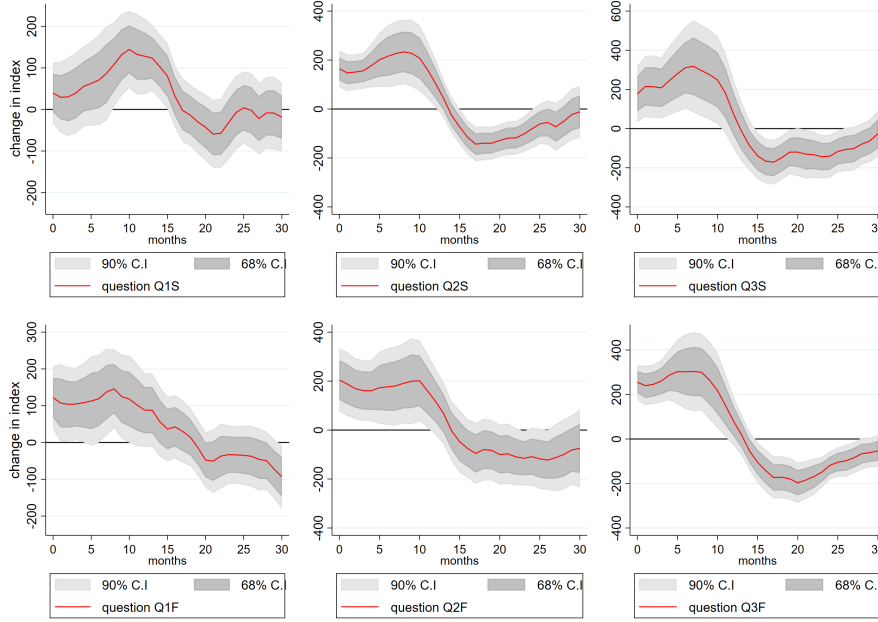
Figure 11: Effects of Christmas Lottery prizes on disaggregated consumer sentiment indices

Impulse responses to Christmas Lottery prizes in the linear LP model (1). To increase the representativeness of the indices at the regional level, we focus on data with at lease 25 respondents in each province and, for each question, we use responses for two consecutive months. The sample period covered is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Finally, we would like to note that, given the reaction of confidence to lottery wins and the analysis that suggests that lottery wins are independent of economic fundamentals, one could use lottery wins as an instrument for autonomous changes in sentiment. Our interest here is in identifying the effects of lottery wins and not confidence shocks. Nevertheless, in the Online Appendix we present the responses of regional unemployment and CPI prices for the sample period 2011M11-2020M1 to a confidence shock identified using lottery wins as an instrument for autonomous changes in sentiment. The results are in line with the results presented in Lagerborg, Pappa and Ravn (2020) and Lagerborg (2019) which show that autonomous changes in sentiment have significant real effects. Differently from those authors, we investigate a positive shock to sentiment (lottery wins versus mass or school shootings) and find that results on unemployment are shorter lived. Yet, our results should be taken with caution given the short sample size and are not directly comparable since the latter authors investigate the dynamics to sentiment shocks in the US economy.

5.3 Spanish Christmas Lottery as a Redistribution Mechanism

An alternative explanation of our findings is that the lottery prizes do not act as simple transfers but they rather represent a redistribution mechanism from rich to poor provinces in Spain. We examine this hypothesis both at the aggregate and the individual level analysis in this section.

To examine whether our main results are driven by poorer provinces receiving huge transfers

from rich regions we interact lottery rewards with a dummy variable for poorer provinces and estimate the following linear LP model for our variables of interest for any $h \geq 0$:

$$S_{j,t+h} = \alpha_{j,h} + \beta_h \text{LotteryPrize}_{j,t} + \delta_h \text{LotteryExp}_{j,t-1} +$$

$$\zeta_h (\text{LotteryPrize}_{j,t} \times \text{Poor}_j) + \sum_{k=1}^{12} \psi_{k,h} X_{j,t-k} + \sum_{s=1}^{12} \lambda_s M_s + \varepsilon_{j,t+h} \qquad (6)$$

where Poor_j is a dummy variable which takes the value of 1 if the average per capita GDP for a province during the sample period is less than the average per capita GDP for all Spanish provinces. Parameter ζ_h captures whether the effect of lottery rewards differs across provinces depending on their GDP per capita level. In the Online Appendix G we show that the coefficient ζ_h is not significantly different from zero, implying that the macroeconomic and sentimental effects of the lottery shock do not differ between poor and rich provinces[18].

We investigate further whether lottery wins affect confidence differently when households live in poor vs rich provinces by looking directly at individuals' survey responses. To do this end, we add two extra variables to the baseline specification in Equation (3): a dummy variable that takes the value of 1 if the GDP per capita in province j at year t is lower than average GDP per capita across provinces for the whole sample ($\text{Poor}_{j,s}$) and an interaction term between the lottery prize dummy and a poor dummy ($(\text{LotteryPrize} \times \text{Poor})_{j,t,s}$):

$$c_{i,j,t,s} = \alpha + \beta \text{LotteryPrize}_{j,t,s} + \delta \text{LotteryExp}_{j,t,s} + \kappa \text{Poor}_{j,t}$$

$$+\zeta (\text{LotteryPrize} \times \text{Poor})_{j,t,s} + \gamma X_{i,j,t,s} + \phi Z_{j,t,s} + \sum_{s}^{S} \lambda_s M_s + \sum_{j}^{J} \mu_j P_j + \epsilon_{i,j,t,s} \qquad (7)$$

The estimates presented in the Online Appendix G (see Table 16) suggest that lower regional GDP per capita does not seem to have a significant impact on neither consumers' expectations about their future nor their sentiment about their current household income after a lottery shock. Similarly, when we estimate Equation (4) in provinces whose GDP per capita is below the sample average and for provinces whose GDP per capita is above we do not find evidence of a stringer reaction of consumption in the poorer provinces (see Figure 16 in the Online Appendix G).

Thus, both the analyses at the aggregate and the individual level suggest that the nature of the experiment we are considering talks more to random monetary transfers and less to redistribution.

5.4 Robustness Exercises

In this section we examine the robustness of our results. For economy of space we present the outcomes of these exercises in the Online Appendix I.1-I.5.

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[18]Similar results hold when we interact the lottery rewards with the average GDP per capita of each province. See Online Appendix G.

We start by investigating whether including in the lottery prizes El Niño (The Kid) lottery affects our main results. El Niño is considered the second most popular lottery prize in Spain. The Niño lottery takes place every year on the 6th of January. The average lottery prize is around €9, which is lower than the average Christmas lottery prize per capita, €42. In the Online appendix H we present summary statistics for this lottery. Given the proximity in time of these two lottery events, those provinces where the winning tickets are sold experience relatively large income shocks in a short time window between the end of each year and the beginning of the next one. It is precisely this proximity in time between these two lotteries, coupled with the common traits it shares with the Christmas lottery (syndicate game, popularity), that might cast some doubts on the results we present since the provinces we considered as the control group in our regressions might have been treated with monetary transfers coming from the El Niño lottery. For that reason, we have extended the original data of Bagues and Esteve-Volart (2016) and constructed a broader lottery rewards and expenditures per capita database that includes both the Christmas lottery data and the data from El Niño lottery. In the Online Appendix H we present results when repeating all the exercises presented above when replacing the original data for lotteries with the extended database. Our main results all survive besides the data extension.

Second, we examine the possible presence of spillover effects by replacing in the specification in Equation (1) data of the winning province with data of the autonomous community in which the province belongs. For example, instead of running regressions using Barcelona as the economic unit, we instead replace this with data for Catalunya. Figure 20 in the Online Appendix I.1 plots the IRFs of the unemployment ratio at the community level for communities in which at least one of their provinces received the money windfalls (we exclude the seven communities with only one province). In accordance with the results of Bagues and Esteve-Volart (2016), the results do not support any significant spillover effects in neighboring provinces for the unemployment rate, while a moderate increase in CPI at the community level is observed.

We also aggregate data in quarters and show that results are robust (see Online Appendix I.2). If we do not account for the size of the reward and just define a dummy for provinces that have won the lottery, the effect on unemployment and consumer sentiments remains statistically significant (see Online Appendix I.3). One might worry that our results are driven by a few outliers that contaminate the effects of lottery prizes on consumption or sentiment and macroeconomic conditions. To alleviate such concerns, we have dropped all the rewards higher than 1000 euros per capita and repeated our analysis. The aggregate effect on unemployment and sentiment indices, albeit smaller, remains significant. We repeat a similar exercise also at the individual level in order to examine the sensitivity of our results with respect to the effects of the lottery shocks on durable consumption and confidence. Our results survive this robustness check as well and are presented in the Online Appendix I.4.

In a recent article Canova (2020) highlights the problems that the application of cross sectional

methods involve when computing macroeconomic objects in spatial settings. He argues that when dynamic heterogeneity is present, if the sample permits it is best to estimate the effect of a policy change or shock in time, unit by unit, and then compute a cross-sectional average. Following his suggestion, we compute dynamic responses to lottery shocks unit by unit. Our results are robust to adopting the proposed methodology (see Online Appendix I.5).

6   Policy Implications

We have shown that lottery wins stimulate consumption, sentiment and economic activity and especially in times that this is mostly needed: in recessions. Moreover, the returns for the government, in terms of revenues, are substantial and account approximately to 0.20 percent of total government revenues (The Online Appendix A.1 presents the evolution of tax revenues from lotteries between 2004 and 2020). Hence, the lottery designed by the SELAE for Christmas in Spain catches two birds with one shot: (i) stimulates economic activity in winning regions and (ii) increases tax revenues *voluntarily*. Hence, the Spanish Christmas lottery can be interpreted as a possible fiscal policy tool.

However, all of our results are relative. That is, we show that household durable spending rises in winning regions relative to losing regions but that does not preclude the aggregate impact of the policy for all of Spain to be negative. According to our statistics, the average individual pays out 58 Euro to the lottery and her possibility of winning the lottery is 0.001 percent. Thus, the non-winners are actually taxed in the rest of Spain. Hence, one would expect aggregate spending in Spain to fall (i.e. spending reductions in losing regions would more than offset spending increases in winning regions). For that reason one would have trouble to conceptually accept this policy as a promising tool for macroeconomic stabilization. According to the popular view, Spaniards play in the lottery collectively and view the lottery expenditure as a part of Christmas spending. To formalize this argument we test whether Christmas Lottery expenditures affect differently household's durable consumption responses in the winning compared to the non-winning provinces. To do so, we directly regress households' actual and intended durable consumption responses on lottery expenditures and the same set of controls included in Equation 3. We restrict the sample to monthly surveys conducted in January, since all provinces would belong to the group of non-winning provinces for the rest of the months within a year.

We do not find suggestive evidence that the correlation between lottery expenditures and household durable consumption is significantly different in the winning versus non-winning provinces. According to Hausman tests reported in Table 7, the consumption (recent or intended) of the non-winners does not seem to be significantly different between winning and non-winning provinces, suggesting that the aggregate consumption should not be significantly affected by the lottery tax.

Table 7: Christmas Lottery expenditures and household durable consumption in winning vs non-wining provinces

	Recent Durable Consumption		Recent and Intended Durable Consumption	
	(1) Non-Winning Provinces	(2) Winning Provinces	(3) Non-Winning Provinces	(4) Winning Provinces
Lottery Expenditures	-5.041 (6.743)	-1.679 (3.152)	26.571* (13.577)	13.656*** (5.159)
Hausman Test P-value	0.6927		0.3779	
Month Dummies	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes
Observations	1628	8780	1396	8493
Pseudo R^2	0.127	0.092	0.163	0.108

Columns (1)-(4) provide results from a probit model where the dependent variable is either DC (columns (1)-(2)) or a variable ((columns (3)-(4)) that takes value 1 if households give positive answers to DC and FDC jointly. *Lottery Expenditures* are expressed in 1000 euros per capita. We test for differences in the coefficient of the lottery expenditures variable by means of a Hausman test for non-linear regression models. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between in each January from 2013 to 2020

7 Conclusions

We show that Spanish Christmas lottery wins work as a stimulative tool for the winning region and their propagation works through sentiment. Lottery winnings spur economic sentiment and induce significant demand effects that lead to a reduction in unemployment, a rise in job vacancies and moderate increases in CPI prices at the province level and they are more expansionary during recessions. Using individual survey data, we confirm that households living in provinces awarded by the lottery, although they do not directly receive wins, become more optimistic about the current and future economic conditions on impact and increase their durable consumption expenditure (for cars and furniture) significantly after the lottery draw. We have also shown that the Christmas lottery generates substantial revenues for the government and that non-winners do not react negatively to losing the prize.

Our results are obviously interesting if one wants to interpret the lottery as a possible policy tool. In this respect, there is encouraging news for fiscal policy. Given the current surge in public debt, policy makers are desperately in search of tools that can contain the fiscal expansion without generating a consolidation driven recession. Our analysis suggests that we are not out of options: tools that increase tax revenues and at the same time bring happiness exist and could be of great use to policy makers. Admittedly, it could be argued that the experiment we have performed is specific to the design of the Spanish Christmas lottery, and therefore cannot be extended to different types of fiscal stimulus such as targeted transfers. Future work should address the challenge of disentangling income and sentiment effects from other types of fiscal transfers and investigate whether the stimulative effects of the latter work also through sentiment.

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The Sentimental Propagation of Lottery Winnings:

Evidence from the Spanish Christmas Lottery

Online Appendix

Not Intended for Publication

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Appendices

A   Spanish Christmas Lottery

A.1   Spanish Christmas Lottery as a Source of Government Revenue

Figure 1 plots the evolution of tax revenues from the Spanish Christmas Lottery as a share of total government revenues (red star line) and as a share of GDP (blue triangle line).
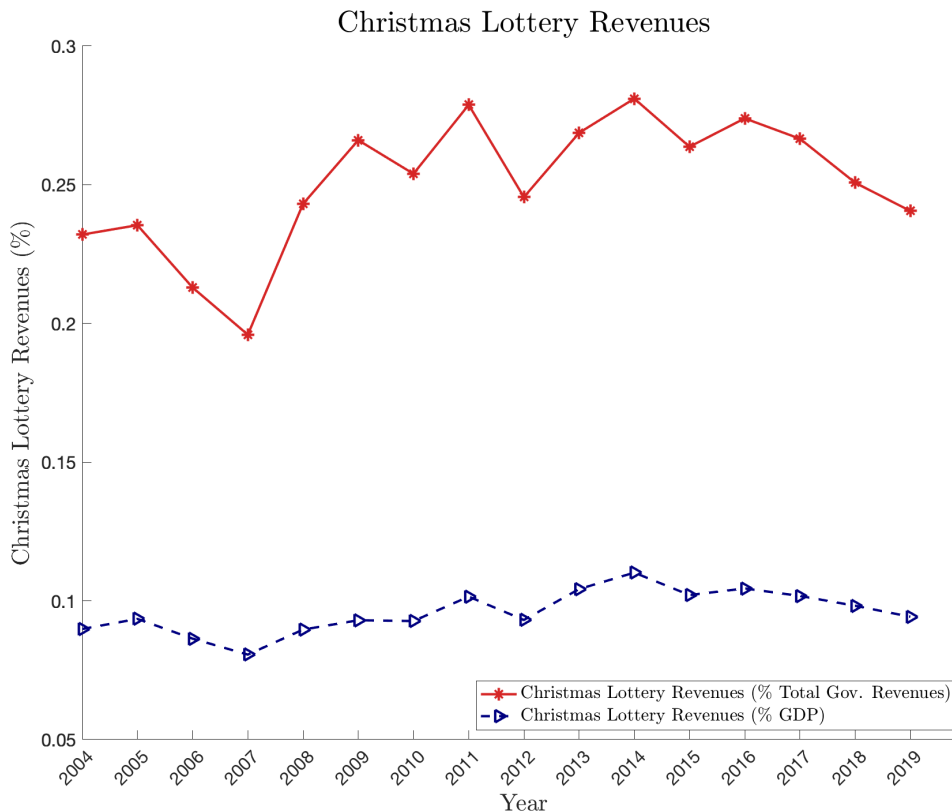
Figure 1: Government Revenues derived from the Spanish Christmas Lottery

Government revenues from the Spanish Christmas Lottery are computed as the sum of 30% of the total lottery emission and the taxable income derived from gambling winnings each year. Total lottery emission is decided by *Sociedad Estatal de Loterías y Apuestas del Estado* (SELAE) and has been changing over the time period considered. Taxable income derived from gambling winnings has been computed by applying the flat tax rate to taxable winnings amount per lottery ticket and then summing over the number of winning lottery tickets distributed in Spain. Note that these percentage numbers represent an upper bound on the revenue raised by the government, since part of the 30% of the total lottery emission does not completely go to Internal Revenue but rather to commissions paid to lottery outlets and administration costs.

A.2 Sentiment and Lottery Expenditure

To check if lottery expenditures in each province are influenced by aggregate economic sentiment, we adopt the specification in Equation 1 and regress the per capita regional lottery expenditures on the two aggregate sentiment indices. The estimates in Table 1 suggest that current and lagged consumer sentiment indices do not explain lottery expenditures at the province level.

Table 1: Testing for Endogeneity of the Lottery Expenditures

	(1) LotteryExp_t	(2) LotteryExp_t	(3) LotteryExp_t	(4) LotteryExp_t
ICC_t	2.44e-06 (2.41e-06)		1.78e-06 (2.82e-06)	
ICE_t		5.53e-07 (2.25e-06)		3.61e-06 (2.99e-06)
ICC_{t-1}			-2.37e-06 (3.30e-06)	
ICC_{t-2}			5.70e-06 (3.74e-06)	
ICC_{t-3}			2.54e-06 (3.13e-06)	
ICE_{t-1}				-7.08e-06 (4.41e-06)
ICE_{t-2}				5.38e-06 (3.79e-06)
ICE_{t-3}				-2.16e-07 (2.82e-06)
LotteryExp_{t-1}	0.985*** (0.015)	0.985*** (0.015)	0.985*** (0.015)	0.985*** (0.015)
Provincial Controls	Yes	Yes	Yes	Yes
Aggregate Controls	Yes	Yes	Yes	Yes
Observations	972	972	972	972

LotteryExp_t denotes per capita expenditure on lottery tickets, ICC is the aggregate index for current economic condition, and ICE is the aggregate index of consumer expectation. Robust standard errors clustered at the province level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A.3 Number of times each province won the Spanish Christmas lottery 2005-2019

The table below reports the number of times each Spanish province has won any of the top prizes between 2005 and 2019.

Table 2: Number of times each province was awarded with any of the Spanish Christmas Lottery main prizes between May 2005 - Jan 2020.

Province	Number of times won any of the top lottery prizes	Province	Number of times won any of the top lottery prizes
Álava	5	La Rioja	3
Albacete	7	Lugo	8
Alicante	11	Madrid	14
Almería	9	Málaga	8
Ávila	4	Murcia	8
Badajoz	7	Navarra	7
Baleares, Islas	5	Ourense	4
Barcelona	13	Asturias	9
Burgos	7	Palencia	4
Cáceres	7	Las Palmas	7
Cadiz	7	Pontevedra	8
Castellon	8	Salamanca	7
Ciudad Real	6	Santa Cruz de Tenerife	11
Cordoba	7	Cantabria	7
Coruña, A	9	Segovia	4
Cuenca	3	Sevilla	10
Girona	6	Soria	7
Granada	9	Tarragona	6
Guadalajara	3	Teruel	2
Guipúzcua	10	Toledo	7
Huelva	7	Valencia	11
Huesca	6	Valladolid	4
Jaén	8	Vizcaya	11
León	5	Zamora	4
Lleida	10	Zaragoza	11

B   Macroeconomic variables

Table 3: Summary Statistics - Macroeconomic data at the province and national level for the period May 2005-Jan 2020

	Mean	St. dev.	Min.	Max.	N
	(1)	(2)	(3)	(4)	(5)
Population (in thousands)	920.28	1136.82	89.50	6600	8850
Total Unemployment level (in thousands)	70.66	83.258	2.067	564.24	8850
Total Unemployment Level in Spain (in thousands)	3554.78	930.72	1959.34	4960.22	8850
Unemployment Rate (%)	20.74 [a]	8.44	5.34	47.42	8850
Unemployment Rate in Spain (%)	17.48	5.85	7.87	26.34	8850
Unemployment Ratio (Population %)	7.52	2.73	1.96	17.06	8850
Long-term Labor Contracts (% Labor Force)	0.72	0.31	0.16	3.82	8850
Short-term Labor Contracts (% Labor Force)	8.63	4.66	2.75	77.31	8850
Total Contracts (% Labor Force)	9.34	4.69	3.07	77.93	8850
Labor Market Tightness (%)	49.32	30.28	9.19	285.09	8850
Regional CPI (% Spanish CPI)	100.27	0.83	96.32	105.09	8850
CPI	97.1	5.82	80.22	106.17	8850
CPI (Spain)	96.8	5.91	83.29	104.87	8850

[a]Average unemployment rate is weighted by provincial labor force participation.

Table 4: Summary Statistics - Macroeconomic data for Asturias, Cantabria, Islas Baleares, Madrid, Murcia, Navarra and La Rioja for the period May 2005- Jan 2020

	Mean	St. dev.	Min.	Max.	N
	(1)	(2)	(3)	(4)	(5)
Population (in thousands)	875.58	442.35	495	1900	1062
Total Unemployment level (in thousands)	77.45	47.01	19.58	229.84	1062
Unemployment Rate (%)	27.24 [a]	8.82	7.12	42.20	1062
Unemployment Ratio (Population %)	8.86	2.74	2.77	14.11	1062
Long-term Labor Contracts (% Labor Force)	0.68	0.33	0.18	2.04	1062
Short-term Labor Contracts (% Labor Force)	10.23	4.80	3.14	28.14	1062
Total Contracts (% Labor Force)	10.90	4.75	3.87	28.50	1062
Labor Market Tightness (%)	44.21	22.51	10.08	141.96	1062
Regional CPI (% Spanish CPI)	100.47	0.79	98.42	102.82	1062
CPI	97.25	5.75	82.16	105.64	1062

[a] Average unemployment rate is weighted by provincial labor force participation.

Variable	Description	Source
Total unemployment	Number of unemployed individuals registered in the National Employment Agency	SEPE
Total employment	Number of employed individuals affilited with the Social Security System	Estadísticas Seguridad Social
Total labor contracts	Number of labor contracts signed by individuals who were registered as unemployed in the National Employment Agency	SEPE
Short-term labor contracts	Number of short-term labor contracts signed by individuals who were registered as unemployed in the National Employment Agency	SEPE
Long-term labor contracts	Number of long-term labor contracts signed by individuals who were registered as unemployed in the National Employment Agency	SEPE
Unemployment rate	Harmonized Unemployment Rate: All Persons for Spain	OECD
Provincial and National CPI	Consumer Price Index: all goods. Base 2016	INE
Provincial and National Rental Price Index	Rental prices subgroup of Consumer Price Index. Base 2016	INE
Mortgages	Number of mortgages. All types of real state property	INE
Population	Total population with Spanish residence	INE

C Consumer Confidence and Durable Consumption Data

C.1 Individual characteristics

Variable	Description
Age	1: Less than 25 years 2: Between 25 and 34 years 3: Between 35 and 44 years 4: Between 45 and 54 years 6: More than 55 years
Gender	0: Male 1: Female
Marital Status	1: Married 2: Single 3: Widow 4: Separated 5: Divorced
Education	1: Less than 5 years of schooling 2: Primary education 3: Less than high-school 4: Some high-school 5: Vocational training I 6: High-school 7: Vocational training II 8: Some college 9: College 10: Master/ PhD degree
Employment Status	0: Other 1: Employed
Household Income	1: Less than 1100 euros 2: Between 110 and 1800 euros 3: Between 1801 and 2700 euros 4: Between 2701 and 3900 euros 5: More than 3900 euros

Table 5: Percentage of answers by question and individual characteristics

	(1) Household Income			(2) Employment Prospects			(3) Spanish Economy		
Answer:	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Age									
16-24	22%	9%	9%	16%	8%	10%	14%	7%	9%
25-34	27%	14%	15%	18%	16%	16%	17%	16%	16%
35-44	24%	20%	20%	21%	22%	20%	21%	22%	21%
45-55	15%	18%	20%	16%	20%	19%	17%	20%	19%
> 55	12%	39%	36%	29%	34%	35%	31%	35%	35%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender									
Female	46%	51%	53%	44%	52%	53%	42%	53%	52%
Male	54%	49%	47%	56%	48%	47%	58%	47%	48%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Marital Status									
Married	40%	55%	53%	50%	55%	52%	51%	55%	52%
Not Married	60%	45%	47%	50%	45%	48%	49%	45%	48%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education									
Less High School	38%	44%	52%	40%	41%	51%	39%	43%	50%
High School	18%	16%	16%	18%	16%	16%	19%	15%	16%
Some College	19%	18%	17%	17%	19%	17%	18%	19%	17%
College	20%	18%	13%	20%	20%	13%	20%	19%	14%
Master/PhD	5%	4%	3%	4%	4%	3%	4%	4%	3%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Employment Status									
Employed	66%	49%	38%	52%	53%	43%	51%	53%	45%
Not Employed	34%	51%	62%	48%	47%	57%	49%	47%	55%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Household Income									
< €1100	16%	24%	42%	19%	24%	35%	20%	24%	35%
€1100 - €1800	33%	34%	35%	33%	35%	35%	32%	35%	35%
€1801 - €2700	26%	23%	16%	25%	23%	18%	25%	23%	18%
€2701 - €3900	15%	12%	6%	15%	12%	8%	14%	12%	8%
> €3900	10%	7%	2%	8%	6%	4%	9%	6%	4%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Observations	32,504	69,508	15,464	49,160	47,156	25,918	47,824	40,903	26,049

Education has been simplified to a categorical value that takes values 1 to 5 in ascending order from lower to higher degree of education attained. Marital status has also been simplified to a categorical value that takes value 1 if married and 0 otherwise

Table 6: Percentage of answers by question and individual characteristics

	(4) Future Household Income			(5) Future Employment Prospects			(6) Future Spanish Economy		
Answer:	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Age									
16-24	19%	7%	6%	14%	7%	8%	14%	7%	8%
25-34	26%	13%	14%	19%	15%	16%	18%	16%	16%
35-44	26%	19%	21%	21%	22%	22%	22%	22%	21%
45-55	17%	19%	21%	17%	21%	20%	17%	20%	20%
> 55	13%	42%	38%	29%	35%	34%	29%	35%	35%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender									
Female	46%	51%	51%	47%	53%	50%	46%	53%	50%
Male	54%	49%	49%	53%	47%	50%	54%	47%	50%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Marital Status									
Married	41%	57%	56%	50%	55%	54%	50%	55%	54%
Not Married	59%	43%	44%	50%	45%	46%	50%	45%	46%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education									
Less High School	41%	44%	51%	43%	42%	47%	43%	44%	46%
High School	19%	15%	15%	18%	15%	16%	18%	15%	16%
Some College	19%	18%	17%	18%	19%	19%	18%	19%	18%
College	17%	19%	14%	19%	19%	6%	17%	18%	16%
Master/PhD	4%	4%	3%	4%	4%	3%	4%	4%	4%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Employment Status									
Employed	44%	51%	57%	50%	47%	51%	49%	53%	48%
Not Employed	56%	49%	43%	50%	53%	49%	51%	47%	52%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Household Income									
< €1100	24%	24%	40%	24%	24%	31%	24%	25%	31%
€1100 - €1800	34%	34%	34%	34%	35%	35%	34%	35%	35%
€1801 - €2700	23%	23%	17%	23%	23%	20%	23%	23%	20%
€2701 - €3900	13%	12%	7%	12 %	12%	12%	12%	12%	9%
> €3900	7%	3%	3%	7%	6%	5%	7%	5%	5%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Observations	22,125	63,712	27,114	39,975	25,629	40,482	39,686	30,387	39,368

Education has been simplified to a categorical value that takes values 1 to 5 in ascending order from lower to higher degree of education attained. Marital status has also been simplified to a categorical value that takes value 1 if married and 0 otherwise

Table 7: Percentage of answers by question and individual characteristics

	(1) Durable Consumption		(2) Durable Consumption Vehicle		(3) Durable Consumption Furniture		(4) Durable Consumption Large Appliance		(5) Durable Consumption Small Appliance	
Answer:	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Age										
16-24	12%	7%	15%	9%	13%	9%	13%	9%	12%	9%
25-34	19%	13%	23%	15%	23%	15%	18%	15%	19%	15%
34-44	23%	19%	23%	21%	25%	20%	22%	21%	24%	20%
44-55	20%	18%	19%	19%	18%	19%	20%	18%	20%	19%
>55	26%	42%	21%	36%	21%	37%	26%	37%	25%	37%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender										
Female	47%	54%	43%	51%	45%	51%	46%	52%	46%	52%
Male	53%	46%	57%	49%	55%	49%	54%	48%	54%	48%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Marital Status										
Married	53%	53%	51%	53%	51%	53%	46%	52%	53%	53%
Not Married	47%	47%	49%	47%	49%	47%	54%	48%	47%	47%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education										
Less High School	36%	54%	38%	46%	30%	48%	35%	49%	34%	49%
High School	17%	15%	18%	16%	17%	16%	18%	16%	17%	16%
Some college	20%	16%	20%	18%	21%	17%	20%	17%	21%	17%
College	21%	13%	20%	17%	25%	16%	22%	16%	23%	15%
Master/PhD	45%	3%	5%	4%	7%	3%	5%	3%	5%	3%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Employment										
Employed	57%	41%	62%	48%	63%	47%	57%	46%	58%	46%
Not Employed	43%	59%	38%	52%	37%	53%	43%	54%	42%	54%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Household Income										
< €1100	17%	38%	15%	29%	13%	30%	16%	31%	17%	31%
€1100 - €1800	33%	35%	32%	34%	30%	35%	32%	35%	33%	35%
€1801 - €2700	26%	17%	27%	21%	28%	20%	26%	20%	25%	20%
€2701 - €3900	15%	7%	16%	10%	18%	10%	16%	9%	15%	9%
>3900	9%	3%	10%	5%	12%	5%	10%	5%	9%	6%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Observations	29,406	87,964	10,445	107,353	17,215	100,489	27,446	90,282	29,406	87,964

Education has been simplified to a categorical value that takes values 1 to 5 in ascending order from lower to higher degree of education attained. Marital status has also been simplified to a categorical value that takes value 1 if married and 0 otherwise

C.2 Consumer Confidence Questions

To assess how lottery income shocks affect consumer sentiment in the winning provinces, we aggregate the answers to the confidence questions across respondents and across questions at the province level to produce two broad indices: the Index of Current Economic Conditions (ICC) and the Index of Consumer Expectations (ICE). The ICC is based on answers to the questions that concern consumers' assessment of their own current financial and economic situation as well as the current state of the Spanish economy. In particular, the ICC focuses on the following three questions:

1. (Q1S) Would you say that your household economic conditions are better off, worse off, or just about the same compared to 6 month ago?

2. (Q2S) Would you say that the current economic situation of Spain would allow you to

improve your employment status, would help worsen your employment status, would have no impact on your employment status compared to 6 months ago?

3. (Q3S) Would you say the current state of the Spanish economy is better, worse, or about the same compared to 6 months ago?

Analogously, the ICE summarizes answers to questions about consumers' expectations about their future household finances, employment status and about the evolution of the Spanish economy. Specifically, the ICE is computed by gathering answers to the following three questions:

1. (Q1F) Would you say that your household economic conditions will be better off, worse off, or just about the same in 6 months from now?

2. (Q2F) Would you say that the economic situation of Spain will allow you to improve your employment status, will help worsen your employment status, will have no impact on your employment status in 6 months from now?

3. (Q3F) Would you say the state of the Spanish economy will be better, worse, or about the same in 6 months from now?

C.3 Aggregate Consumer Sentiment Indices

We follow the methodology adopted by University of Michigan's Survey of Consumer Confidence and construct two broad consumer sentiment indices for each province j: Index of Current Economic Conditions (ICC) and Index of Consumer Expectation (ICE)

$$ICC_{j,t} = \frac{Q_{1S,j,t} + Q_{2S,j,t} + Q_{3S,j,t}}{3}$$
$$ICE_{j,t} = \frac{Q_{1F,j,t} + Q_{2F,j,t} + Q_{3F,j,t}}{3}$$

where

$$Q_{i,j,t} = \%\text{Better}_{j,t} - \%\text{Worse}_{j,t} + 100 \quad i \in \{1S, 2S, 3S, 1F, 2F, 3F\}$$

The Spanish consumer confidence survey is designed to be representative at the national level, but the CIS does not guarantee that the sample will be representative of the population within each separate province during each month. Following Aguiar, Hurst and Karabarbounis (2013), we average over two months responses in order to mitigate measurement error in our data set due to sampling variation within the survey at the province level. Also, to keep the representativeness of the consumer sentiment indices at the province level, we keep in our sample those monthly observations for which the provincial ICC and ICE are constructed with at least 25 respondents. A representativeness threshold of 25 respondents implies that we have at least 25 survey answers for each of the three questions included in the computation of ICE and ICC, respectively. Table 8 summarizes the number of observation in the representative sample.

Table 8: Representativeness of Provincial ICC and ICE - Consumer sentiment indices at the province level have been constructed using monthly information between November 2011 and January 2020 for 50 Spanish provinces.

Representativeness of Provincial ICC and ICE			
Threshold	Number of observations	Provinces remaining in the sample	Provinces remaining in the sample at least 50 monthly obs.
>= 25 survey respondents per question	1,692	29	17

Provincial and aggregate consumer confidence indices are strongly correlated (the average correlation coefficient between the national and all provincial ICC and ICE is 0.88 and 0.82, respectively)[1].

D   Province-level Regressions

D.1   Effects of Lottery Income Shocks Net of Lottery Expenditures on Unemployment Rate, Prices and Consumer Confidence Indices

In this section we investigate whether our results are sensitive to the treatment effect considered. In the main text we report results where the treatment effect is lottery wins after taxes. Here the the treatment effect is the coefficient on the net win, that is the lottery wins net of lottery expenditures.

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[1]The reported values for the average unconditional correlations between the national and all provincial ICC and ICE have been computed after keeping those monthly observations for which there are at least 25 respondents answering the survey questions. If we relax the threshold for representativeness to 5 respondents, these average unconditional correlations take value 0.80 and 0.71, respectively.
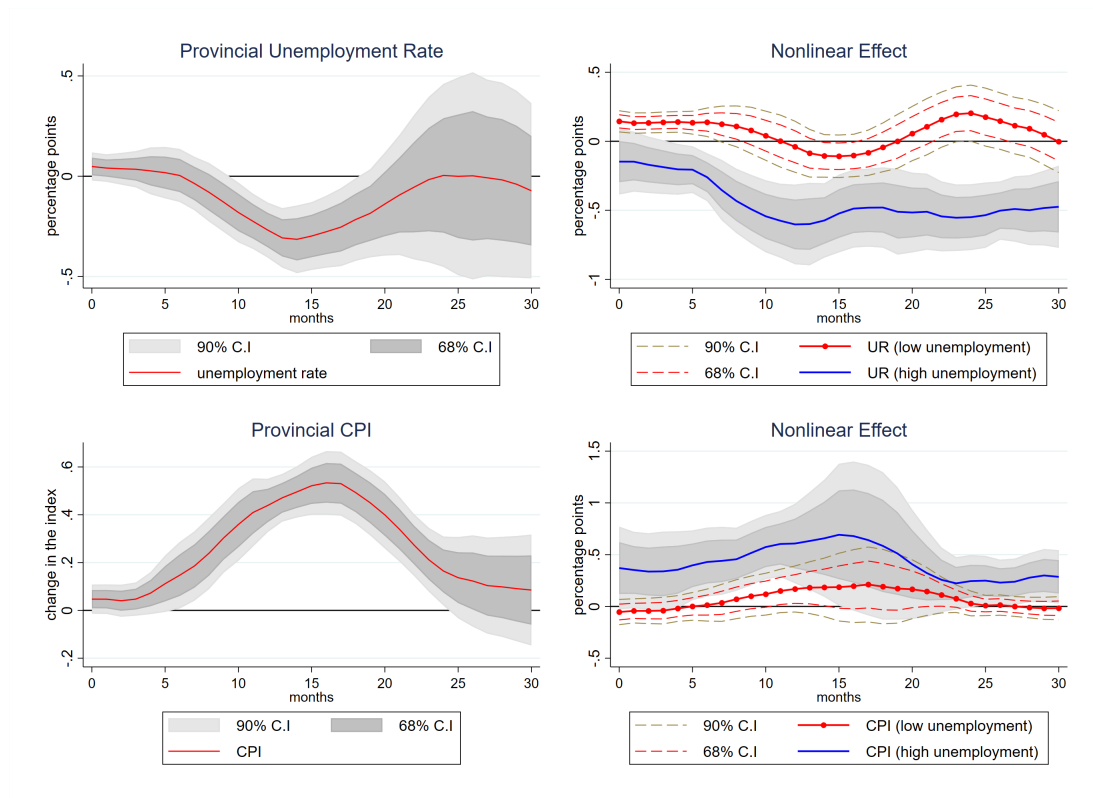
Figure 2: Effects of Christmas Lottery Prizes (net of lottery expenditures) on Unemployment Rate and CPI

Impulse responses to Christmas Lottery prizes (net of lottery expenditures). The left panel presents responses in the linear LP model (1), while right panel presents responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.
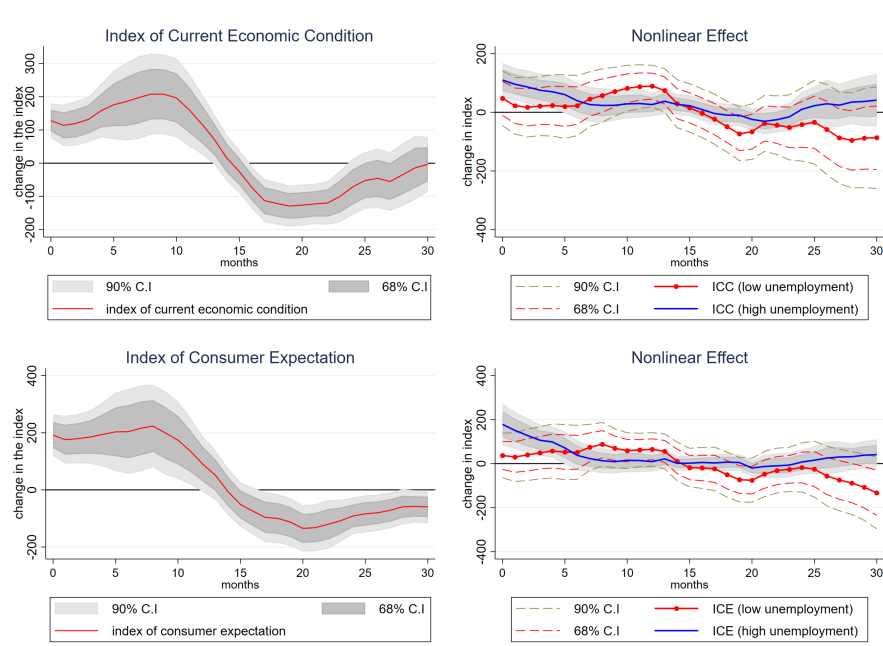
Figure 3: Effect of Christmas Lottery Prizes (net of lottery expenditures) on Index of Current Economic Condition and Index of Consumer Expectation

Impulse responses to Christmas Lottery prizes (net of lottery expenditures). The left panel presents responses in the linear LP model (1), while right panel presents responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and we use responses for two consecutive months (see Online Appendix for details and robustness checks on the construction of the indices). Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

D.2 Effects of Lottery Income Shocks on Relative Unemployment and CPI

In the baseline regressions we control for the aggregate unemployment and CPI in Spain in order to evaluate the effects of the shocks on unemployment and CPI at the province level. Here we present results when instead we regress relative unemployment, i.e., province unemployment/average unemployment in Spain and relative CPI, defined similarly on the lottery wins
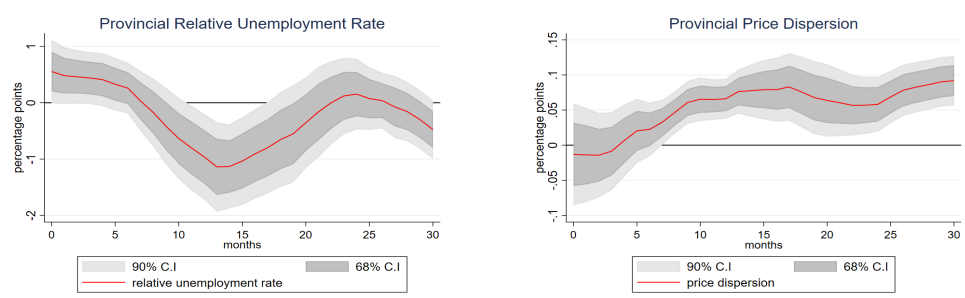
Figure 4: Effects of Christmas Lottery Prizes on Relative Unemployment rate and Relative CPI

Impulse responses to Christmas Lottery prizes. The graph show responses in the linear LP model (1). Relative unemployment is defined as provincial unemployment over total unemployment. Similarly relative CPI is defined as the ratio of provincial CPI over Spain's CPI. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Given the discrepancy of the unemployment rate data, we present here results of the same set of regressions as in Equation (1) for the log of the total number of unemployed population instead of the unemployment rate.
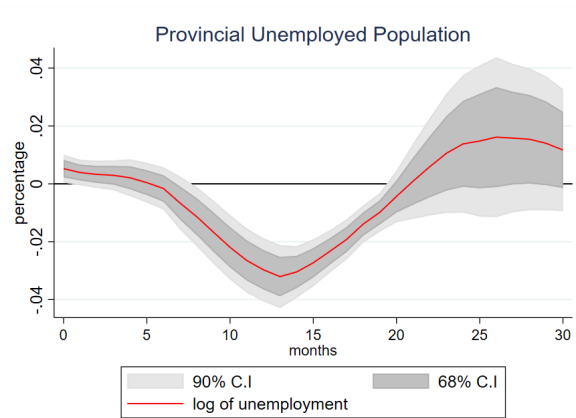
Figure 5: Effect of Christmas Lottery Prizes on Log of Total Unemployment

Impulse responses to Christmas Lottery prizes the linear LP model (1). Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M1-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

D.3   Testing for Differences in the Effect of Lottery Prizes across States

The table below presents Wald test statistics for the equality of responses of the unemployment rate, the relative CPI, the ICC and the ICE in recessions versus expansions.

Table 9: Wald Test Statistics Results

		Wald Test Results		
Horizon (months)	Statistics for UR	Statistics for CPI	Statistics for ICC	Statistics for ICE
$h = 0$	5.7	15.6	1.8	5.68
	(0.01)	(0.00)	(0.3)	(0.02)
$h = 1$	12.3	0.47	0.0	0.4
	(0.00)	(0.5)	(0.9)	(0.53)
$h = 3$	0.23	0.14	1.85	0.0
	(0.63)	(0.71)	(0.18)	(0.9)
$h = 6$	9	0.00	1.07	0.52
	(0.00)	(0.9)	(0.31)	(0.47)
$h = 12$	11.7	3.1	2.45	1.6
	(0.00)	(0.07)	(0.02)	(0.2)
$h = 24$	22.2	0.49	0.15	0.3
	(0.00)	(0.48)	(0.7)	(0.6)

Wald test statistics for the null hypothesis that lottery wins have the same effect in high-unemployment and low-unemployment periods for different horizons (Equation 2). The first column shows the results for the unemployment rate (UR), the second column for the relative prices (CPI,), the third column for the Index of Current Economic Condition (ICC) and the forth one for the Index of Consumer Expectation Index (ICE). Numbers in parenthesis show the corresponding p-value for each test.

D.4 Alternative Detrending Method: growth rates and HP filtered series

(a) Unemployment Rate Growth

(b) CPI Growth
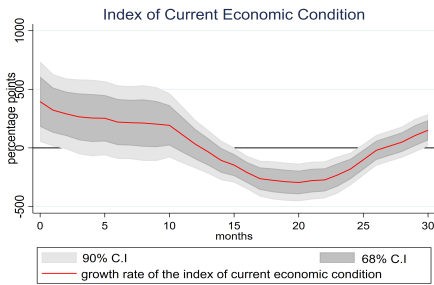
(c) ICC Growth
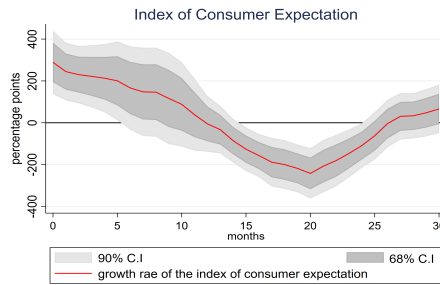
(d) ICE Growth

Figure 6: Effects of Christmas Lottery Prizes on the Growth Rate of Unemployment Rate, CPI, and Consumer Sentiment Indices

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the linear LP model (1). Data has been detrended using Hodric Prescot filter instead of a fourth order polynomial. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1 for UR and CPI and 2011M11 - 2020M1 for the sentiment indices. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and we use responses for two consecutive months. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

(a) Unemployment Rate

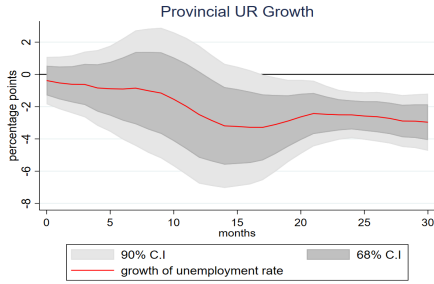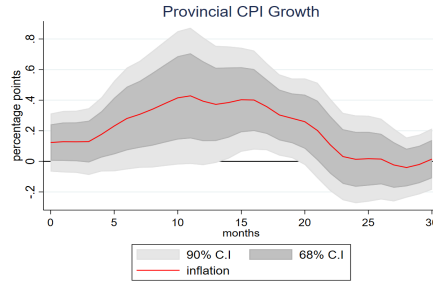**(b)** CPI

(c) ICC

(d) ICE

Figure 7: Effects of Christmas Lottery Prizes on Unemployment Rate, CPI, and the Sentiment Indices.

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the linear LP model (1). Data has been detrended using Hodric Prescot filter instead of a fourth order polynomial. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1 for UR and CPI and 2011M11 - 2020M1 for the sentiment indices. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and we use responses for two consecutive months. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

D.5   Effects of Lottery Income Shocks in Sub-sample 2011-2020
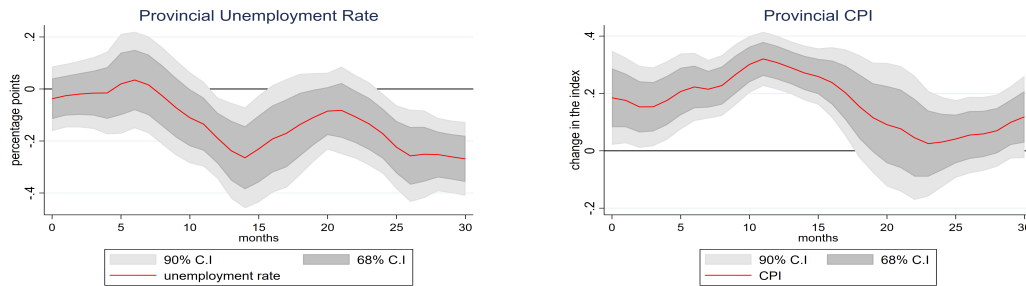
Figure 8: Effects of Christmas Lottery Prizes on Unemployment Rate and CPI

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the linear LP model (1). Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2011M1 - 2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

D.6 Effects of Lottery Income Shocks on Long vs Short Run Contracts
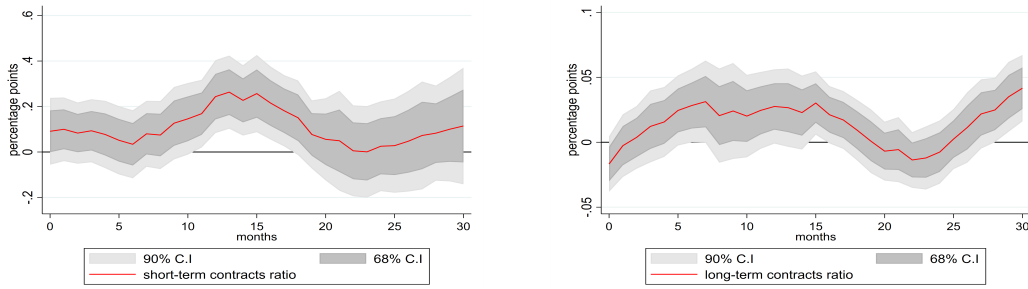
(a) Short-run contracts to Participation Ratio

(b) Long-run contracts to Participation Ratio

Figure 9: Effects of Christmas Lottery Prizes on Labor Contracts by Contract Duration

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the linear LP model (1). Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

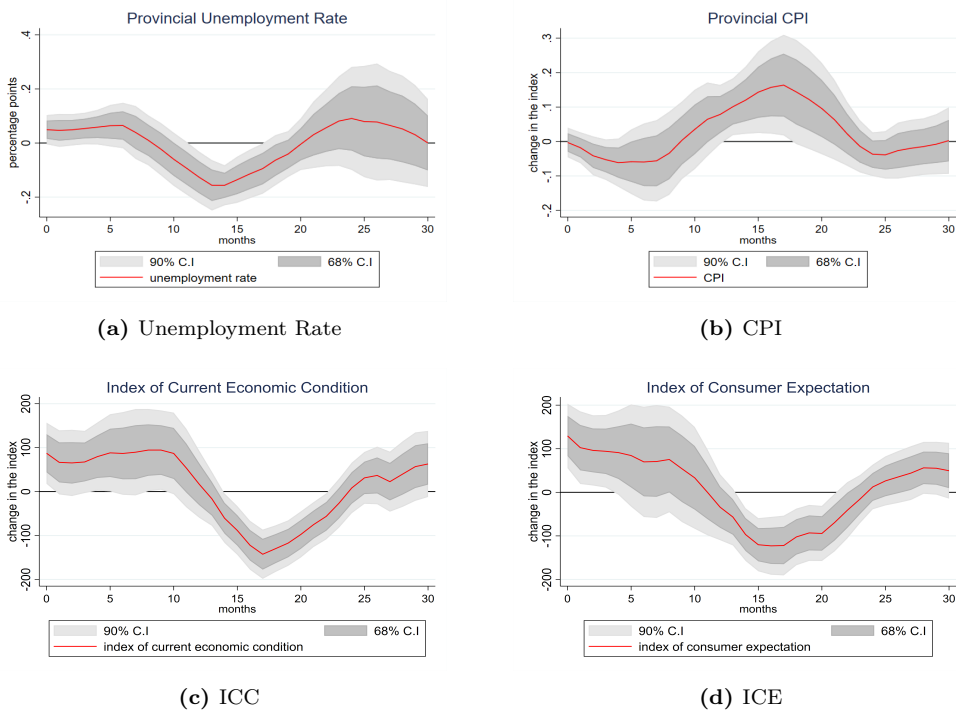## D.7 First-stage Regression of Christmas Lottery on Disaggregated Consumer Confidence Indices

Table 10: First-stage F-statistics for the null hypothesis that the lottery awards has no explanatory power for consumer confidence.

F-statistics						
horizon (months)	Q1S	Q2S	Q3S	Q1F	Q2F	Q3F
$h = 0$	0.49	5.9	0.28	6.1	3.3	7.7
$h = 1$	1.4	17.8	3	13.7	2.9	43.1
$h = 2$	0.2	20.1	3.9	3.3	8.5	83.4
$h = 3$	1.9	7.6	15	2.6	22.1	21.8
$h = 6$	1.7	14.7	4.6	5.1	2.2	18.7
$h = 12$	8.9	4.7	0.35	0.6	1.4	0.13

D.8 An IV Exercise

(a) Provincial unemployment rate   **(b)** Provincial CPI
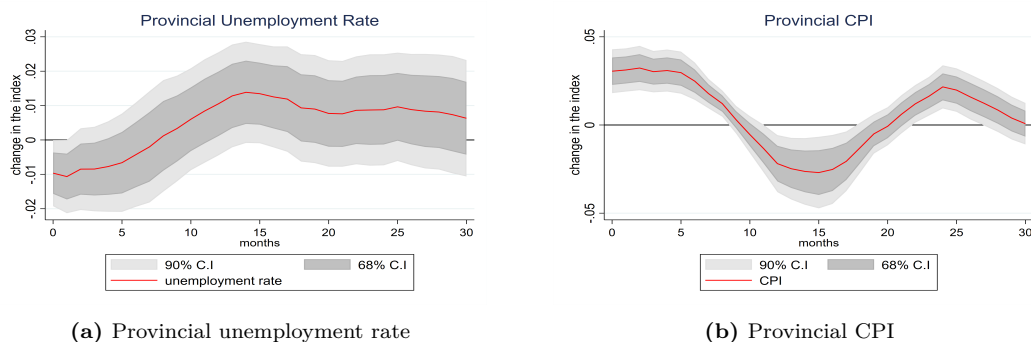
Figure 10: Effect of the Index of Consumer Expectation Instrumented by Lottery Rewards on the Provincial Unemployment Rate and CPI

Impulse responses to the Index of Consumer Expectation shocks instrumented by Lottery prizes. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months (see Online Appendix for details and robustness checks on the construction of the indices). Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

E Results for Autonomous Communities/Provinces

E.1 Effects of Lottery Shocks on Consumer Sentiment Indices

Figure 11 shows the effect of winning the lottery on the consumer sentiment in autonomous communities with one province using quarterly indicators for consumer sentiment.
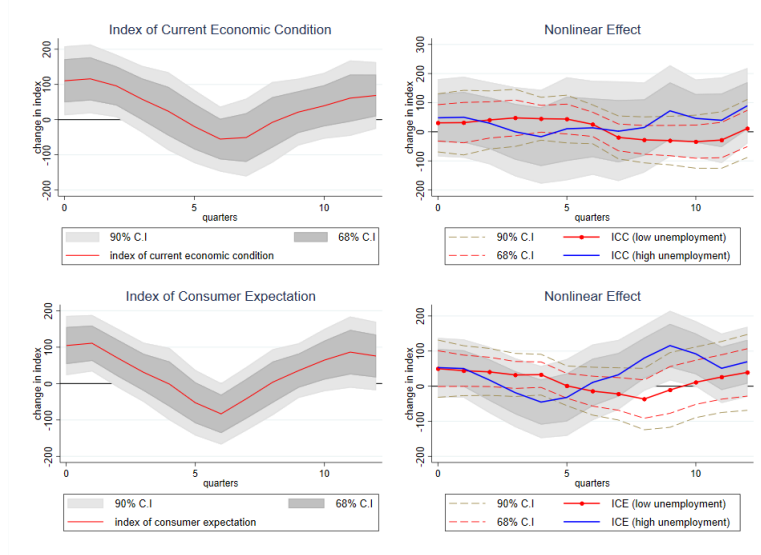
Figure 11: Effect of Christmas Lottery Prizes on the Index of Current Economic Condition and the Index of Consumer Expectation- Seven provinces

Impulse responses to Christmas Lottery prizes. The left panel presents the responses in the linear LP model (1), while the right panel presents the responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. Sentiment indices are normalize to 100 for the first quarter of 2013, to be comparable to the business sentiment index. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2013Q1-2019Q4 an includes data for Asturias, Cantabria, Islas Baleares, Madrid, Murcia, Navarra and La Rioja. Standard errors are robust and clustered at the communities level and response functions are smoothed by centered moving average.

E.2   Business Confidence Index

We use the Harmonised Business Confidence Index from Spanish Statistical Office *(Instituto Nacional de Estadística)* for those provinces that are also constituted as autonomous communities[2]. This index measures the confidence of a representative sample of firms operating in all sectors of the economy. It is constructed as the geometric average of two other indices: Situation Index and Expectations Index. The Situation and Expectations Indices for region j are constructed as follows:

$$Q_{j,t} = \%\text{Better}_{j,t} - \%\text{Worse}_{j,t} + 100$$

The index reference quarter are 2013Q1.

F   Individual-level Regressions

F.1   Controlling for The Size of the Lottery Shock

We estimate again our baseline regression at the individual (Equations (4) for durable consumption and Equations (3) and (5) for consumer confidence in the main text) by replacing the lottery prize dummy variable by a categorical variable (LotteryPrizeCat$_{j,t,s}$) that takes values:

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[2]These are: Asturias, Cantabria, Islas Baleares, Madrid, Murcia, Navarra and La Rioja

- LotteryPrizeCat$_{j,t,s}$ = 0 if the Christmas Lottery reward per capita in province j in month s and year t is 0

- LotteryPrizeCat$_{j,t,s}$ = 1 if the Christmas Lottery reward per capita in province j in month s and year t is non-zero, but below the sample median

- LotteryPrizeCat$_{j,t,s}$ = 2 if the Christmas Lottery reward per capita in province j in month s and year t is above the sample median

In this way we are able to assess whether household durable consumption and consumer confidence, if affected by unexpected provincial monetary transfers, is increasing in the size of the income transfer.

Results in Tables 11 and 12 slightly differ from our baseline results where we use the lottery prize dummy instead. When using lottery rewards per capita in our regression, we do not find that consumer sentiment about future employment prospects and current and future evolution of the Spanish economy is significantly affected when the province wins (Table 11) in our linear specification. In turn, when controlling for the recession periods, the results for the effects of lottery wins on consumer confidence remain unaltered, that is, lottery wins make households living in the lucky provinces significantly more optimistic about current and future employment prospects and the evolution of the Spanish economy as well as about their current household income during recession periods (see Table 12). These results suggest that when the economy is at slack, the positive effect of lottery income shocks on households' sentiment about current and future economic conditions is significantly increasing in the size of those income transfers.

Table 11: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment - Lottery as categorical variable

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize	0.038*	0.064***	0.054**	-0.002	0.007	0.010
	(0.021)	(0.020)	(0.024)	(0.025)	(0.024)	(0.021)
Lottery Expenditures	2.189**	0.960*	0.741	-1.908**	-0.926*	-0.931*
	(0.855)	(0.546)	(0.759)	(0.765)	(0.515)	(0.535)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	112047	106086	114776	109441
Pseudo R^2	0.049	0.039	0.023	0.011	0.021	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery Prize Cat* is a categorical vaue that takes value 0 is the Christmas Lottery reward per capita is 0, takes value 1 if the Christmas Lottery reward per capita is non-zero, but below the sample median and takes value 2 if the Christmas Lottery reward per capita is above the sample median. *Lottery expenditures* are the monetary amount of expenditures in Christmas lottery expressed in 1000 euros per capita. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 12: Survey evidence on the state-dependent effects of Spanish Christmas Lottery on consumer sentiment - Lottery as categorical variable

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize	-0.006	0.043**	-0.003	-0.021	-0.037	-0.013
	(0.021)	(0.021)	(0.024)	(0.025)	(0.024)	(0.022)
Lottery Expenditures	0.669	0.089	-0.519	-1.820**	-1.546***	-0.979*
	(0.672)	(0.471)	(0.713)	(0.766)	(0.529)	(0.529)
Recession Dummy	-0.284***	-0.161***	-0.230***	0.017	-0.112***	-0.008
	(0.013)	(0.011)	(0.012)	(0.013)	(0.013)	(0.011)
Lottery × Recession	0.024	0.003	0.102***	0.077***	0.108***	0.082***
	(0.019)	(0.017)	(0.017)	(0.019)	(0.017)	(0.019)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117463	112938	112033	106073	114762	109427
Pseudo R^2	0.056	0.041	0.027	0.011	0.022	0.012

Columns (1)-(6) provide results from an ordered probit where the dependen variable is Q1S-Q3F. *Lottery Prize Cat* is a categorical vaue that takes value 0 is the Christmas Lottery reward per capita is 0, takes value 1 if the Christmas Lottery reward per capita is below the sample median and takes value 2 if the Christmas Lottery reward per capita is above the sample median. *Lottery expenditures* are the monetary amount of expenditures in Christmas lottery expressed in 1000 euros per capita. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Figure 19 presents evidence that the household consumption responses are increasing in the size of the lottery income transfers. Results suggest that households living in provinces awarded with larger Christmas lottery prizes are 2% more likely to have increased their durable goods consumption 6 and 8-10 months after the lottery draw took place.
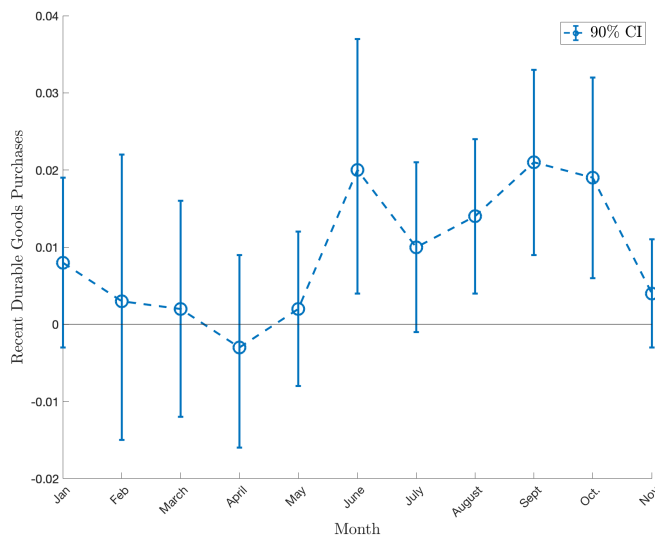
Figure 12: Effects of Christmas Lottery on Household Durable Consumption

This figure plots the marginal effects associated to the β_s's coefficients and their 90% CI from estimating Equation (4) in the main text using a probit model. The dependent variable is DC

F.2 Heterogeneous Effects

This section presents estimates of the effects of lottery wins on individual sentiment about current and expected individual and aggregate conditions when we control for individual characteristics by interacting the lottery prize with age, gender, education, income and employment (see Tables 13-15).

Figure 13 plots the responses of realized durable consumption (question DC) in the months after the lottery win for different household groups.

Table 13: Heterogeneous effects of Spanish Christmas Lottery on consumer sentiment - current and future household income

	(1) Household Income	(2) Future Household Income	(3) Household Income	(4) Future Household Income	(5) Household Income	(6) Future Household Income	(7) Household Income	(8) Future Household Income	(9) Household Income	(10) Future Household Income
Lottery Prize Dummy	0.136***	0.137***	0.103**	0.131***	0.117**	0.154***	0.104*	0.135***	0.102**	0.113***
	(0.042)	(0.051)	(0.046)	(0.034)	(0.057)	(0.053)	(0.057)	(0.049)	(0.048)	(0.040)
Lottery Expenditures	2.169**	0.935*	2.170**	0.934*	2.169**	0.932*	2.170**	0.932*	2.170**	0.936*
	(0.854)	(0.540)	(0.853)	(0.540)	(0.852)	(0.540)	(0.853)	(0.540)	(0.854)	(0.540)
Age×Lottery	-0.011	-0.006								
	(0.008)	(0.009)								
Gender×Lottery			-0.010	-0.032						
			(0.027)	(0.020)						
Education×Lottery					-0.003	-0.007				
					(0.005)	(0.006)				
Household Income×Lottery							-0.003	-0.008		
							(0.011)	(0.011)		
Employment×Lottery									-0.008	0.004
									(0.033)	(0.029)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117463	112938	117463	112938	117463	112938	117463	112938	117463	112938
Pseudo R^2	0.049	0.039	0.049	0.039	0.049	0.039	0.049	0.039	0.049	0.039

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

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Table 14: Heterogeneous effects of Spanish Christmas Lottery on consumer sentiment - current and future employment prospects

	(1) Employment Prospects	(2) Future Employment Prospects	(3) Employment Prospects	(4) Future Employment Prospects	(5) Employment Prospects	(6) Future Employment Prospects	(7) Employment Prospects	(8) Future Employment Prospects	(9) Employment Prospects	(10) Future Employment Prospects
Lottery Prize Dummy	0.195***	0.140***	0.169***	0.029	0.181***	0.170***	0.179***	0.125**	0.182***	0.078
	(0.056)	(0.047)	(0.045)	(0.045)	(0.056)	(0.065)	(0.054)	(0.057)	(0.050)	(0.049)
Lottery Expenditures	0.711	-1.916**	0.711	-1.913**	0.710	-1.926**	0.709	-1.926**	0.707	-1.920**
	(0.761)	(0.765)	(0.760)	(0.765)	(0.760)	(0.766)	(0.761)	(0.765)	(0.760)	(0.765)
Age×Lottery	-0.009	-0.024**								
	(0.009)	(0.012)								
Gender×Lottery			-0.009	0.054**						
			(0.021)	(0.024)						
Education×Lottery					-0.003	-0.019***				
					(0.005)	(0.005)				
Household Income×Lottery							-0.006	-0.029**		
							(0.011)	(0.012)		
Employment×Lottery									-0.036	-0.044**
									(0.033)	(0.022)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112033	106073	112033	106073	112033	106073	112033	106073	112033	106073
Pseudo R^2	0.023	0.011	0.023	0.011	0.023	0.011	0.023	0.011	0.023	0.011

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 15: Heterogeneous effects of Spanish Christmas Lottery on consumer sentiment - current and future evolution of the Spanish economy

	(1) Spanish Economy	(2) Future Spanish Economy	(3) Spanish Economy	(4) Future Spanish Economy	(5) Spanish Economy	(6) Future Spanish Economy	(7) Spanish Economy	(8) Future Spanish Economy	(9) Spanish Economy	(10) Future Spanish Economy
Lottery Prize Dummy	0.111**	0.106**	0.074**	0.056	0.121**	0.185***	0.138***	0.154***	0.100***	0.074*
	(0.044)	(0.051)	(0.035)	(0.040)	(0.050)	(0.045)	(0.045)	(0.043)	(0.038)	(0.041)
Lottery Expenditures	-0.938*	-0.943*	-0.937*	-0.940*	-0.941*	-0.951*	-0.946*	-0.956*	-0.942*	-0.942*
	(0.521)	(0.537)	(0.521)	(0.537)	(0.520)	(0.537)	(0.520)	(0.536)	(0.520)	(0.536)
Age×Lottery	-0.008	-0.010								
	(0.009)	(0.011)								
Gender×Lottery			0.019	0.030						
			(0.021)	(0.024)						
Education×Lottery					-0.006	-0.019***				
					(0.005)	(0.004)				
Household Income×Lottery							-0.023***	-0.035***		
							(0.008)	(0.011)		
Employment×Lottery									-0.033	-0.006
									(0.021)	(0.023)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114762	109427	114762	109427	114762	109427	114762	109427	114762	109427
Pseudo R^2	0.021	0.012	0.021	0.012	0.021	0.012	0.021	0.012	0.021	0.012

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.
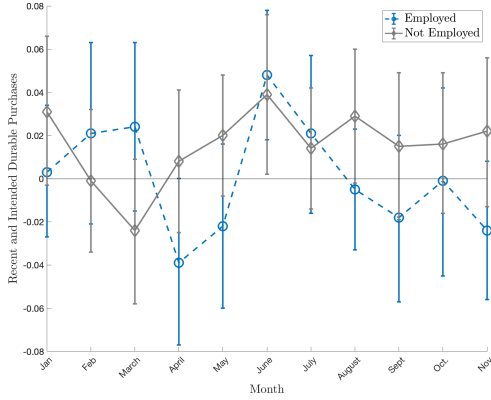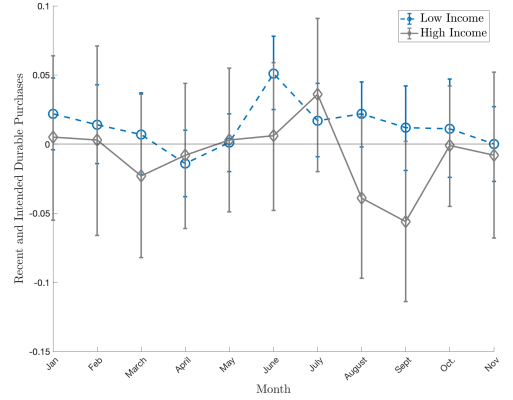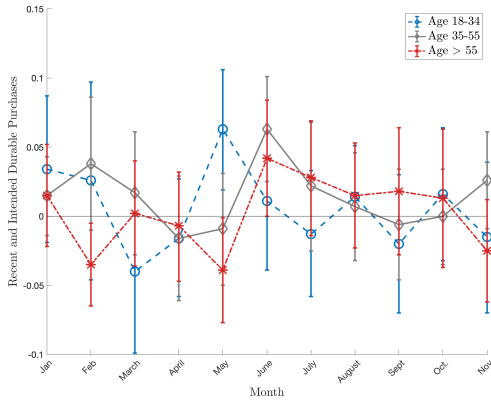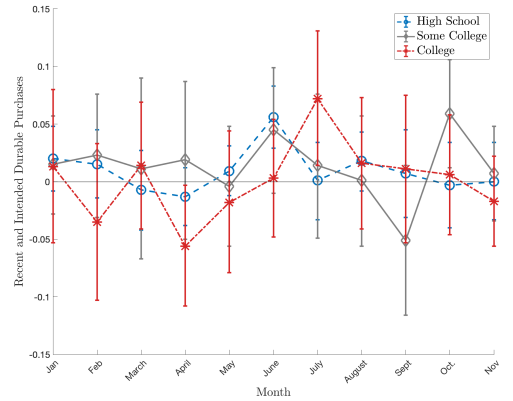
(a) Employment Status

(b) Household Income

(c) Age Groups

(d) Education Level

Figure 13: Heterogeneous Effects of Christmas Lottery on Recent Household Durable Consumption - By Employment Status, Household Income, Age and Education Level

The figures plot the marginal effects associated to the β_s coefficients and their 90% CI from estimating Equation (4) using a probit model. The dependent variable is DC. Panel 13a restricts the sample to employed individuals (blue circled line) and unemployed or non-active individuals (gray diamond line). Panel 13b to households with monthly household income below or equal to 2700 euros (blue circled line) and above 2700 euros (gray diamond line). Panel 13c plots responses for individuals aged between 18-34 years old (blue circled line), aged between 35-55 years old (gray diamond line) and panel aged above 55 years old (red star line). Panel 13d plots responses for responses for individuals with high school degree or lower (blue circled line), with some college degree (gray diamond line) and with college degree or higher (red star line). Standard errors are robust and clustered at the province level

G Spanish Christmas Lottery as a Redistribution Mechanism

To examine whether our main results are driven by poorer provinces receiving huge transfer from rich regions we present estimates of Equation 6 in the main text. Figure 14 presents the estimation of ζ for economic variables and consumer sentiment indices, respectively. In all regressions, ζ is not significantly different from zero, showing that the effect of lottery shocks on the unemployment rate and consumer sentiments is not significantly different by differences between poor and richer provinces. The effect of CPI is slightly weaker for poor provinces. A similar result holds by interacting the lottery rewards with the GDP per capita of each province (see Figure 15).

Figure 14: Effects of Christmas Lottery Prizes on Unemployment rate, CPI and Consumer Sentiment Indices in High vs Low-GDP per capita Provinces

Impulse responses to Christmas Lottery prizes in provinces with low GDP per capita. The graph shows the responses in the LP model (6) for the coefficient of the interaction term between a dummy variable for poor provinces and lottery prizes. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.
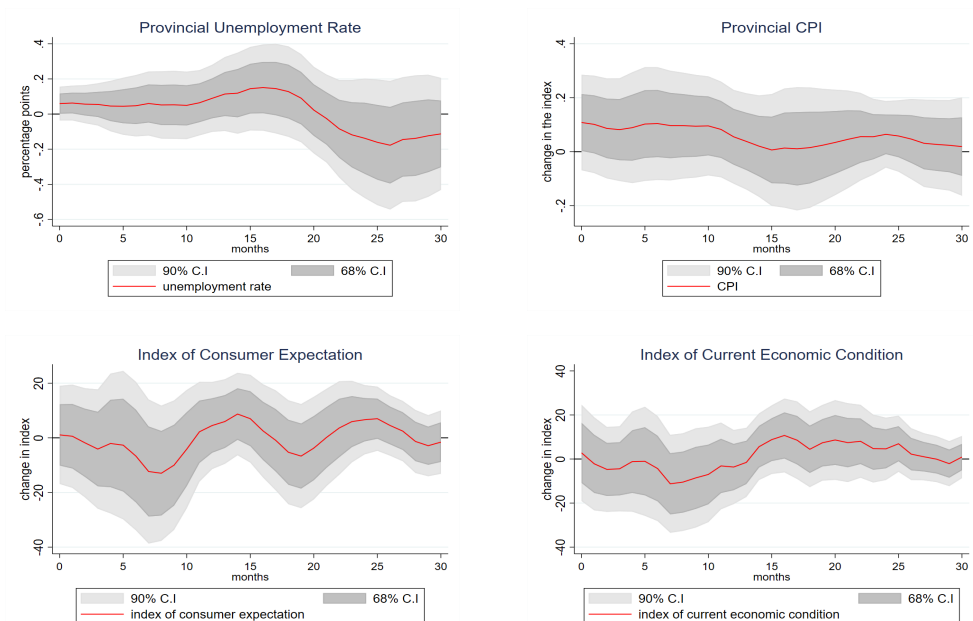
Figure 15: Effects of Christmas Lottery Prizes Unemployment rate, CPI and Consumer Sentiment Indices and GDP per capita

Impulse responses to Christmas Lottery prizes conditional on their GDP per capita. The graph shows the responses in the LP model (6) for the coefficient of the interaction term between average GDP per capita and lottery prizes. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months. Christmas Lottery prizes are net of taxes and measured in 1000 euros per capita. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

We also explore whether the consumer sentiment responses to the lottery shock vary across provinces depending on their living standards. To do this end, we estimate Equation 7 in the main text. Table 16 reports the results of this regression.

Table 16: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment in provinces with different living standards

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.059	0.078*	0.136***	0.128**	0.109**	0.109**
	(0.047)	(0.042)	(0.046)	(0.054)	(0.050)	(0.043)
Lottery Expenditures	2.151**	0.697	1.391	-1.189*	0.164	-0.066
	(0.937)	(0.653)	(0.877)	(0.720)	(0.695)	(0.630)
Poor Dummy	-0.256***	-0.166***	-0.306***	-0.062**	-0.224***	-0.082**
	(0.032)	(0.026)	(0.042)	(0.029)	(0.040)	(0.033)
Lottery × Poor	0.053*	0.034	0.113***	0.018	0.075**	0.051*
	(0.031)	(0.037)	(0.040)	(0.028)	(0.036)	(0.031)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	93793	90224	90529	85892	92206	88432
Pseudo R^2	0.049	0.040	0.027	0.014	0.026	0.015

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery prize dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery expenditures* are expressed in per capita terms. *Poor dummy* takes value 1 if GDP per capita in the province is lower than the average GDP per capita across provinces. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and December 2018.

We investigate further whether lottery wins affect household durable consumption and consumer confidence differently when households live in poor vs rich provinces by looking directly at individuals' survey responses. To study the former, we estimate Equation 4 from the main text in two different samples, one for provinces whose GDP per capita is below the sample average GDP per capita and another one for those provinces whose GDP per capita is above. Figure 16 suggest that durable consumption effects are not stronger in poorer Spanish regions.
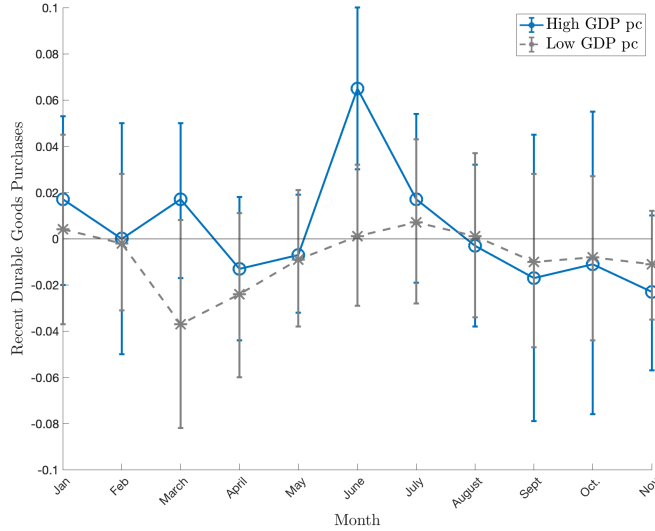
Figure 16: Effects of Christmas Lottery on Household Durable Consumption - High-Income vs Low-Income Provinces

This figure plot the marginal effects associated to the β_s's coefficients and their 90% CI from estimating Equation (4) in the main text using a probit model for provinces with GDP per capita above the sample average GDP per capita (gray star line) and provinces with GDP per capita below the sample average GDP per capita (blue circled line).The dependent variable is DC. Standard errors are robust and clustered at the province level

H   Extending the Spanish Lottery Data: El Niño Lottery

The *El Niño* lottery (*Sorteo de 'El Niño'*) is the second most popular national lottery game held in Spain. This lottery event was institutionalized in 1877 for the first time by the king of Spain Alfonso XII, given its popularity among Spaniards. The draw takes place on the the 6th of January[3] just 15 days after the Christmas Lottery event, and is also organized by the National Lottery and Gambling Agency (*Sociedad Estatal de Loterías y Apuestas del Estado*). El Niño tickets have also five-digit numbers and are available at a cost of €200. Each of the tickets is split into 10 identical sub-tickets (or fractions), known as decimos, sold for €20 each. Similar to what occurs with the Christmas lottery, it is also very common to buy a share of a decimo, through local associations, workplaces, sport teams, etc.

Lottery tickets are sold in official lottery outlays located throughout the country. Out of the total revenues, 70% of the ticket sales are distributed as prizes while the remaining 30% is devoted to commissions paid to outlets, internal revenue, and administration costs. There are three main prizes: the top prize, also popularly known as *El Gordo de El Niño*, which awards to each fraction holder of the winning number €10,000 per euro played, and the second and third prize which reward winners with €3,750 and €1,250 per euro played, respectively. This means that all holders of a decimo of the top prize winning number would win €200,000. The individuals holding a decimo of the second or third prize winning number would win €75,000

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[3]Before 1999 the draw used to take place on the 5th of January and it was moved to the 6th of January in 2000

or €25,000, respectively. The top prizes represent around half of the total payout assigned to prizes. There are also several smaller prizes ranging from €60 to €1 per euro played. Usually one lottery outlay sells most (if not all) of the series of a single number. The El Niño lottery constitutes a collective game in the same way the Christmas lottery does: Spaniards like to share decimos with family, friends and co-workers, especially if they were not lucky enough to win any Christmas lottery prize. Again, this implies not only that the winners of a lottery number usually live in the same area (province or village) but that the main top prizes end up being distributed as smaller prizes to several individuals living in the same location.

H.1 Descriptive statistics

Data on El Niño lottery gross rewards and expenditures by province has been provided by the National Lottery and Gambling Agency (*Sociedad Estatal de Loterías y Apuestas del Estado*) for the time period January 2006-January 2020. Differently from the Christmas Lottery event, we input El Niño lottery prizes in January, that is, the very same month in which the gambling event takes place, as the draw is held at the beginning of the month (6th of January). Expenditures on El Niño Lottery are in turn inputted in December[4]. As in the Christmas Lottery case, we do not observe the remaining several smaller prizes that are also awarded in El Niño Lottery. We also compute the after-tax revenue derived from the top lottery prizes and obtain a measure of net lottery-prize revenue per capita. Table 17 presents descriptive statistics for El Niño Lottery at the province level. Panel B summarizes the El Niño lottery expenditure and top prizes per capita in the winning provinces. The average expenditure per capita in those Spanish provinces is around €15, which is substantially lower than the €61 that on average Spaniards spent on Christmas Lottery during the same period.

Table 17: Summary Statistics - El Niño Lottery data at the province level. Top prizes and expenditures per capita are computed using data from May 2005 - Jan 2020. Top prizes (% of GDP) are computed using data from 2005 to 2018

	Mean	St. dev.	Min.	Max.	N
	(1)	(2)	(3)	(4)	(5)
A: El Niño Lottery: *all provinces*					
Top prizes pc (in euros)	2.92	32.53	0.00	832.47	750
Top prizes (% of GDP)	0.01	0.16	0.00	3.84	650
Expenditure pc (in euros)	16.96	7.25	5.05	53.25	750
B: El Niño Lottery: *winning provinces*					
Top prizes pc (in euros)	8.85	56.29	0.02	8.32.47	247
Top prizes (% GDP)	0.05	0.29	0.00	3.84	194
Expenditure pc (in euros)	15.48	5.16	5.05	47.16	247
C: El Niño Lottery: *winning provinces with maximum prize pc*					
Top prizes pc (in euros)	108.88	208.21	10.03	832.47	15
Top prizes (% GDP)	0.54	1.03	0.03	3.84	13
Expenditures pc (in euros)	23.20	11.83	9.28	53.07	15

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[4]We have inputted El Niño lottery expenditures in December for computational purposes although we have also considered the case in which these expenditures are inputted in January and results remain unaltered. This is somewhat intuitive since what matters for the identification of the causal effect of lottery prizes on consumer sentiment and macroeconomic outcomes is to control for the amount of lottery expenditures at the province level (high provincial lottery expenditures increase the odds of winning the lottery for that province)

The average lottery prize is around €9, which is also lower than the average Christmas lottery prize per capita, €42. Panel C of Table 30 reports summary statistics for those provinces that were awarded the maximum prize per capita for our sample period. In these winning provinces, the average top lottery prize per capita on El Niño lottery goes up to €109 with a standard deviation of €208.

If the Christmas lottery constitutes the most popular lottery event in the country, El Niño lottery should be considered the second most popular one. Given the proximity in time of these two lottery events (only 15 days between the two draws), those provinces where the winning tickets are sold experience relatively large income shocks in a short time window between the end of each year and the beginning of the next one. It is precisely this proximity in time between these two lottery events coupled with the common traits it shares with the Christmas lottery (syndicate game, popularity), what has motivated us to construct broader lottery rewards and expenditures per capita variables and check whether our results are robust to include El Niño lottery data in our sample. We now consider the lottery prize and expenditures variable as the sum of the main prizes of both the Christmas and El Niño lottery and the sum of their corresponding expenditures, respectively, for the time period December 2005 - January 2020. As a result, we are able to compare the effects of windfall gains coming from these two lottery events on consumer sentiment and macroeconomic outcomes in the winning provinces versus non-winning provinces in the cleanest possible way[5]. Figures 17 and 18 replicate the provincial-level results and tables 18 to 22 show the individual-level main results when the lottery income and expenditures variable compound the Christmas and El Niño lottery events. Results remain unaltered except for Tables 18 and 19 where the coefficients for the lottery prize dummy on consumer sentiment about their current household income and about the current and future evolution of the Spanish economy are no longer significant.

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[5]For example, in some years of the sample El Niño lottery randomly allocates income to some Spanish provinces that the Christmas lottery does not and viceversa. Although El Niño lottery tends to distribute a lower amount of income per capita in form of awards to the lucky provinces, still this could derive in relevant effects in terms of consumer sentiment, prices and labor market outcomes

H.2 Province-level Results: Controlling for El Niño lottery
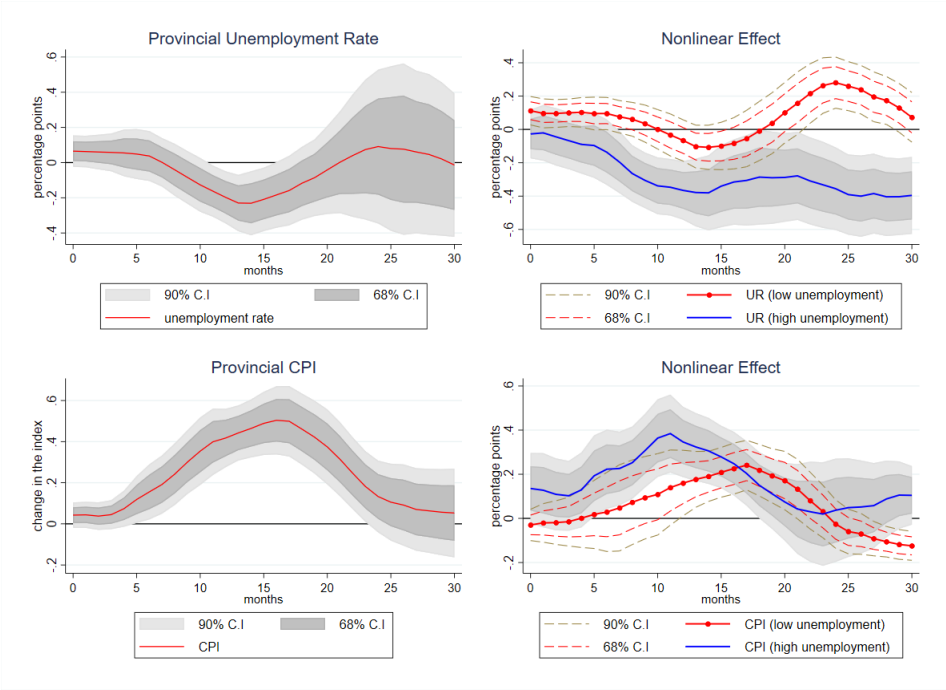
Figure 17: Effects of Christmas Lottery and El Niño Lottery Prizes on Unemployment Rate and CPI

Impulse responses to the sum of Christmas Lottery prizes and El Niño Lottery prizes. The left panel presents responses in the linear LP model (1), while right panel presents responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. Christmas Lottery and El Niño prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2005M5 - 2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

Figure 18: Effect of Christmas Lottery and El Niño Prizes on the Index of Current Economic Condition and the Index of Consumer Expectation

Impulse responses to the sum of Christmas Lottery prizes and El Niño Lottery prizes. The left panel presents responses in the linear LP model (1), while right panel presents responses in the state-dependent LP model (2), where the solid blue line are responses in high-unemployment state and the dotted red line are responses in low-unemployment state. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months (see Online Appendix for details and robustness checks on the construction of the indices). Christmas Lottery and El Niño prizes are net of taxes and measured in 1000 euros per capita. The sample period covered is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.
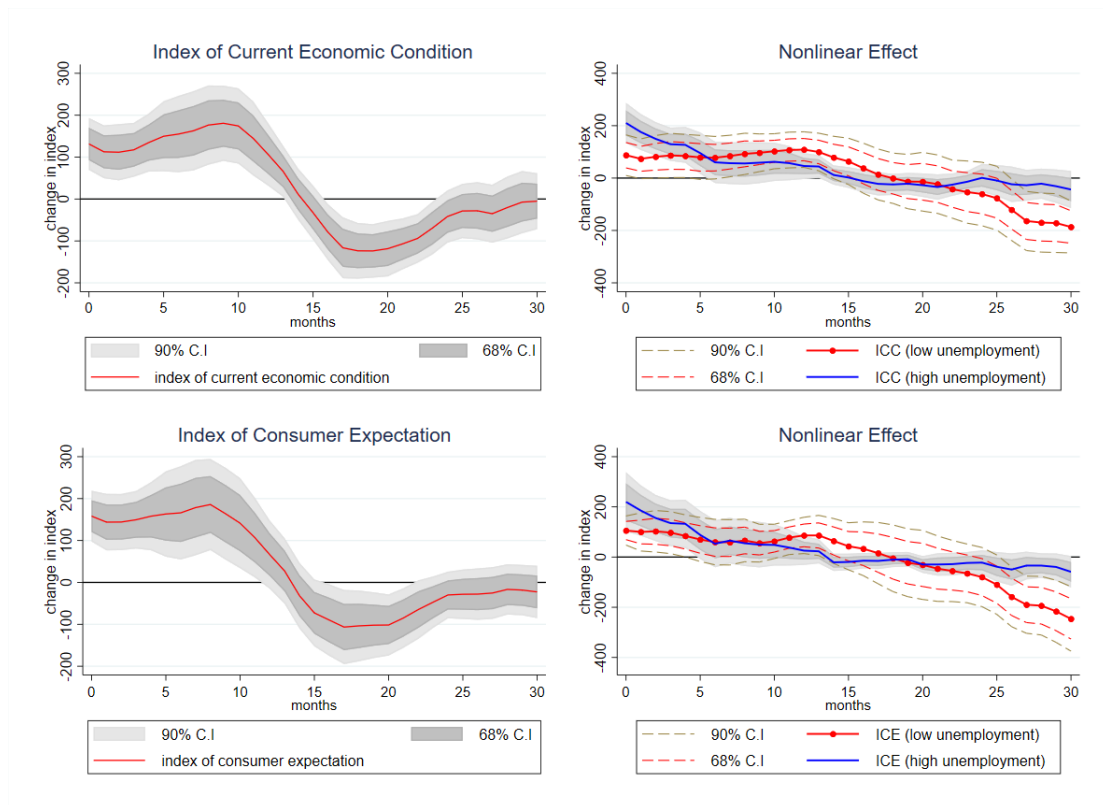
H.3 Individual-level Results: Controlling for El Niño lottery

Table 18: Survey evidence on the effects of Spanish Christmas Lottery and El Niño Lottery on consumer sentiment

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.039	0.090**	0.128**	-0.031	0.027	0.035
	(0.055)	(0.040)	(0.061)	(0.047)	(0.052)	(0.046)
Lottery Expenditures	1.830***	0.988**	0.661	-1.620**	-0.689	-0.822*
	(0.706)	(0.491)	(0.627)	(0.667)	(0.437)	(0.466)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	112047	106086	114776	109441
Pseudo R^2	0.049	0.039	0.024	0.011	0.021	0.013

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery prize dummy* takes value 1 if awarded Christmas and El Niño tickets were distributed in that province. *Lottery expenditures* are expressed in 1000 euros per capita. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 19: Survey evidence on the state-dependent effects of Spanish Christmas Lottery and El Niño Lottery on consumer sentiment

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	-0.050	0.046	0.016	-0.062	-0.061	0.001
	(0.042)	(0.035)	(0.059)	(0.049)	(0.053)	(0.047)
Lottery Expenditures	0.517	0.236	-0.423	-1.542**	-1.224***	-0.854*
	(0.539)	(0.424)	(0.597)	(0.665)	(0.454)	(0.457)
Recession Dummy	-0.287***	-0.163***	-0.233***	0.017	-0.115***	-0.007
	(0.012)	(0.011)	(0.012)	(0.012)	(0.013)	(0.011)
Lottery × Recession	0.074***	0.026	0.178***	0.101***	0.177***	0.093***
	(0.024)	(0.020)	(0.020)	(0.023)	(0.025)	(0.026)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	112047	106086	114776	109441
Pseudo R^2	0.056	0.041	0.027	0.011	0.022	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery prize dummy* takes value 1 if awarded Christmas and El Niño lottery tickets were distributed in that province. *Lottery Expenditures* are expressed in 1000 euros per capita. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 20: Heterogeneous effects of Spanish Christmas Lottery and El Niño Lottery on consumer sentiment - current and future household income

	(1) Household Income	(2) Future Household Income	(3) Household Income	(4) Future Household Income	(5) Household Income	(6) Future Household Income	(7) Household Income	(8) Future Household Income	(9) Household Income	(10) Future Household Income
Lottery Prize Dummy	0.081	0.106*	0.040	0.102**	0.050	0.126**	0.037	0.102**	0.038	0.089**
	(0.058)	(0.055)	(0.058)	(0.042)	(0.069)	(0.051)	(0.067)	(0.051)	(0.058)	(0.042)
Lottery Expenditures	1.829***	0.988**	1.830***	0.988**	1.829***	0.986**	1.830***	0.987**	1.830***	0.989**
	(0.707)	(0.491)	(0.706)	(0.491)	(0.706)	(0.491)	(0.706)	(0.491)	(0.706)	(0.491)
Age×Lottery	-0.012*	-0.005								
	(0.007)	(0.009)								
Gender×Lottery			-0.002	-0.023						
			(0.025)	(0.021)						
Education×Lottery					-0.002	-0.006				
					(0.005)	(0.005)				
Household Income×Lottery							0.001	-0.005		
							(0.011)	(0.011)		
Employment×Lottery									0.002	0.003
									(0.031)	(0.027)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117476	112951	117476	112951	117476	112951	117476	112951	117476	112951
Pseudo R^2	0.049	0.039	0.049	0.039	0.049	0.039	0.049	0.039	0.049	0.039

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 21: Heterogeneous effects of Spanish Christmas Lottery and El Niño Lottery on consumer sentiment - current and future employment prospects

	(1) Employment Prospects	(2) Future Employment Prospects	(3) Employment Prospects	(4) Future Employment Prospects	(5) Employment Prospects	(6) Future Employment Prospects	(7) Employment Prospects	(8) Future Employment Prospects	(9) Employment Prospects	(10) Future Employment Prospects
Lottery Prize Dummy	0.163**	0.052	0.132**	-0.051	0.138**	0.062	0.128*	0.021	0.142**	-0.011
	(0.070)	(0.062)	(0.062)	(0.050)	(0.065)	(0.056)	(0.066)	(0.052)	(0.063)	(0.050)
Lottery Expenditures	0.660	-1.621**	0.660	-1.618**	0.660	-1.627**	0.661	-1.627**	0.658	-1.624**
	(0.628)	(0.666)	(0.627)	(0.667)	(0.627)	(0.667)	(0.628)	(0.666)	(0.627)	(0.666)
Age×Lottery	-0.010	-0.024**								
	(0.008)	(0.011)								
Gender×Lottery			-0.007	0.042*						
			(0.021)	(0.022)						
Education×Lottery					-0.002	-0.016***				
					(0.005)	(0.004)				
Household Income×Lottery							0.000	-0.022*		
							(0.011)	(0.011)		
Employment×Lottery									-0.026	-0.037*
									(0.030)	(0.022)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	112047	106086	112047	106086	112047	106086	112047	106086	112047	106086
Pseudo R^2	0.023	0.011	0.023	0.011	0.023	0.011	0.023	0.011	0.023	0.011

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.

Table 22: Heterogeneous effects of Spanish Christmas Lottery and El Niño Lottery on consumer sentiment - current and future evolution of the Spanish economy

	(1) Spanish Economy	(2) Future Spanish Economy	(3) Spanish Economy	(4) Future Spanish Economy	(5) Spanish Economy	(6) Future Spanish Economy	(7) Spanish Economy	(8) Future Spanish Economy	(9) Spanish Economy	(10) Future Spanish Economy
Lottery Prize Dummy	0.056	0.069	0.021	0.027	0.052	0.129***	0.060	0.098**	0.041	0.039
	(0.061)	(0.059)	(0.050)	(0.049)	(0.062)	(0.049)	(0.058)	(0.050)	(0.053)	(0.048)
Lottery Expenditures	-0.690	-0.823*	-0.689	-0.821*	-0.691	-0.828*	-0.694	-0.830*	-0.692	-0.822*
	(0.437)	(0.466)	(0.437)	(0.466)	(0.437)	(0.466)	(0.437)	(0.465)	(0.437)	(0.466)
Age×Lottery	-0.008	-0.010								
	(0.008)	(0.010)								
Gender×Lottery			0.012	0.016						
			(0.021)	(0.024)						
Education×Lottery					-0.004	-0.016***				
					(0.005)	(0.004)				
Household Income×Lottery							-0.014*	-0.027**		
							(0.008)	(0.011)		
Employment×Lottery									-0.028	-0.007
									(0.019)	(0.023)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114776	109441	114776	109441	114776	109441	114776	109441	114776	109441
Pseudo R^2	0.021	0.012	0.021	0.012	0.021	0.012	0.021	0.012	0.021	0.012

Columns (1)-(10) provide results from an ordered probit. Robust standard errors clustered by province in parentheses. The sample includes information consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020.
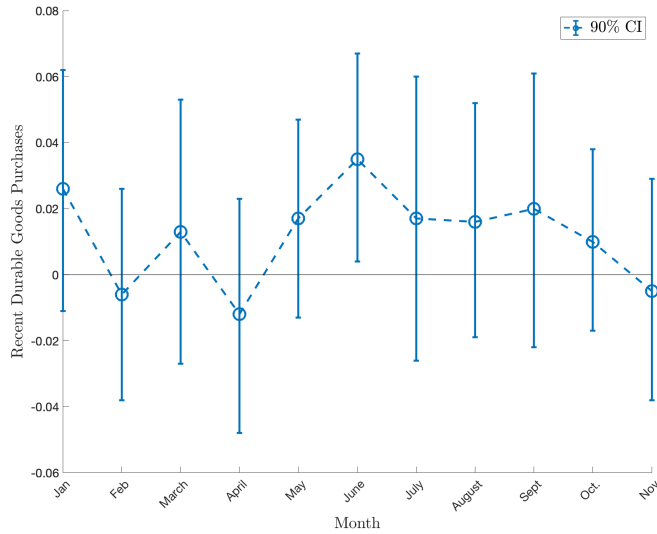
Figure 19: Effects of Christmas and El Niño Lottery on Household Durable Consumption

This figure plots the marginal effects associated to the β_s's coefficients and their 90% CI from estimating Equation (4) in the main text using a probit model. The dependent variable is DC. Standard errors are robust and clustered at the province level

I Robustness

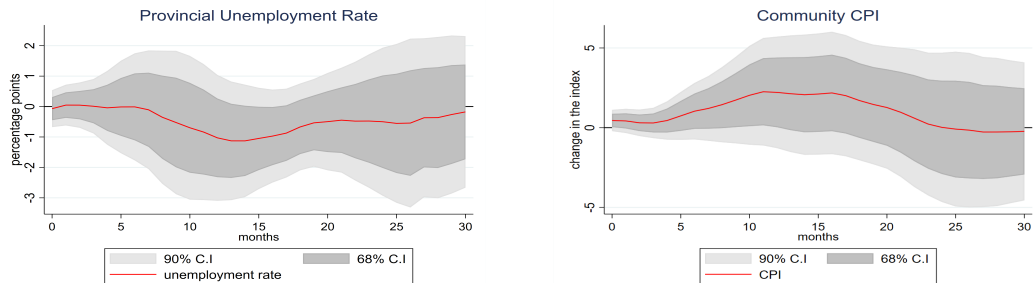## I.1 Regional Spillover Effects of Lottery Winnings

Figure 20: Effect of Christmas Lottery Prizes on the Weighted Average of Unemployment Rate and CPI in the Autonomous Community

The graph shows the responses in the LP model (1). The sample period covered is 2005M5-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average..

I.2 Aggregating Data in Quarters

Next we aggregate our data at quarterly frequency as a simple average of monthly data in each quarter. Due to the random sampling of the household sentiment survey, each quarterly data will represent a higher number of questioned households in each province for each quarter. Figure 21 shows a similar effect on the the macroeconomic aggregates of the regional economy. The confidence bands on the reaction of sentiments, although still above zero at the 68 percent confidence level, are wider. This is because, as we have seen in the analysis at the monthly

frequency, the confidence responses are more significant in the first six months after the lottery shock and aggregation at the quarterly level distorts the significance of this short run effect. For the same reason, also the size of the responses is distorted and when aggregating the data at quarterly frequency the effect of the shock in both macroeconomic aggregates and sentiment indices appears to be smaller.
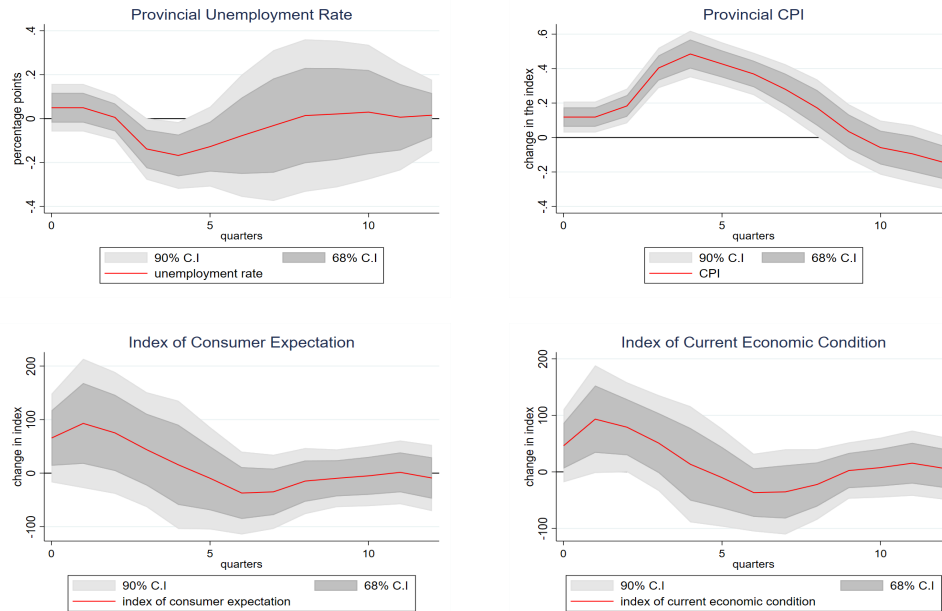

Figure 21: Effects of Christmas Lottery Prizes on Unemployment rate, CPI and Consumer Sentiment Indices - Aggregating data in quarters

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the LP model (1). Data has been transformed from monthly to quarterly frequency. Thus, the sample period is 2005Q2-2020Q1. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

I.3 Dummy for Lottery Shocks

In the analysis so far, we have used a continuous value for reward per capita to explore the macroeconomic effects of lottery winnings. Figures 22 shows that if we do not account for the magnitude of the reward and just define a dummy for provinces that have won at least one euro per capita in the lottery, the effect on unemployment and consumer sentiments remains significant. This result is important since it implies that some reward, albeit small, might still stimulate positive sentiment among the individuals in the winning province and affects household's perception about economic conditions and, thus, can have positive real effects.
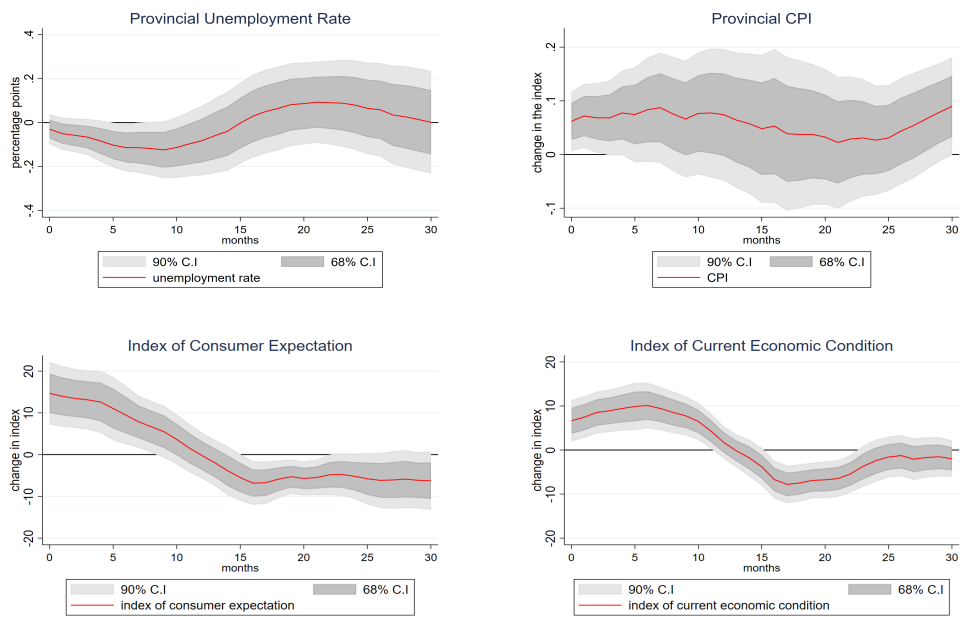
Figure 22: Effects of Christmas Lottery Prizes on Unemployment rate,CPI and Consumer Sentiment Indices - Dummy Variable

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the LP model (1) when the Christmas Lottery variable is defined as a dummy variable that takes value of 1 if the province is awarded at least one euro per capita with any of the top prizes. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months. The sample period is 2011M11-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

I.4   Lottery Prize Outliers

One might worry that our results are driven by a few outliers that contaminate the effects of lottery prizes on unemployment or sentiment. To alleviate such concerns, we have dropped all the rewards higher than 1000 per capita and repeated our benchamrk regressions. Figure 23 shows that the effect on unemployment and sentiment indices remains significant and that it is not driven by some big rewards.
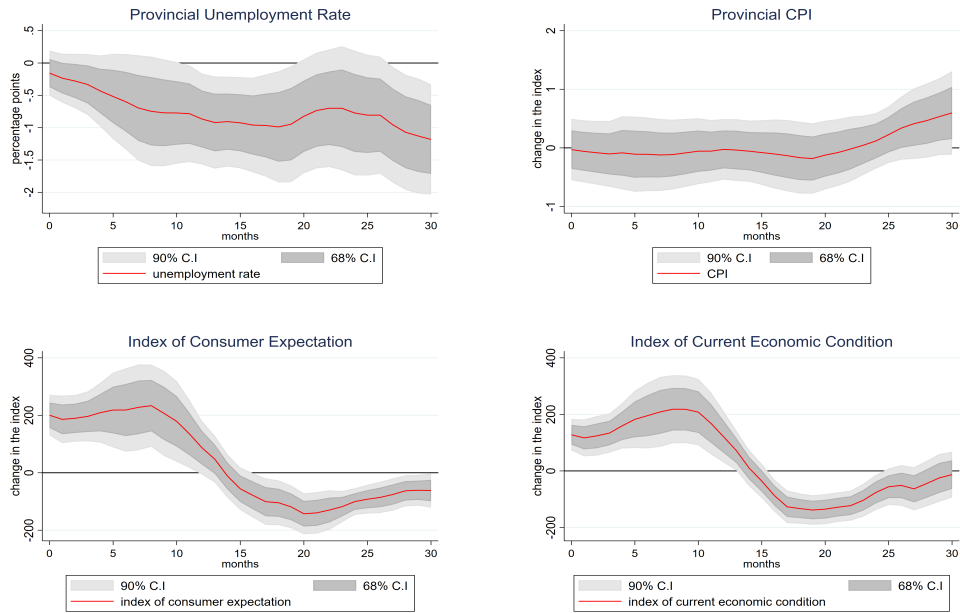
Figure 23: Effects of Christmas Lottery Prizes on Unemployment rate, CPI and Consumer Sentiment Indices - Outliers

Impulse responses to Christmas Lottery prizes. The graph shows the responses in the LP model (1) when we omit Christmas Lottery prizes higher than 1000 euros per capita. To increase the representativeness of the indices at the regional level, we focus on data with at least 25 respondents in each province and, for each question, we use responses for two consecutive months. The sample period is 2005M5-2020M1. Standard errors are robust and clustered at the province level and response functions are smoothed by centered moving average.

We repeat a similar exercise also at the individual level in order to examine the sensitivity of our results with respect to the effects of the lottery shocks on household durable consumption and confidence. In this way, we make sure we our results on the macroeconomic effects of lottery winnings and their propagation through consumers' confidence are not spurious.

On Christmas 2017, the lottery prize per capita in Lugo was €1191.633. We drop from our sample that particular episode since this province received an excessively large lottery income shock in per capita terms and estimate again the baseline specification as well as the alternative specification in which we control for recessions for both household consumption on durables and consumer confidence. Tables 23 and 24 and Figure 24 collect the results of these exercises. Results are robust, suggesting that the effect of Christmas lottery on household consumption and consumer sentiment is not driven just by few consumers becoming extremely optimistic when receiving a considerable amount of money.

Table 23: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment - Dropping Outliers

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.098**	0.115***	0.164***	0.056	0.084**	0.071*
	(0.041)	(0.034)	(0.045)	(0.046)	(0.036)	(0.038)
Lottery Expenditures	2.171**	0.935*	0.712	-1.914**	-0.937*	-0.942*
	(0.853)	(0.540)	(0.761)	(0.765)	(0.521)	(0.537)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117463	112938	112033	106073	114762	109427
Pseudo R^2	0.049	0.039	0.023	0.011	0.021	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery prize dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery expenditures* are expressed in per capita terms. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020. We drop Lugo (Christmas 2017)

Table 24: Survey evidence on the effects of Spanish Christmas Lottery on consumer sentiment during times of slack- Dropping Outliers

	(1) Household Income	(2) Future Household Income	(3) Employment Prospects	(4) Future Employment Prospects	(5) Spanish Economy	(6) Future Spanish Economy
Lottery Prize Dummy	0.011	0.068*	0.047	0.023	-0.007	0.030
	(0.049)	(0.038)	(0.042)	(0.049)	(0.041)	(0.042)
Lottery Expenditures	0.655	0.060	-0.543	-1.815**	-1.549***	-0.978*
	(0.672)	(0.468)	(0.716)	(0.763)	(0.534)	(0.529)
Recession Dummy	-0.286***	-0.163***	-0.232***	0.018	-0.114***	-0.007
	(0.013)	(0.011)	(0.012)	(0.013)	(0.013)	(0.011)
Lottery×Recession	0.073**	0.034	0.194***	0.106***	0.188***	0.114***
	(0.030)	(0.023)	(0.025)	(0.027)	(0.029)	(0.029)
Month Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117463	112938	112033	106073	114762	109427
Pseudo R^2	0.056	0.041	0.027	0.011	0.022	0.012

Columns (1)-(6) provide results from an ordered probit where the dependent variable is Q1S-Q3F. *Lottery prize dummy* takes value 1 if awarded Christmas lottery tickets were distributed in that province. *Lottery expenditures* are expressed in per capita terms. *Recession dummy* takes value 1 if unemployment rate in Spain is higher than 20%. Robust standard errors clustered by province in parentheses. The sample includes information from consumer confidence monthly surveys conducted by the Spanish Center for Sociological Research (CIS) between April 2013 and January 2020. Lugo (Christmas 2017)
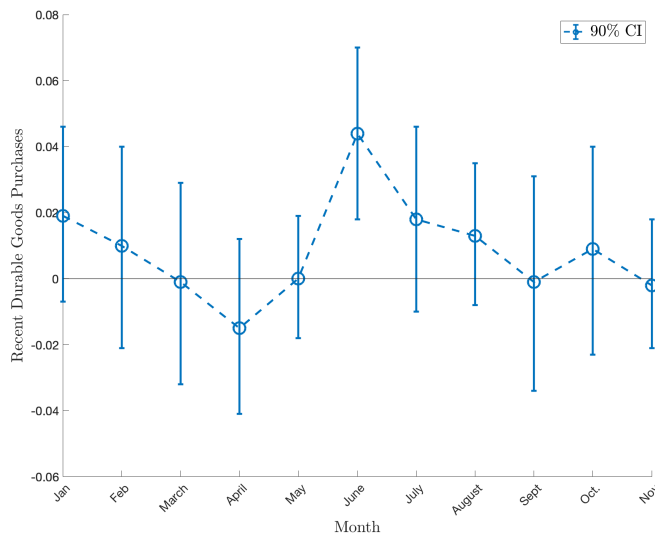
Figure 24: Effects of Christmas Lottery on Household Durable Consumption - Dropping Outliers

This figure plots the marginal effects associated to the β_s's coefficients and their 90% CI from estimating Equation (4) in the main text using a probit model. The dependent variable is DC. Standard errors are robust and clustered at the province level. We drop from our sample the Christmas Lottery event in 2017 for Lugo

I.5 Controlling for Cross-section Dynamic Heterogeneity

In a recent article Canova (2020) highlights the problems that the application of cross sectional methods display when computing macroeconomic objects in spatial settings. He argues that when dynamic heterogeneity is present, the estimates obtained are invalid, even when IV is employed. He suggests that in the presence of dynamic heterogeneity, if the sample permits it is best to estimate the effect of a policy change or shock in time, unit by unit, and then compute a cross-sectional average. Given that our analysis could be subject to his critique, we follow his suggestion and compute dynamic responses to lottery shocks unit by unit. In Figure 25 we present the weighted average responses of the local projection estimates we have run unit-by-unit for the unemployment rate and CPI, and for the two sentiment indices we consider. We weight responses by the the inverse of the standard errors of the unit responses. The Figure confirms the response patterns we have obtained in the cross section analysis. Hence, dynamic heterogeneity does not distort the picture presented in our baseline regressions.

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Figure 25: Weighted Average of Unit-by-unit Local Projection Estimates

This graph shows the weighted average of unit-by-unit local projection estimates of the effect of Christmas Lottery prizes on unemployment rate, CPI, and consumer sentiment indices. The weights are the inverse of the standard error of the unit responses. Response functions are smoothed by centered moving average

References

Aguiar, M., E. Hurst, and L Karabarbounis. 2013. "Time Use During the Great Recession." *American Economic Review*, 103(5): 1664–1696.

Canova, F. 2020. "Should we trust cross sectional multiplier estimates?" *Journal of Applied Econometrics.*