Windfall money and outbound tourism:
A natural experiment from lottery winnings

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Abstract:

Income is a relevant factor for explaining outbound tourism demand. However, when working with regional- or country-level data, it is difficult to disentangle the role of income in stimulating tourism travelling from other factors that correlate with greater income levels. This paper exploits a natural experiment from Spanish Christmas Lottery to estimate the causal effect of income shocks on outbound tourism. We leverage the staggered and quasi-random assignment of lottery winnings across Spanish regions to estimate the elasticity of outbound annual trips and expenditure to windfall gains. Using difference-in-differences with the amount of lottery prizes as an indicator of treatment intensity, we show that lottery winnings per capita increase both the annual number of tourism trips and expenditure per capita. This effect operates during the first two years following the draw, which is likely explained by bandwagon and income multiplier effects.

Keywords: *windfall money; natural experiment; income shock; outbound tourism*

1. INTRODUCTION

Income plays a central role in outbound tourism. At the macro/regional level, the normal versus luxury character of tourism travelling has been traditionally measured based on the elasticity of outbound trips with respect to GDP per capita (e.g., Waqas-Awan et al., 2021), the Industrial Production Index (e.g., Dogru et al., 2017), or household disposable income (e.g., Lim, 1997). The literature has traditionally found that the income elasticity of international tourism demand is above the unity (Peng et al., 2015), with long-haul travelling being considered a luxury good (Crouch, 1994). Domestic travelling is comparatively less sensitive to income (Eugenio-Martín and Campos-Soria, 2011). However, the different income measures at the macro level used in the literature might be imperfect indicators because they usually correlate with other unobserved factors that drive outbound tourism, such as transport infrastructure (e.g., Khadaroo and Seetanah, 2008) or institutional quality (e.g., Nguyen, 2023). As such, it is difficult to properly isolate the role of income from other dimensions that evolve in parallel. Therefore, well-identified causal evidence on the income elasticity of tourism demand remains scarce to date.

Friedman's permanent income hypothesis (Friedman, 1957) predicted that consumption decisions are driven by expectations about future income and not by transitory income. However, empirical evidence has challenged this hypothesis, showing that consumption reacts to unanticipated variations in income (Carroll, 2001; Stephens and Unayama, 2011). Because of mental accounting (Sheffrin and Thaler, 1988; Thaler, 1985; 1999), households' marginal propensity to consume increases when they receive extra money, generally assigning it to discretionary expenses. Furthermore, windfall gains are spent more readily than regular earnings because they are not allocated to any specific 'account' (Arkes et al., 1994; Thaler, 1990). Yet, it is unclear how discretionary goods like tourism travelling benefit from unanticipated income gains. Experimental work by Crouch et al. (2007) and Dolnicar et al. (2008) has shown that people prioritize the allocation of hypothetical discretionary income to tourism trips over other goods. Evidence by Agarwal and Qian (2014) also suggests that people allocate a share of unanticipated income to travel. Against this background, we ask the following: what is the effect of exogenous windfall money on outbound tourism demand?

This paper aims to answer this research question using Spanish Christmas lottery winnings as a natural experiment. This follows the practice of a growing body of literature in economics that exploits lottery prizes as exogenous income shocks to evaluate different behavioural decisions and consumption patterns (e.g., Bagues and Esteve-Volart, 2016; Imbens et al., 2001). We leverage the quasi-random and staggered assignment of lottery income across Spanish regions (NUTS 2) in the period 2001-2019 to investigate their causal effect in stimulating the number of outbound tourism trips and expenditure per capita. Based on difference-in-differences (hereafter DiD) using the amount of the jackpot won by each region in per capita terms as a continuous treatment, we show that regional lottery winnings per capita increase both the annual outbound tourism trips and expenditure per capita of residents in winning regions. The elasticity is nonetheless quantitatively small. As we discuss later, this pattern is interpreted as suggestive that the wealth shock expands over non-winners within regions due to bandwagon and Veblen effects in tourism travelling (Boto-García and Baños-Pino, 2022) together with income multiplier effects associated with optimism and positive consumer sentiment (Ghomi et al., 2022). Interestingly, the effect does not only take place in the following calendar year, but it also spills over another year later.

Our findings expand our knowledge about the income elasticity of outbound tourism, which has been extensively analysed in the tourism economics literature (e.g., Balcilar et al., 2021; Crouch, 1995; 1996; Peng et al., 2015). This stream of literature has investigated how income elasticities vary across households (Strale, 2022), within the year (Smeral, 2018; 2019) and over the business cycle (Smeral, 2017), their stability considering long time series (Falk and Lin, 2018), or their sensitivity to augmented specifications that include climate or internet searches data (Emili et al., 2020). While these studies typically use data on aggregate income indicators, one distinctive feature of this paper is that we leverage the exogenous variation in regional income produced by lottery prizes to obtain causal evidence on how they stimulate outbound travelling and expenditure.

The paper also adds to a growing literature that uses the Christmas draw of the Spanish National Lottery as a natural experiment to study its effects on voting behaviour (Bagues and Esteve-Volart, 2016), entrepreneurial activity (Bermejo et al., 2022), sentiments and durables consumption (Ghomi et al., 2022), or employment, business, and migration (Kent and Martínez-Marquina, 2022). This randomized experiment offers the advantages that most Spanish citizens participate in the draw (around 75% of the population), the draw takes place every year at the same date (22nd December), winners tend to be geographically concentrated within regions, and the prizes represent a substantial share of regional GDP. To our knowledge, no previous work has evaluated its effects on outbound tourism trips and expenditure.

The remainder of the paper is structured as follows. Section 2 reviews the related literature and economic theories on windfall income allocation. Section 3 describes the Christmas draw of the Spanish National Lottery. Section 4 explains the data and presents some descriptive statistics. Section 5 outlines the empirical strategy. Section 6 reports and discusses the estimation results together with some robustness checks. Finally, Section 7 offers some concluding remarks, limitations, and avenues for future work.

2. BACKGROUND AND RELATED LITERATURE

2.1.The role of income in outbound tourism demand

At the micro level, household income has been revealed as a major determinant of the individual decision to travel (Boto-García, 2022), travel frequency (Alegre et al., 2009), the choice of destination (Eugenio-Martín and Campos-Soria, 2011), and tourist expenditure (Gedecho et al., 2022; Strale, 2022). Income changes affect tourism demand through expanding both the quantity and quality of trips, being the former component generally more sensitive to income variations than the latter (Fleischer and Rivlin, 2009). A greater frequency of travelling induces greater future demand through habit and taste formation mechanisms (Boto-García, 2022). Nonetheless, income does not affect tourism demand equally across sociodemographic profiles, and income elasticities have been shown to vary over the life cycle (Bernini and Cracolici, 2015; 2016). In this vein, Bernini et al. (2017) document that there are relevant differences in tourism consumption among Italian households with the same income levels that are attributed to heterogeneity in lifestyles and taste for tourism. Furthermore, tourism demand is not only affected by income levels but also by households' financial wealth and position perceptions (Ridderstaat, 2021).

At the macro level, the literature has also pointed to income in source markets as the main explanatory variable of tourism arrivals, receipts, and expenditure (Crouch, 1995; Peng et al., 2015; Su et al., 2023). Meta-analyses indicate that international tourism is a luxury good since the income elasticities of demand are generally above 1 (Crouch, 1995; 1996; Peng et al., 2015). The estimated elasticities vary notably across studies depending on the countries considered, frequency of the data, demand measures, and econometric methods used (Crouch, 1992). As recently highlighted by Rosselló-Nadal and He (2020), the interpretation of the elasticities changes depending on which variable is used to measure demand. Scholars nonetheless agree that income elasticities (i) have decreased over time, with tourism travelling becoming more a necessity than a luxury good (Balcilar et al., 2021; Falk and Lin, 2018; Gunter and Smeral, 2016), (ii) are highly seasonal, varying across seasons within the year (Smeral, 2018; 2019), and (iii) are greater in magnitude for long-haul trips (Lim et al., 2008).

Economic crises have offered researchers the opportunity to evaluate the extent to which income cutdowns affect tourism travelling (Khalid et al., 2020; Smeral, 2010; Song and Lin, 2010). This body of research agrees to find that income elasticities are highly asymmetric: they are quantitatively smaller during economic downturns due to precautionary savings motives and income uncertainty (Gunter and Smeral, 2017; Nguyen et al., 2020; Smeral, 2012). Based on bilateral tourism flows between 192 countries in the period 1995-2016, Waqas-Awan et al. (2021) show there is an inverted U-shaped relationship between income elasticity and income. Their findings imply that low-income and high-income countries are comparatively less sensitive to income shocks than middle-income countries. Relatedly, Wong et al. (2016) show that the role of personal characteristics in explaining travelling decisions vary over time depending on the economic conditions of the source market.

Income has been generally measured by the Gross Domestic Product (whether in levels or per capita), although other proxies like average weekly earnings (Seetaram, 2012), or household disposable income (Lim, 1997; Su et al., 2023) have also been used. One problem with the use of GDP as a proxy for income is that it captures all sources of economic activity, from consumption to government and capital investment. Although households' purchasing power typically evolves in parallel with GDP per capita, it is difficult to empirically distinguish the changes in tourism travelling due to variations in household income from changes that are due to other factors captured by GDP like better transport infrastructure (Farhadi, 2015) or institutional quality (Acemoglu and Johnson, 2005), among many others. In other words, there are typically no exogenous sources of variation in income that allow researchers to clearly identify the sensitivity of tourism demand to households' disposable income changes. Our study aims to address this gap by offering novel causal evidence.

2.2.Unexpected income gains and consumption decisions

The permanent income hypothesis developed by Friedman (1957) (also known as the lifecycle theory of consumption) postulated that changes in consumption decisions are driven by changes in permanent (expected) income rather than transitory income variations. According to this framework, the marginal propensity to consume unexpected money should be zero because it does not represent a change in lifetime wealth. However, this theory has been rejected at the empirical level since consumption has been found to be sensitive to changes in discretionary income (Carroll, 2001; Stephens, 2008; Stephens and Unayama, 2011).

Aside from bounded rationality, one argued explanation for the violation of the permanent income hypothesis is mental accounting theory introduced by Shefrin and Thaler (1988) and Thaler (1985; 1990; 1999). This framework suggests that households keep separate mental accounts for assets, present, and future income so that their consumption choices depend on changes in the income allocation to the present account. A relevant implication from this theory is that, when individuals receive unexpected cash, they tend to purchase items they would have not otherwise (Milkman and Beshears, 2009). Souleles (1999) shows that the marginal propensity to consume after unexpected tax refunds is 0.64, implying that around two thirds of each extra dollar is subsequently spent.

On the other hand, the fungibility assumption in economic theory states that the source of money should have no effect on consumption choices (von Neuman and Morgenstein, 1947). However, the seminal work by Arkes et al. (1984) show experimentally than the marginal propensity to consume of windfall gains is higher than that of non-windfall earnings. That is, individuals exhibit a greater tendency to spend unanticipated income since they do not allocate it to any concrete mental account (if any, to a pocket on-disposal account). One potential mechanism underlying this pattern is that windfall money produces a positive shock in happiness (positive affect) that induces consumers to spend money more freely. This pattern also relates to Prelec and Loewenstein (1998) framework on the *pain of paying*: as opposed to earned income, windfall money makes consumption free of the utility loss produced by giving up money gained with effort. According to this, people are predicted to increase their consumption if endowed with unexpected windfall money.

Several works have shown that windfall money in the form of lottery winnings stimulate consumption expenditure in both durables and non-durables (Cabanillas-Jiménez, 2021; 2022; Kent and Martínez-Marquina, 2022; Kim and Koh, 2022). Nonetheless, the propensity to consume is mediated by household liquidity, risk aversion, sociodemographic characteristics like age, and the amount won (Christelis et al., 2019). In this vein, the marginal propensity to consume decreases with the amount won, with winners of small prizes consuming approximately everything in the first year after the winning (Fagereng et al., 2021).

As regards the allocation of windfall gains across types of goods, experimental studies have shown that people prioritize hedonic over utilitarian goods (Helion and Gilovich, 2014). O'Curry and Strahilevitz (2001) show that people prefer to purchase hedonic products with lottery winnings than with earned income. Using survey data of lottery winners, Imbens et al. (2001) show that unearned income increases the marginal propensity to consume leisure by around 11 per cent. Agarwal and Qian (2014) report that an unanticipated income shock in Singapore produced positive increases in consumption in discretionary categories like travel. In the tourism setting, Crouch et al. (2007) and Dolnicar et al. (2008) have experimentally shown that people allocate about 21 per cent of discretionary income to domestic and overseas trips. Along these lines, we formulate the following research hypothesis:

H1: Exogenous windfall money translates into greater outbound tourism trips and expenditure

The income shock is expected to expand outbound tourism demand not only through the budget constraint, but also because of greater leisure time associated to drops in labour supply (Picchio et al., 2018), or increases in potential travel companions through a greater number of friends with whom to travel (Nguyen, 2021).

Importantly, the expected positive effect of windfall money on outbound tourism demand does not necessarily apply directly to *actual* recipients of the lottery winnings, but it might expand to non-winners within regions through different economic mechanisms. The first one is the occurrence of income multiplier effects. Bagues and Esteve-Volart (2016) show that around 88 per cent of the income shock is kept in the winning province. Even if part of the lottery prizes is not allocated to outbound travelling but to other goods or durables like housing or vehicles, the wealth shock likely stimulates aggregate regional demand and economic activity, which subsequently raises production, employment, and real wages. For the Spanish case, Bermejo et al. (2022) report that lottery prizes lead to higher firm creation, start-up job creation, and self-employment in winning regions. Ghomi et al. (2022) document that it also decreases unemployment. As such, lottery winnings induce an indirect shift in outbound tourism demand through the expansion of aggregate demand. In this regard, the lottery prize can be seen as an unconventional random fiscal expansionary policy (Párraga-Rodríguez, 2018).

A second channel through which lottery winnings could indirectly expand outbound tourism is herding behaviour, bandwagon effects, and conspicuous consumption (Leibenstein, 1950). This refers to people's tendency to follow the crowd because individual demand curves depend on the level of consumption by other people through a mixture of social comparisons and consumption externalities. Several works have documented that social comparisons among peers induce increases in consumption among non-recipients of windfall money 'to keep up with the Joneses' (Agarwal et al., 2021; Kuhn et al., 2011). Accordingly, small shifts in individual travel demands might expand to other people in the region through herding and social comparisons (e.g., Boto-García and Baños-Pino, 2022).

A third way by which the income shock might indirectly expand tourism demand is through optimism and consumer sentiment. Several studies have documented that lottery winnings improve psychological well-being (Gardner and Oswald, 2007) and happiness (Kim and Oswald, 2021) among lottery recipients. In the specific context of the Spanish Christmas Lottery, Bagues and Esteve-Volart (2016) show that political incumbents in winning regions are more likely to be re-elected, a finding that the authors attribute to increase happiness and better perceptions about the regional economic situation. Ghomi et al. (2022) show that non-winning households in winning provinces become more optimistic and update their expectations about the evolution of the Spanish economy. In particular, lottery winnings spur economic sentiment and induce significant demand effects.

3. THE CHRISTMAS DRAW OF THE SPANISH NATIONAL LOTTERY

The Christmas draw of the Spanish National Lottery (so called *El Gordo*) could be considered as a unique lottery.[1] Since 1812, it takes place every year on December 22, offering in the last edition of 2022 a huge jackpot of 720 million euros.[2] The lottery is run by the *Sociedad*

Estatal de Loterías y Apuestas del Estado (SELAE) that issues 180 series (in the 2022 draw), each consisting of 10 lottery tickets (tenths) of the same number. That is, a total of 100,000 numbers (from 00,000 to 99,999) are included in the draw representing a total of 1,800 lottery tickets (tenths) that cost €20 each. On a private basis, or through associations and other organizations, each tenth is at the same time allowed to be divided into shares (*participaciones*) that cost between €2 and €5 euros each. Anyone holding a share of a winning ticket will be entitled to the corresponding share of the prize amount.

Lottery tickets for the Christmas draw are sold throughout lottery outlets across the country. If all the tickets are sold, the total of the issuance amounts to 3,600 million euros, of which 2,520 million are allocated to prizes (payout rate is about 70% and the rest of sales revenue is kept to pay outlets and to cover administration costs). The jackpot amounts to 4 million euros to each series of the winning number (€400,000 to the tenth), which is equivalent to a return of €20,000 of prize per euro staked. Besides the jackpot, there are other prizes that can be won. According to Spanish tax laws, if a lottery prize is won, €40,000 euros will be subtracted from the total amount of the prize, which will in any case be exempt from taxes. The rest of the amount of the prize (from €40,000 euros) is subject to a tax rate of 20%.

Because of the assignment of lottery numbers to outlets, generally the jackpot is entirely sold in a single outlet located in a given region. On some occasions, the jackpot is split across regions if the series of the same number have been sold in outlets pertaining to different regions. Although most people buy tickets in their region of residence (Bagues and Esteve-Volart, 2016), in recent years there is a trend of purchasing tickets online from lucky stores due to superstitious reasons. As discussed in Garvía (2007), the Spanish Christmas Lottery is a social event: most Christmas players only gamble in this specific draw, partly to avoid regretting not having purchased a ticket in case a friend or relative wins the lottery. In this regard, Humphreys and Pérez (2012) show there are positive consumption network externalities in Spanish lottery markets.[3]

The quasi-random assignment of lottery winnings to Spanish regions over time is a natural experiment that has been recently widely used in the economics literature to evaluate the effects of exogenous wealth shocks on different outcomes. After the seminal work by Bagues and Esteve-Volart (2016) on how incumbent politicians are more likely to be re-elected in winning regions through temporal shocks in happiness, scholars have shown that cash windfalls from the Spanish Christmas Lottery produce higher firm creation and self-employed (Bermejo et al., 2022) and higher consumption of durables and real estate appreciation (Kent and Martínez-Marquina, 2022).

4. DATA

4.1.Dependent variables

Outbound tourism is measured at the regional level using two variables: (i) the annual total number of leisure tourism trips undertaken by residents (both domestically and abroad), and (ii) the annual total expenditure in leisure trips (in euros). These two variables are obtained for the 17 Spanish regions (NUTS 2) during the period 2001-2019.[4] The data comes from the Domestic Travel Survey, undertaken by the *Instituto de Estudios Turísticos* until 2015 and by the *Instituto Nacional de Estadística* (hereafter INE) from then onwards. Ideally, we would like to further disaggregate these two variables by type of accommodation, travel purpose, or travel party size. Whereas since 2015 INE offers disaggregated statistics of tourism outflows at the regional level, the data prior to 2015 is not so detailed, particularly for small regions for which there are many missing values. Therefore, we restrict the analysis to these two outcomes only.

The original expenditure variable is measured in current euros of each period, but it is deflated by the regional Consumer Price Index in base 2021 to express it in real terms. Figure 1 maps the values of annual trips (*Tripspc*) and total expenditure (*Exppc*) in per capita terms in the first (2001) and last (2019) period in the sample. On average, Spanish residents took 3.67 tourist trips in 2001 whereas that figure increases to 4.13 in 2019. In constant euros of 2021, the mean expenditure is €660 in 2001 but €1,004 in 2019. These figures indicate a notable increase in the frequency of tourism travelling and the amount of money spent in the last 20 years. Box plots of the distribution of total annual trips and expenditure per region are presented in Figures A1 and A2 in Appendix.

FIGURE 1 HERE

4.2.Lottery winnings

We manually collected information on the Christmas lottery jackpot (*El Gordo*) claimed per region and draw in the period 2000-2018 (hereafter denoted as *prize*) based on news and press reports. This variable refers to the jackpot prize associated with the winning tickets sold by stores located in each region. The data was double-checked from different sources. Since the draw always take place on December 22, the jackpot prizes are imputed to the following calendar year (e.g., the prize from the draw in December 2002 is assigned to the year 2003). To leave out price inflation effects, this variable is also deflated by the regional Consumer Price Index so that it refers to constant euros of 2021.

Figure 2 summarizes the composition of lucky regions per year of the draw in the sample period. Dark red colour indicates positive lottery winnings from the jackpot in the draw of that year and that is why this figure covers the period 2000-2018. Figure A3 in Appendix presents a boxplot of the lottery winnings per region during the study period. In the years 2000 (Castile and Leon), 2004 and 2005 (Catalonia), 2009 (Madrid), 2011 (Aragon), 2015 (Andalusia) and 2016 (Madrid), all the jackpot was allocated to a single region. In the rest of years, it was split across two or more regions.

FIGURE 2 HERE

Figure 3 presents the time series evolution of the Christmas lottery jackpot prize per year, both in current and real terms. We see it has increased over time, reaching almost 700 million euros in 2018. For small regions like Aragon (2012), Asturias (2008), Murcia (2002) and La Rioja (2003), the jackpot represents 22.5, 15.1, 11.6 and 23.3 per cent of their GDP, respectively.

FIGURE 3 HERE

4.3.Control variables, summary statistics and descriptive evidence

Differences in the total number of annual tourism trips and total expenditure over time and across regions are potentially explained by other macroeconomic and sociodemographic factors. We consider the following variables as controls in the empirical analysis: GDP (in euros), average wages of the working population (in euros), years of schooling for the population over 25, unemployment rate, population size, average age of the population, and the share of people over 65 years old. The monetary measures are also deflated by the regional Consumer Price Index.

Table 1 presents summary statistics of the variables together with their definition and data source. The statistics are calculated over the pool of regions and periods (17 regions ×19 years=323 observations). On average, Spanish residents made 9.8 million tourist trips per year, spending around 2,140 million euros annually. The average lottery jackpot prize in the sample is 33 million euros, ranging from €408,918 in the Canary Islands in 2018 to 760 million euros in Aragon in 2012. Regions have 2.6 million people, on average, with 9.3 years of schooling, an unemployment rate of 15 per cent and a GDP of 6.8e+10 euros. Spanish residents earn €31,367 per year and are around 42 years of age, with 18 per cent being over 65.

TABLE 1 HERE

Figures 4 and 5 present scatter plots of the unconditional relationship between the inverse hyperbolic sine transformation (IHS) of the lottery prizes per capita (*IHS prizepc*) and the two dependent variables, in logs and in per capita terms.[5] These two plots visually present the variation we intend to exploit in the empirical analysis. We clearly see that there is a positive association between jackpot gains and outbound tourism in winning regions. However, a sound analysis needs to isolate the confounding effect of region-specific differences fixed in time (e.g., geographical position, size), temporal shocks that affect all regions in a similar way (e.g., the 2008 economic crisis), and region-specific time-varying factors like economic development or unemployment rates. The following section describes the empirical strategy.

FIGURE 4 HERE

FIGURE 5 HERE

5. IDENTIFICATION STRATEGY

To identify the causal effects of windfall money on outbound tourism demand, we initially propose the following DiD specification using the inverse hyperbolic sine (IHS) of the prize per capita as a continuous treatment:

$$\log Y_{it} = \beta \left(D_{it} \times \text{IHS}\, prizepc_{|D=1_{it}} \right) + \alpha_i + \tau_t + \gamma X_{it} + \varepsilon_{it} \tag{1}$$

where $\log Y_{it}$ denotes the outcome variable in region *i* in year *t*; X_{it} is a vector of exogenous control variables that include GDP per capita (in logs), population size (in logs), average age of the population, and unemployment rate; α_i and τ_t are region and year fixed effects, respectively; and $D_{it} \times \text{IHS}\, prizepc_{|D=1_{it}}$ is the indicator of treatment intensity, computed as the product of the binary indicator for region *i* receiving positive windfall money through lottery winnings (D_{it}) times the inverse hyperbolic sine of the prize amount in per capita terms for winning regions ($\text{IHS}\, prizepc_{|D=1_{it}}$).[6] Under the assumption that trends in the outcome variable would have been similar in regions that won the lottery to trends in those that did not, β captures the causal effect of windfall money on outbound tourism demand.[7]

The adopted specification is similar to that used by Card (1992) and Clemens et al. (2018); it is a static DiD model with a continuous treatment. Unlike other applications where the dose of the treatment smoothly increases over time, in our research design the treatment is non-absorbing because the amount of windfall money received by each region exogenously changes over time; that is, regions switch on and off the treatment at each period (see Figure 2).[8]

To check the validity of the lack of different pre-trends in outbound tourism demand between winning and non-winning regions, we have estimated an auxiliary panel regression with leads of D_{it}. Wald tests as described in Freyaldenhoven et al. (2023) do not reject the null hypothesis that all the pre-event coefficients are zero for both the trips and expenditure per capita (F(1,16))=0.14, p-value=0.715; F(1,16)=0.59, p-value=0.455). Accordingly, there is no evidence of anticipation effects.

To interpret the parameter β as causal, we need to also verify that lottery winnings are indeed 'as good as randomly assigned' given controls. Despite scale differences are partially removed by expressing all the variables in per capita terms, one might reasonably argue that regional heterogeneity in lottery tickets sales associated with different taste for gambling might bias the estimates; that is, if some regions spend more on lottery per capita, they are also more likely to win a greater share of the jackpot per capita.[9] To explore this, we have run two-way panel fixed effects regressions of both D_{it} and $D_{it} \times \text{IHS}\, prizepc_{|D=1_{it}}$ on the lottery sales of the corresponding draw (both in levels and in per capita terms) per region and year with and without controls (Appendix, Table A1). These regressions show that covariate-adjusted lottery sales are not significant for explaining actual lottery winnings, implying they can be safely taken as conditionally exogenous given controls and unit and period fixed effects.

6. RESULTS

6.1.Main findings

Table 2 below reports the estimation results of the model in equation (1) using *Tripspc* and *Exppc* as the dependent variables (in logs). Columns (1) and (2) present the estimates controlling for regional and year fixed effects only.[10] Columns (3) and (4) add the above-mentioned time-varying controls. Standard errors are clustered at the regional level to deal with heteroskedasticity and serial correlation following common practice.

TABLE 2 HERE

We find that when no time-varying controls are considered, the elasticity of the number of yearly trips per capita and the expenditure per capita to lottery winnings is 0.0031 and 0.0029, respectively. Although positive and statistically significant, this elasticity is quantitatively small; the annual outbound tourism trips and expenditure per capita increase by around 0.03 per cent for each 10 per cent increase in lottery winnings per capita. Nonetheless, the corresponding level shift in demand is non-negligible; computed at the sample means (see Table 1) and keeping population size constant, the estimated elasticity would represent an annual total increase of around 300,506 trips and €62,060,000 expenditure in real terms per region for each 10 per cent increase in the jackpot prize.

When regional controls are added to the regression, the elasticity for tourism trips remains largely unchanged whereas that for expenditure slightly shrinks and loses statistical significance. Accordingly, it seems that exogenous windfall money only affects travel frequency but not how much money to spend. In principle, this would suggest that exogenous income only stimulates tourism demand through quantity (number of trips) rather than quality (expenditure). This result partially falls in line with Fleischer and Rivlin (2009), who show that the quantity component of tourism demand is more sensitive to income variations than the quality dimension.

Looking at the control variables, none except the unemployment rate are statistically significant. The negative effect of unemployment rate is consistent with expectations and prior studies (e.g., Balcilar et al., 2021; Nguyen et al., 2020). Because the regressions control for regional and period fixed effects, it seems that the covariates do not exhibit enough within variation to identify significant effects. We will go back to this issue in subsection 6.2.

Although both lottery winnings and our dependent variables are expressed in per capita terms to adjust to differences in population size across regions, our macro-level analysis does not allow us to capture how this windfall money is distributed across the population of winning regions. That is, in the extreme case that a single person claims all the jackpot prize, the wealth effect we intend to measure could dissipate. Lump sum winners may well be more likely to save or invest their winnings on durables while recipients of small quantities tend to allocate them to leisure activities. Furthermore, the aggregate *net* income effect will be contingent on how much money people from winning regions have spent on lottery tickets. One possible way to inspect this is to replace the continuous indicator of lottery winnings by the ratio of these winnings over lottery sales in the corresponding draw. This variable thus captures the regional return to euro spent. Conditional on population size, total sales are a good proxy of gambling preferences of the region and the potential number of lottery winners under the assumption that the jackpot is randomly assigned among lotto players (Bagues and Esteve-Volart, 2016; Ghomi et al., 2022). Columns 1 and 2 in Table 3 present the estimation results using $\frac{prize_{|D=1}{}_{it}}{sales_{it}}$ as the main explanatory variable (IHS-transformed). We see that, in line with the baseline estimates in Table 2, marginal increases in lottery winnings per euro spent on tickets positively increase the annual tourism trips per capita. Nonetheless, the effect on expenditure per capita is again non-statistically significant.

TABLE 3 HERE

The previous regressions have assumed that windfall money only exerts contemporaneous effects on outbound travel demand. However, it could be the case that this wealth shock produces dynamic effects. To examine this, Columns 3 and 4 in Table 3 add a first lag of $D_{it} \times \text{IHS}\, prizepc_{|D=1_{it}}$ together with its contemporaneous value to the baseline specification in (1). In this way, we evaluate the effect that the amount of jackpot in the draw of year *t* exerts on outbound tourism in *t+1* and *t+2*. We find that both indicators of outbound tourism demand significantly increase with the jackpot prize per capita, not only in the year that follows the draw but in the subsequent one too. This finding might be explained by income multiplier and bandwagon effects needing time to operate within the winning region.

6.2.Model extensions, robustness checks and sensitivity analyses

We have performed some robustness checks and extensions to our main analysis. Firstly, we have re-estimated the three model versions presented before using correlated random effects (Mundlak device) by Generalized Least Squares. This consists of estimating a random effects panel regression expanded with the time means of the control variables (Mundlak, 1978). It offers the advantage that it considers regional unobserved heterogeneity that might be correlated with the controls without the need to estimate regional fixed effects that residualize the treatment indicator and might produce identification problems through overlapping with covariates that exhibit low temporal variation. Table 4 reports the estimation results. We see the estimates for the continuous indicator of the lottery prize, the first lag, and the ratio of the prize over sales remain largely unchanged. However, GDPpc now becomes statistically significant and greater in magnitude for expenditure than for the number of trips. This suggests that the lack of statistical significance of GDPpc in Tables 2 and 3 is potentially due to the regional fixed effects already capturing level differences in economic development across areas.

TABLE 4 HERE

Secondly, we have replaced the continuous by the binary treatment indicator D_{it} and re-estimated our baseline model (Appendix, Table A2). The results are very similar to those in Table 2. We prefer to use the continuous indicator of the jackpot prize in the main analysis as it captures differences in the magnitude shock of wealth across regions. Thirdly, we have re-estimated the model in (1) using alternative control variables. Specifically, we have replaced GDPpc by average wages and years of schooling on the one hand, and the average age of the population by the share of people over 65 years old on the other. The results are shown in Table A3 in Appendix and exhibit robustness to these alternative specifications.

Thirdly, recent developments in the DiD literature have shown that two-way fixed effects panel regressions might produce biased estimates of the DiD estimand in the presence of heterogeneous treatment effects (e.g., de Chaisemartin and D'Haultfoeuille, 2020). This is what the literature calls the *negative weighting* problem, which might cause a reversal of the coefficient sign. This is likely to be more problematic for non-binary treatments as in our case (de Chaisemartin and D'Haultfoeuille, 2022). To inspect the sensitivity of our results to this issue, we have first obtained the weights assigned by the TWFE regression to each treated unit in the estimation of β following de Chaisemartin and D'Haultfoeuille (2020; 2022). Out of the 103 Local Average Treatment Effects (each region $\times$ year cell), 77 are positive while 26 are negative; the sum of the positive weights is equal to 1.185 while that for negative weights equals -0.185. A boxplot of the weights per region is shown in Figure 6. As a rule of thumb to determine the robustness to heterogeneous treatment effects, de Chaisemartin and D'Haultfoeuille (2020) propose $\hat{\beta} \leq \hat{\sigma}\sqrt{3}$, where $\hat{\beta}$ is the coefficient estimate from the regression and $\hat{\sigma}$ is the minimal value of the standard deviation of the average treatment effects under which $\hat{\beta}$ and the true causal effect could be of opposite signs. Since the estimate of σ is 0.050, it seems the results are robust to the negative weighting problem.

FIGURE 6 HERE

Table 5 below reports the correlation between the control variables and the weights to examine if the weights are as-good-as randomly assigned across regions and periods. Interestingly, we see the weights are negatively and significantly correlated with the unemployment rate but positive associated with average wages, years of schooling, and the average age of the population. This suggests that the causal effect of lottery winnings on outbound tourism is partially mediated by these covariates. As a further sensitivity analysis, we have implemented the two-stage difference-in-differences estimator proposed by Gardner (2021) that is robust to treatment effect heterogeneity under staggered adoption.[11] Table 6 presents the estimation results. We document that the results are consistent with Tables 2, 3 and 4.

TABLE 5 HERE

TABLE 6 HERE

Finally, like Bagues and Esteve-Volart (2016), we have performed a placebo exercise as follows. We have generated a fake binary treatment with the same prevalence in the sample as the actual share of winning regions (mean=0.238). This has been done based on an auxiliary uniform distribution bounded between zero and one. Subsequently, we have re-estimated the model with and without controls using this fake treatment. If our results are due to lottery winnings affecting travel demand, there should be no relationship between the fake treatment and our two dependent variables. As expected, it is never statistically significant (Appendix, Table A4). This provides additional evidence that our findings can be given a causal interpretation.

7. DISCUSSION AND CONCLUSIONS

This paper has exploited the Christmas draw of the Spanish National Lottery to draw causal inference about the effect of quasi-randomly assigned income on outbound tourism. While the income elasticity of tourism demand has received great attention in the literature, the different proxies used at the aggregate level might have the limitation that they usually capture various regional dimensions other than income. Our analysis has coupled data at the regional level on annual tourism trips and expenditure with the amount of the jackpot prize claimed by each region per period between 2001 and 2019. We have used a difference-in-differences empirical strategy in which the jackpot prize is taken as an indicator of the intensity of the wealth shock.

Our main finding is that the exogenous rollout of windfall gains across regions positively increases the number of outbound tourism trips and expenditure per capita, both during the first and second calendar year following the draw. The fact that the lottery winnings materialize into greater tourism demand with some delay is consistent with the existence of Veblen/bandwagon (Boto-García and Baños-Pino, 2022) and income multiplier effects (Párraga-Rodríguez, 2018), by which initial income shocks to a small number of winners spill within regions over time through optimism and induced aggregate demand (Ghomi et al., 2022). Nonetheless, the elasticity of demand to such windfall money is modest in relative terms (about 0.003). Additional evidence suggests the effect is greater with the regional return to euro spent. We have also addressed recent econometric concerns about staggered difference-in-difference research designs by showing the robustness of our findings to the use of alternative estimators and control variables.

Our findings offer novel insights and theoretical contributions to the tourism economics literature, complementing existing research in two main directions. First, experimental studies have shown that people allocate part of unearned income to tourism travelling (Crouch et al., 1007; Dolnicar et al., 2008). We offer the first field evidence on this issue. On the other hand, our study adds to other work that contradicts Friedman’s permanent income hypothesis (Friedman, 1957) since tourism consumption varies with changes in discretionary income (Carroll, 2001; Stephens, 2008; Stephens and Unayama, 2011). In line with mental accounting theory (Shefrin and Thaler, 1988; Thaler, 1985; 1990) and other works in marketing (Prelec and Loewenstein, 1998) and psychology (Arkes et al., 1984), it appears that unearned income is allocated to an on-disposal pocket and more freely spent on utilitarian goods. Without the prejudice that a share of the regional wealth shock is allocated to durables, our estimates indicate that people also assign part of that money to tourism travelling.

From a broader perspective, our study relates to the literature on place-based economic policies in which cash transfers (vouchers and travel subsides) are targeted toward geographic areas to increase demand. This sort of policy has been recently implemented in several areas to battle COVID-19 pandemic (Cvelbar et al., 2021; Matsuura and Saito, 2022). We have shown that exogenous annual cash transfers in the form of lottery winnings stimulate outbound tourism, although the effect size is rather small. Accordingly, the paper offers novel evidence on how outbound demand reacts to income transfers in a setting where income is randomly allocated. Our findings could be used by policy makers when considering the possibility of developing expansionary fiscal policies to stimulate tourism demand during economic downturns and calls for detailed cost-benefit analyses of these sort of stimulus policies.

The paper has some limitations that must be acknowledged and that could be fruitful avenues for future research. Possibly the most important is that we work with regional level data due to the lack of detailed information at the micro level. If longitudinal data were available, it would be interesting to conduct multi-level analyses to study how tourism participation and expenditure patterns change after windfall gains. This would complement our findings by controlling for individual-level heterogeneity. In this vein, one might expect that the marginal propensity to consume on tourism after an income shock varies across sociodemographic profiles and the taste for travelling of the income recipient (Imbens et al., 2001). A second limitation is that we lack information about the total amount of lottery prizes claimed by each region per lottery draw. We have just used information on the jackpot prize (*El Gordo*), but other minor prizes are also awarded. Unfortunately, we lack this sort of information.

ENDNOTES

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[1] *El Gordo* is the term commonly used by Spanish people to refer to both the jackpot and the lottery itself.

[2] This is the total amount of the jackpot prize that would correspond to all the issued tickets of the winning number. It is usually shared by a significant number of lottery winners.

[3] The reader is referred to Humphreys and Perez (2013) for the characteristics and motivations of lottery players in Spain.

[4] We do not consider the years 2020 and 2021 to avoid the disruptive effects of COVID-19.

[5] We adopt a log-arcsin specification in the empirical analysis because a regression in levels would constraint the outcomes to grow by the same amount each year. Moreover, it offers the advantage that the regression slope can be interpreted as an elasticity. Because the log is non-defined for zero values, we take the inverse hyperbolic sine transformation for the prize per capita.

[6] We do not control for average wages or the years of schooling in the baseline regressions since they are highly correlated with GDP per capita. We nevertheless use them in place of GDPpc as a robustness check (see subsection 6.2).

[7] Because the treatment is not binary, strictly speaking β is not the Average Treatment Effect on the Treated (ATT) but the average causal response parameter (de Chaisemartin and D'Haultfoeuille, 2020).

[8] In preliminary analyses we run semiparametric regressions to leave the functional relationship between windfall money and outbound tourism to be determined by the data. These checks (available upon request) support the use of a linear model, in line with Figures 4 and 5.

[9] Baker et al. (2016) show that the relationship between lottery sales volumes and per capita income in Spanish regions vary with jackpot size.

[10] For the sake of visualization, Figures A4 and A5 in Appendix plot binned scatterplots of the residualized (covariate-adjusted) relationship between HIS *Prizepc* and the two dependent variables (in logs), respectively. By Frisch-Waugh-Lovell theorem, the slope is the same as that in Columns (3) and (4) in Table 2.

[11] This estimator removes regional and temporal heterogeneity from the dependent variable in a first stage (using untreated and not-yet treated observations so that the unit fixed effects are not contaminated by the treatment) and then runs a regression of the two-way demeaned outcome on the treatment indicator and the control variables in a second stage.

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Table 1. Summary statistics of the variables (obs=323)

Variable	Description	Mean	SD	Min	Max	Data source
Trips	Annual number of tourism trips	9.84e+06	9.20e+06	990434	3.67e+07	INE and TURESPAÑA
Exp	Annual total expenditure (constant euros 2021)	2.14e+09	2.19e+09	2.06e+08	1.04e+10	INE and TURESPAÑA
Prize	Lottery prize December previous year (constant euros 2021)	3.38e+07	1.21e+08	0	7.60e+08	SELAE
GDP	Gross Domestic Product (constant euros 2021)	6.79e+10	6.61e+10	7.53e+09	2.46e+11	INE
Wages	Average wages (constant euros 2021)	31,367.96	2,989.951	25,886.83	38,794.25	FEDEA
Schooling	Average years of schooling population over 25	9.31	0.83	7.22	11.65	FEDEA
Population	Population size	2.65e+06	2.36e+06	276,200	8,448,400	INE
Av. age	Average age of the population	41.97	2.447	36.53	48.28	INE
Share over 65	Percentage of population over 65 years old	18.31	3.119	11.79	25.66	INE
Unemployment rate	Unemployment rate	15.28	6.994	4.335	36.48	INE

*Note: INE=Instituto Nacional de Estadística; FEDEA=Fundación de Estudios de Economía Aplicada; SELAE=Sociedad Estatal de Loterías y Apuestas del Estado

Table 2. Baseline estimation results from DiD (TWFE)

Dep. variable	(1) Log Tripspc	(2) Log Exppc	(3) Log Tripspc	(4) Log Exppc
D x IHS prizepc	0.003**	0.003**	0.003**	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Log GDPpc			0.824	1.057*
			(0.555)	(0.502)
Log Population			-0.142	-0.050
			(0.369)	(0.413)
Av. Age			0.049	0.076*
			(0.029)	(0.037)
Unemployment rate			-0.012**	-0.011*
			(0.004)	(0.006)
Constant	8.259***	13.485***	-0.842	0.260
	(0.045)	(0.044)	(8.358)	(8.013)
Regional FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	323	323	323	323
Number of regions	17	17	17	17
Number of periods	19	19	19	19
R-squared	0.369	0.607	0.475	0.678

Note: clustered standard errors at the regional level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3. Expanded estimation results from DiD (TWFE)

Dep. variable	(1) Log Tripspc	(2) Log Exppc	(3) Log Tripspc	(4) Log Exppc
D x IHS prize/sales	0.032**	0.025		
	(0.015)	(0.016)		
D x IHS prizepc			0.003**	0.003*
			(0.001)	(0.001)
D x IHS prizepc(t-1)			0.003**	0.004**
			(0.001)	(0.001)
Log GDPpc	0.551	0.970*	0.555	0.950
	(0.630)	(0.550)	(0.634)	(0.551)
Log Population	-0.006	-0.175	-0.028	-0.210
	(0.368)	(0.463)	(0.373)	(0.445)
Av. Age	0.049	0.065	0.047	0.063
	(0.030)	(0.044)	(0.031)	(0.043)
Unemployment rate	-0.012**	-0.012*	-0.012**	-0.012*
	(0.004)	(0.006)	(0.005)	(0.006)
Constant	0.860	2.388	1.088	2.937
	(8.989)	(8.159)	(9.159)	(8.205)
Regional FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	306	306	306	306
Number of regions	17	17	17	17
Number of periods	18	18	18	18
R-squared	0.468	0.693	0.473	0.698

Note: clustered standard errors at the regional level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Estimation results from DiD (Mundlak device)

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable	Log Tripspc	Log Exppc	Log Tripspc	Log Exppc	Log Tripspc	Log Exppc
D x IHS prizepc	0.003**	0.002*	0.003***	0.003**		
	(0.001)	(0.001)	(0.001)	(0.001)		
D x IHS prizepc(t-1)			0.003***	0.004***		
			(0.001)	(0.001)		
D x prize/sales					0.034**	0.028*
					(0.014)	(0.015)
Log GDPpc	0.641***	0.935***	0.439**	0.883***	0.448**	0.881***
	(0.181)	(0.195)	(0.183)	(0.202)	(0.188)	(0.204)
Log Population	0.014	0.006	0.029	0.011	0.020	0.002
	(0.043)	(0.030)	(0.039)	(0.029)	(0.038)	(0.030)
Av. Age	0.044**	0.022	0.043**	0.017	0.042**	0.017
	(0.019)	(0.014)	(0.020)	(0.015)	(0.020)	(0.015)
Unemployment rate	-0.012***	-0.007	-0.012***	-0.008*	-0.012***	-0.008*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Time means of regressors	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	323	323	306	306	306	306
Number of regions	17	17	17	17	17	17
Number of periods	19	19	18	18	18	18
R-squared	0.439	0.761	0.454	0.760	0.454	0.760

Note: clustered standard errors at the regional level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Regression of variables possibly correlated with the treatment effect on the weights

Weights TWFE regression	(1) Coeff. (SE)	(2) Correlation
Log GDPpc	0.004 (0.005)	0.042
Log wages	0.014*** (0.002)	0.214
Log schooling	0.130*** (0.023)	0.325
Log Population	-0.007 (0.020)	-0.017
Av. Age	0.266*** (0.044)	0.206
Unemployment rate	-0.315** (0.156)	-0.088

Table 6. Estimation results from two-stage DiD (Gardner, 2021)

Dep. variable	(1) Log Tripspc	(2) Log Exppc	(3) Log Tripspc	(4) Log Exppc
D x IHS prizepc	0.003** (0.001)	0.002* (0.001)	0.003*** (0.001)	0.002* (0.001)
D x IHS prizepc(t-1)			0.002*** (0.001)	0.003** (0.001)
Controls	YES	YES	YES	YES
First-stage residualization by year and unit FE	YES	YES	YES	YES
Observations	323	323	306	306
Number of regions	17	17	17	17
Number of periods	19	19	18	18

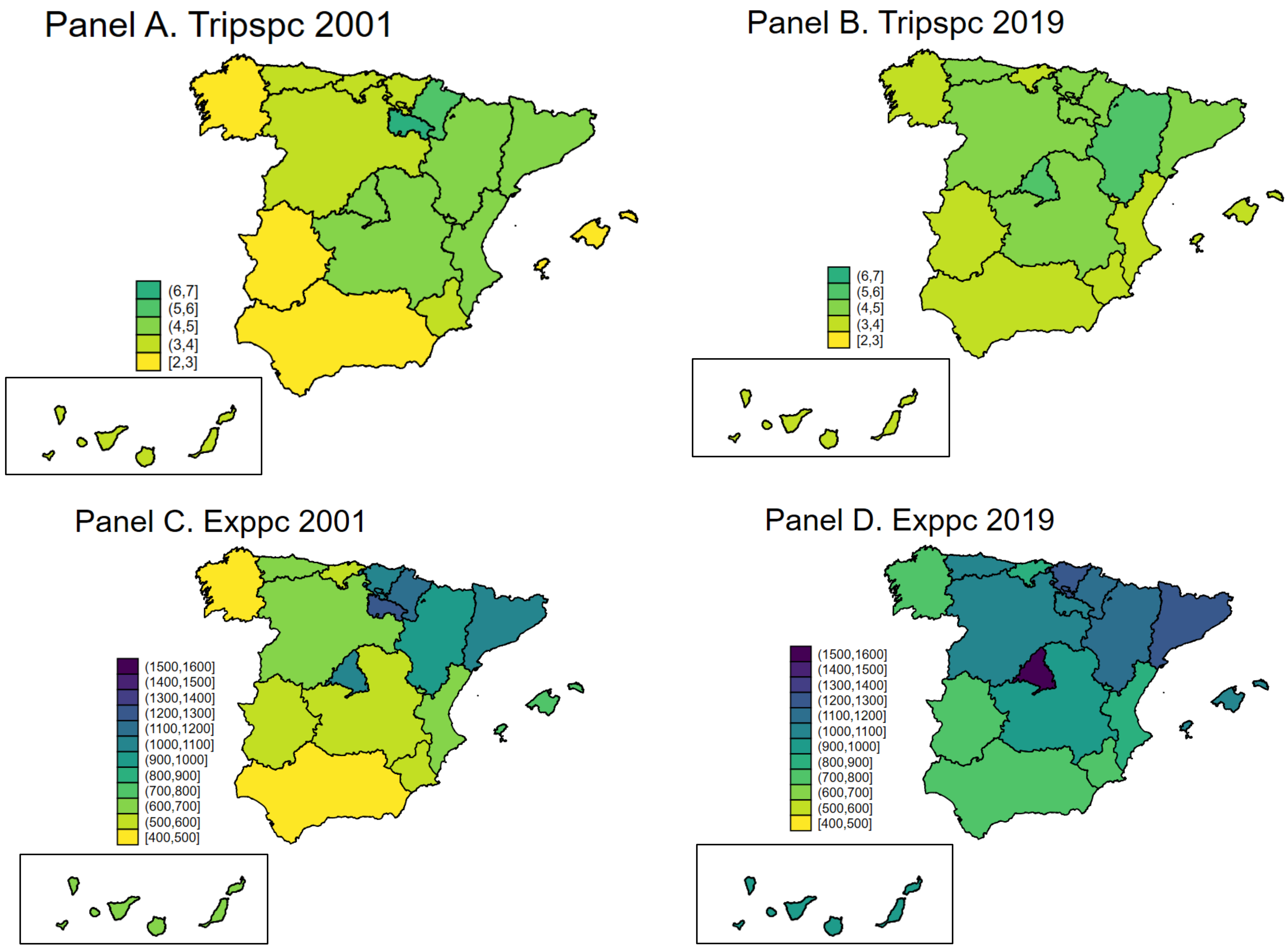

Figure 1. Trips and expenditure per capita across Spanish regions in 2001 (Panels A and C) and 2019 (Panels B and D)

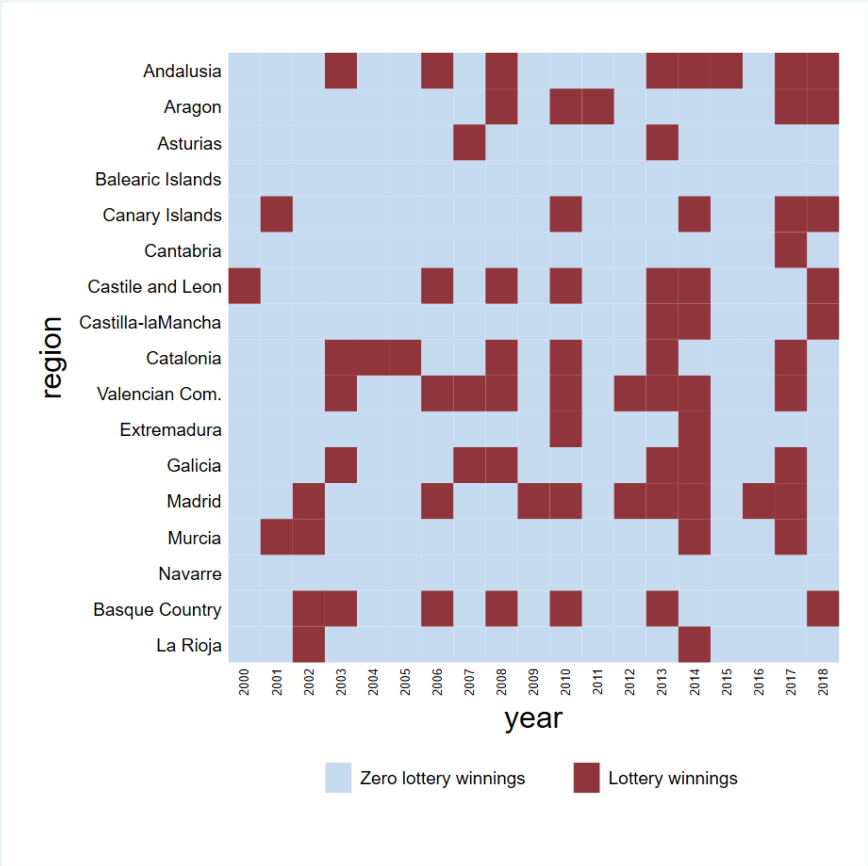

Figure 2. Distribution of treated (positive lottery winnings, in dark red) and non-treated (zero lottery winnings, in light blue) regions over time

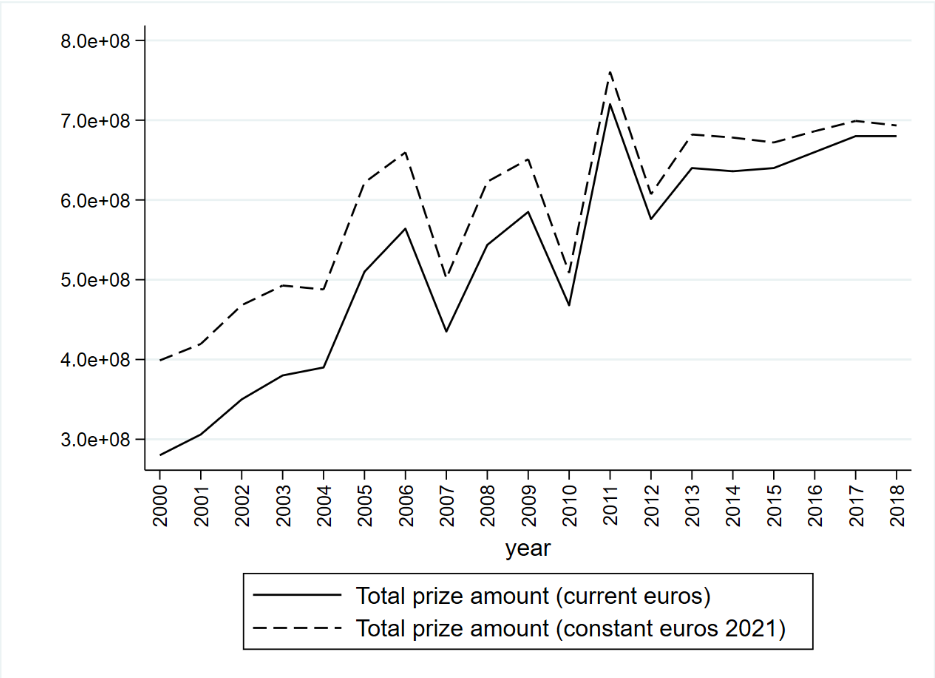

Figure 3. Total prize amount in current and constant euros of 2021 over time

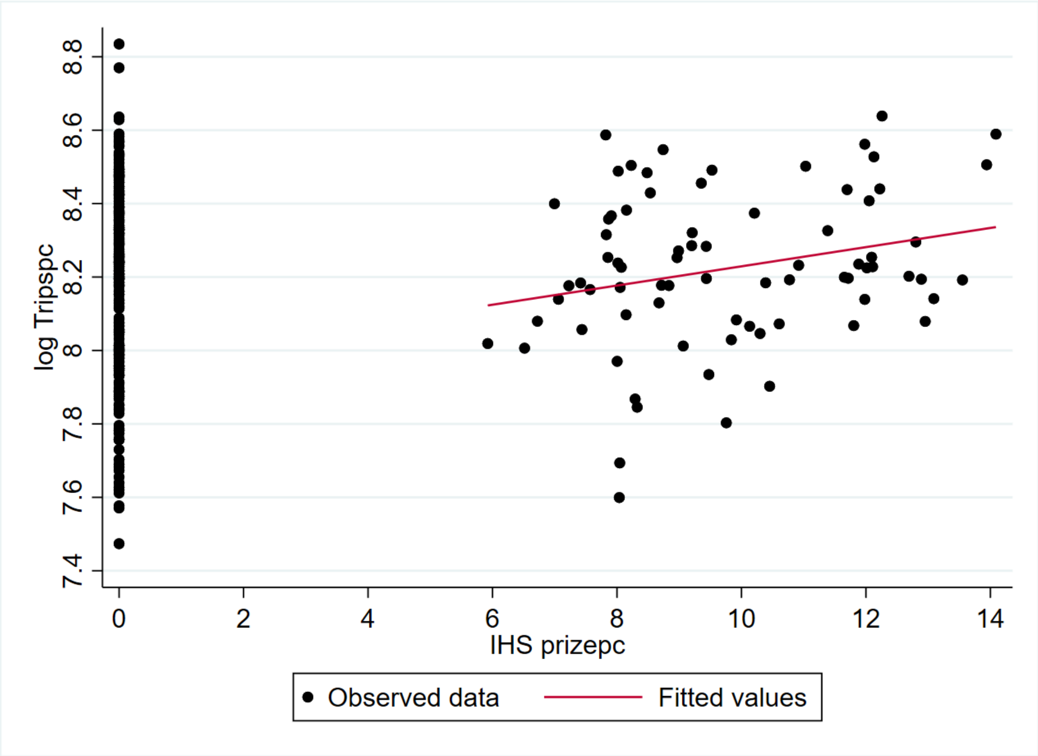

Figure 4. Descriptive scatterplot of the relationship between log *Tripspc* and *IHS prizepc*

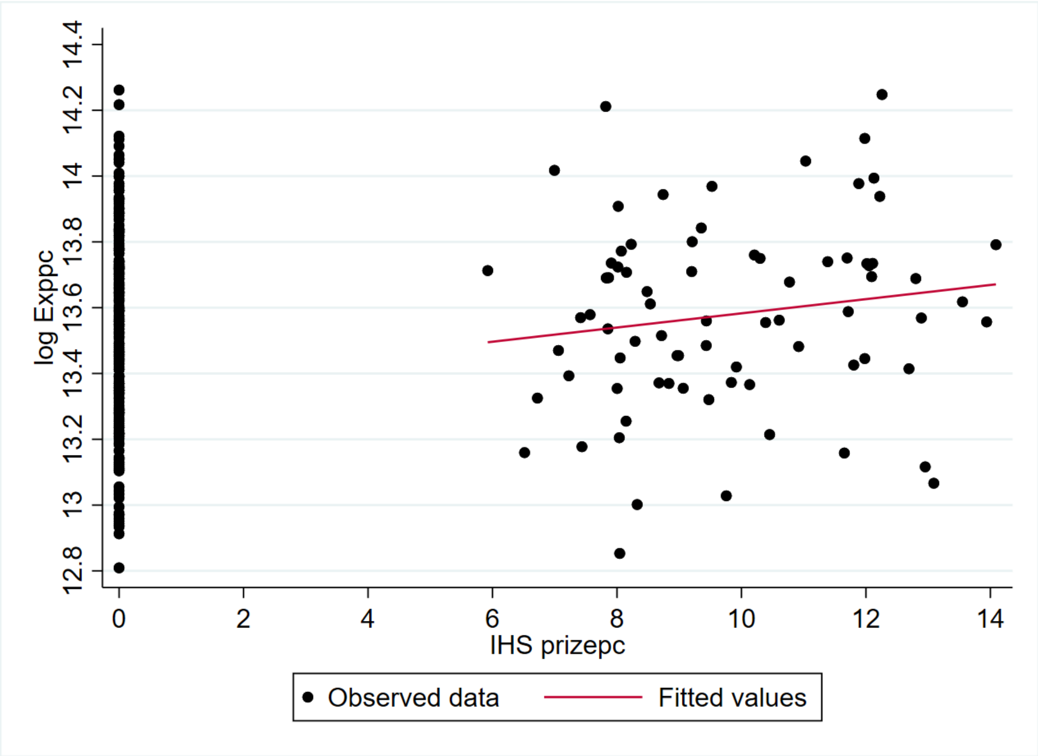

Figure 5. Descriptive scatterplot of the relationship between log *Exppc* and *IHS prizepc*

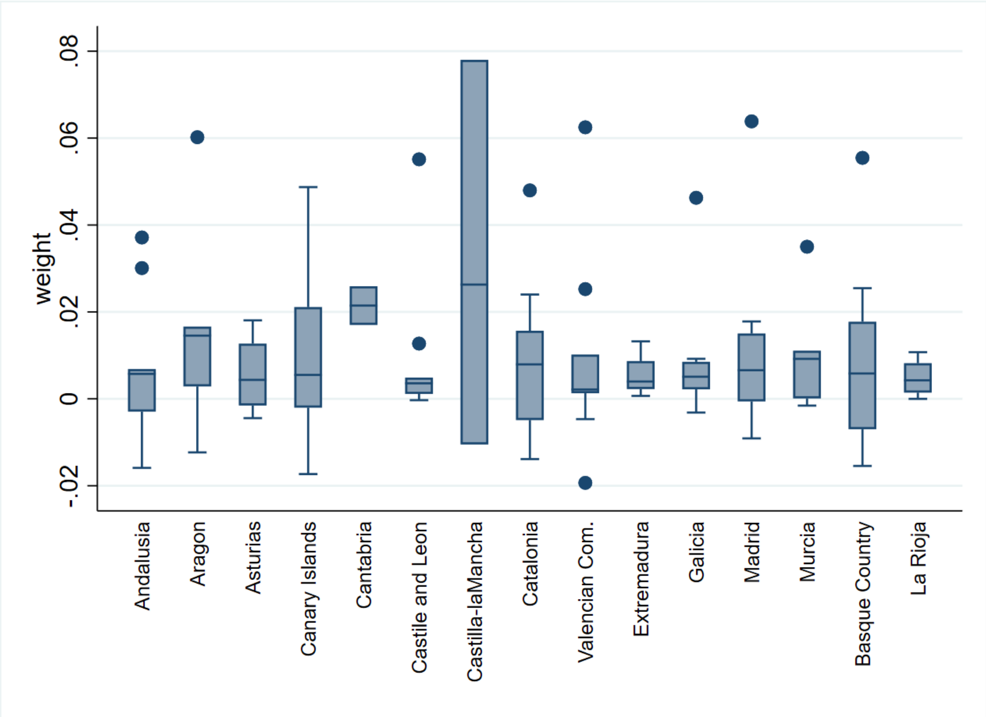

Figure 6. Boxplot of estimated weights per region from TWFE regression based on de Chaisemartin and D'Haultfoeuille (2020)