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Master Thesis

"The macroeconomic effects of consumer confidence shocks on the Spanish economy: A proxy-SVAR approach"

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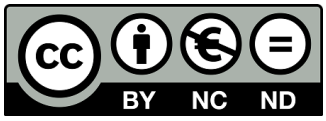

SUMMARY

By means of a proxy-SVAR, we estimate the dynamic causal effect of consumer sentiments using the international victories of the Spanish national football and basketball teams as an instrumental variable for changes in consumer sentiment. In general, increasing confidence leads to a positive impact on output and a declining effect on uncertainty, whereas the effects on the nominal side of the economy as well as on the labor market are less evident. Using a shorter sample from January 1997 to December 2013, the effect of the sentiment shock reflects a significant decrease in the unemployment rate for about five months, an effect which takes place ten months after the shock.

Keywords: Proxy SVAR; Instrumental variables; Business cycles; News shocks; Sentimental behavior

DEDICATION

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1. INTRODUCTION

Following the recent crises experienced by developed and emerging economies, a growing attention has been paid to the driving role of expectations as a source of business cycles. As discussed in Fève and Guay, 2016, there is an existing body of research that points out that changes in expectations, ergo changes in behavior, lead to aggregate fluctuations, as in O. Blanchard, 1993, Hall, 1993 and Cochrane, 1994. Indeed, changes in expectations can result from: (1) multiple equilibria and sunspots fluctuations (see Benhabib et al., 2015 and Farmer, 2011 for a thoroughly explanation); (2) news on economic fundamentals such as technological advancements, monetary and fiscal policy decisions or trade agreements (see Beaudry and Portier, 2006, 2014 and Jaimovich and Rebelo, 2009); (3) anticipated changes in future economic conditions which never actually materialize; (4) information frictions disconnected from any changes in economic fundamentals (see Angeletos and La'O, 2013 and Angeletos et al., 2014). As pointed out in Fève and Guay, 2016, there is no consensus about the contribution of news and sentiment shocks to the observed aggregate fluctuations, and different models, with different restrictions and assumptions, have been employed to study these issues. This heterogeneity has led to a great variety of conclusions. Following the studies that have considered consumer confidence without discerning the sometimes irrational nature of it, Beaudry and Portier, 2006 use a SVAR model with long and short-run restrictions to conclude that news on total factor productivity (TFP) account for more than a half of output fluctuations. With a different identification strategy for its SVAR model, Barsky and Sims, 2011 also reached the conclusion that news on TFP account for a sizeable fraction of output fluctuations, contributing modestly to recessions. O. J. Blanchard et al., 2013 used a Dynamic Stochastic General Equilibrium model (DSGE) to find that noise shocks account for the bulk of output fluctuations at a yearly horizon.

However, the source of behavioral changes of households driven by exogenous factors not linked to economic fundamentals such as irrationality or waves of psychological pessimism/optimism remains largely unexplored. Among the few papers that have addressed this issue, Lagerborg et al., 2020 concluded by means of a proxy Structural VectorAutorregression (proxy-SVAR), that sentiments account for a non-negligible part of cyclical fluctuations, employing as a source of pessimism news on fatalities of seven persons or more in the United States for the period between January 1965 and November 2019. Using a FAVAR approach, Forni et al., 2014 found that noise shocks (unrelated to economic fundamentals) entail long-lasting responses of output, investment and consumption, representing a third of their variance. Linked to this strand of the literature, Angeletos et al., 2014, using different approaches of DSGE models, found that confidence shocks unrelated to any fundamentals can explain about one half of output volatility at a business-cycle frequencies, around 6 to 32 quarters.

The foundations of this Thesis are partly built from the existing literature, and attempt to provide a better understanding of how sentiments affect the Spanish economy by employing an empirical approach not previously used for the study of economic sentiments in this particular country. The modelling strategy is based on the Proxy-SVAR method employed in Lagerborg et al., 2020 to model the impact of, in this case, positive noise shocks (not related to economic fundamentals), on the macroeconomic aggregates in Spain. There does not exist abundant literature on the impact of exogenous changes on consumer confidence for the case of Spain. With the aim of highlighting the importance of adopting an optimistic attitude for the economic situation of a country, we will use a Proxy-SVAR model instrumented with a positive shock originated by sport victories of Spanish representatives in international championships. As elaborated in a later section, for this study, we will omit the impact of victories against national teams/representatives since those victories could cause polarization, largely induced by the feeling of belonging. We will consider the period that spans from January 1997 to December 2019 to leave out the COVID-19 crisis but, in order to make temporal robustness checks, we will also model the economy from January 1997 to December 2013. We focus on this shorter sample because the frequency of victories increases and also to leave out the aftermath of the 2008-2013 crisis.

The rest of this Master Thesis is organized as follows. The next section briefly reviews the literature about the impact of consumer confidence on macroeconomic variables, placing some emphasis on the modelling strategies, in an attempt to understand how the Spanish behavior leads the economy. Section 3 describes the data- along with an explanation of the assumptions to be met by the instrument that makes consumer confidence exogenous- and the methodology to conduct the analysis. Section 4 delves into the empirical model and its results, and finally, section 5 provides conclusions and policy implications.

2. LITERATURE REVIEW

There is an emerging literature on the effects of human behavior on macroeconomic variables, however, its impact on the business cycle has not been sufficiently addressed. As specified in Lagerborg et al., 2020, the vast majority of studies in this field have tried to report causal effects of monetary and fiscal policy shocks, technological, investment-specific and oil price shocks, without comprehensively addressing how non-economic fundamentals such as human irrationality and/or "animal spirits" affect the economy and how this effect can propagate over time. This stems from the tradition to use rational expectations (RE hypothesis) to compute expectations in macroeconomics, thus ignoring periodic behavioral irrationality. This concept lies on two clearly discernible assumptions. The first is that it considers perfect information, and in general people do not always take into account all the available information in order to make the best decision [1]. Within this framework, psychological factors can cause people to act in one way or another, in some cases senselessly, thus dismantling the traditional rational architecture. Also, in some cases the concept of rational expectations is quite strict, since to consider that all people have assimilated the same information [2] (and it could be doubted whether all have accessed the same) in the same way to make relatively similar decisions, would be to reduce the economy to a situation of stability, where roughly speaking there are no exogenous factors that can incite people to adopt positions contrary to what is rational.

The second argument of the paradigm of behavioral irrationality refers to perhaps the periodicity of economic cycles. As we have just commented, the assumption of rationality may stand in times of economic stability, in which exogenous factors may not disrupt households' behavior; however, it is well known that neither economic stability nor behavioral stability are permanent, and this is where social factors come into play as a guide, in part, of business cycles. Behavioral instability arises from exogenous factors that disrupt this stability, and these can be either economic (e.g. dot.com, Bitcoin, subprime mortgages, among others) [3] - state of the economy- or internal, such as general changes in behavior motivated by different external stimuli not related to economic fundamentals (attacks, see Abadie and Gardeazábal, 2003; victories of the favorite soccer team; the lottery, see Ghomi et al., 2022; social media; state of confidence; etc.). Keynes referred to these internal attitudes as motivated by market conditions, but sometimes they may not be related to them and those entail the ones that model future economic outcomes. Thus, it would be convenient to be able not only to study potential causes of business cycles coming from economic fundamentals but also to consider behavioral power as a guide to

[1] With best decision we refer to what is economically understood as the best decision, and not necessarily the best decision from the decision-maker's point of view.

[2] Also pointed out on Aarle and Kappler, 2012.

[3] Which are sometimes cycles of overoptimism and overpessimism, related to (speculative) boom-bust cycles along the lines of Minsky's panics and manias.

the cycles, and to determine whether it was the social factor that generated instability or vice versa.

Arias, 2016 proposes an alternative to modeling with rational expectations. The new methodology employs adaptive learning (AL), that is, people are basically given subjective beliefs about their predictive models. In this model it is assumed that beliefs move only in response to economic outcomes or economic fundamentals, denying other important factors of human behavior, such as the subjective component (see Akerlof and Shiller, 2009 for a thoroughly explanation). Moreover, it considers that the factors that foster behavioral change are based on economic variables, and not the other way around. However, it still allows to evaluate the influence of irrational behavior. In general, and as also justified in Arias, 2016, sentimental shocks show a general pattern on real variables, amplifying their fluctuations over the cycle, acting as waves of pessimism and optimism, which are stronger during recessions where agents remain more pessimistic and need more time to revert, slowing down the recovery. Furthermore, if we were to consider seriously the statement that changes in behavior are only motivated by changes in economic fundamentals, then information asymmetries or heterogeneity would come into play, which is associated with the term referred to in Angeletos et al., 2016 as information dispersion. This does not necessarily imply that in recessionary times people may behave irrationally and therefore a priori unpredictably, but that this behavior will be very heterogeneous among them by the simple fact that each person/household comes to consider as the cause of the problem something different from what others may consider, generating greater uncertainty and feeding back a recessionary spiral. This is to some extent argued by Angeletos et al., 2016, that highlight that the associated errors in households' forecasting of economic activity increase the volatility of employment while decreasing its correlation with output, and so the dispersion of information induces inertia in the response of macroeconomic variables. Therefore, these information frictions could be another root of behavioral irrationality [4].

What is also important regarding expectations and "irrational" behavior is what is mentioned in Makridis, 2017 about the role of personal experiences in belief formation, for instance about inflation (Malmendier and Nagel, 2016) and housing prices (Kuchler and Zafar, 2019). In Makridis, 2017 the personal experiences are modelled conditional on demographic characteristics and location fixed effects, i.e, changes in local economic conditions which then affect personal behavior and then condition the future state of the national economy. In this study, household behavior is located between local economic fundamentals and national economic fundamentals, but a further step could be to consider the social factor as the driving force of both local and national changes. In this respect, it is worth mentioning the important contribution of Lagerborg et al., 2020 to the literature on behavioral economics as a driver of cycles. Employing a SVAR model identified using an instrumental variable, consistent with the assumption of orthogonality to economic fundamentals, they found that sentiments affect the behavior of people and they may then

[4] Also mentioned in Morris and Shin, 1998, 2002; Benhabib et al., 2015; Beaudry et al., 2011.

lead to recessionary periods when there is a pessimistic wave.

Another important aspect of the interaction between sentiments, behavior and macroeconomic aggregates is the past dependence of all of them. Using a simple New Keynesian model, Miranda-Agrippino, 2015 found that the dependence of monetary surprises on forecasts of macroeconomic fundamentals makes them dependent on past information as well. Therefore, surprises will in general be a function of the shocks and of the forecast update triggered by the implicit revelation of central banks' forecasts that happens at the time of the announcement (see also Barakchian and Crowe, 2013; Nakamura et al., 2017; Melosi, 2017). Leaving central banks aside in this case, this study shows us that forecasts and sentiments have a temporary, feedback character, which are reinforced by the past. However, this again leaves us at the crossroads of considering either the change in the macroeconomic variable to be responsible for the sentimental change in households, or exogenous and/or irrational changes in households that cause the path of the macroeconomic variable in question to be altered. What is common to both views is the temporal nature of this relationship and that the past and present influence the future of both.

3. DATA AND EMPIRICAL METHODOLOGY

In this section we provide an overview of the data and the empirical methodology employed, with the objective to derive the effect of sentimental shocks on the Spanish economy.

3.1. Consumer confidence

For the purpose of the present research, we employ data that is collected by Grupo Gallup España and treated by the OECD within the framework of the Harmonised EU programme. The Harmonised European series are seasonally adjusted using DAINTIES software for which the direct method is used, that is, the national unadjusted series are aggregated prior to seasonal adjustment. As of January 2019, the composition of the consumer confidence indicator was revised, changing the methodology. This current CCI, based on four questions of the Harmonised EU-wide Consumer Survey, was designed in 2001 and the choice of questions to be included in the alternative composite indicators is based on two criteria: their performance in tracking private consumption growth at EU, euro-area and Member States levels, and a solid theoretical foundation. In terms of the methodology, the comparison relies on six analytical blocks: correlation analysis, ability to track directional change, two simple in-sample models, an out-of sample forecasting exercise and a volatility analysis. The new CCI is the arithmetic mean of the balance series (i.e. the percentage of positive minus the percentage of negative replies) to the following four survey questions:

- How has the financial situation of your household changed over the last 12 months?

- How do you expect the financial position of your household to change over the next 12 months?

- How do you expect the general economic situation in this country to develop over the next 12 months?

- Compared to the past 12 months, do you expect to spend more or less money on major purchases (furniture, electrical/electronic devices, etc.) over the next 12 months?

Consumer opinion surveys (COS) are carried out to obtain qualitative information for monitoring the current and future economic situation. The information collected in COS is described as qualitative because respondents are asked to assign qualities (opinions), rather than quantities, to the variables of interest. Typically, COS are based on a sample of households and respondents are asked about their intentions regarding major purchases, their economic situation now compared with the recent past and their expectations for the immediate future. Thus, the OECD prepared the Main Economic Indicators (MEI) that include three of the harmonized European indicators, namely:

- EU Harmonised Confidence indicator (CI)

- Consumer prices; future tendency (CPFT)

- General economic situation; future tendency (ESFT)

For the case of Spain, data are collected monthly (12 questions) and quarterly (3 questions) by personal interview during the first three weeks of the month by Grupo Gallup España. The current sample is based on the 2001 population census. The sample is proportionally stratified according to: (1) direct proportional distribution of Spanish population in terms of town size by Nielsen Region, (2) random selection of sampling point (town-village) and censal sections within sampling points are also randomly selected, (3) random selection of households and (4) selection of individuals within households according to non-interlocking gender and age quotas, which replicates exactly the distribution of the Spanish population. Sample selected represents about 95.6% of the Spanish population, where the sample size is around 2,000 units and the response rate is around 33%. Moreover, the survey excludes Ceuta, Melilla and Canary Islands. For the purpose of the study, we will focus on the future tendency of the economic situation (ESFT) because of its intrinsic expectational nature. Given that it is normalized to 100, a value above 100 implies a boost in consumers' confidence regarding the future economic situation, as a consequence of which they are less prone to save and more inclined to spend money on major purchases in the next 12 months. Values below 100 indicate a pessimistic attitude towards future developments in the economy possibly resulting in a tendency to save more and consume less. The question asked for the compilation of this indicator is "How do you expect the general economic situation in this country to develop over the next 12 months?" It will (++) get a lot better, (+) get a little better, (=) stay the same, (-) get a little worse, (–) get a lot worse and (N) do not know. In fact, this measure is relevant because it is well documented that consumer confidence fluctuates with macroeconomic aggregates, showing in our case a correlation of +0.312 with industrial production and -0.267 with the unemployment rate.

3.2. Victories in sport events

In this Thesis an instrumental variable approach will be employed as to identify consumer confidence in Spain due to its endogenous nature. Consumer confidence fluctuates with macroeconomic conditions and it is made up of economic fundamentals, noise, shocks and sentiments; therefore, to isolate the non-fundamental component, we propose an appropriate proxy. Regarding the economic fundamental part, which is the source of endogeneity, Islam and Mumtaz, 2016 found a relationship between consumer confidence and economic growth throughout consumption in European countries, and Malovaná et al., 2021, concluded that there exists a clear relationship between consumer confidence and asset prices and lending conditions. To construct that instrument, we rely on the number of sporting events won by Spanish representatives against international teams/rivals, and

the number of spectators in each event. The central idea is that such events constitute a source of good news that should not derive from economic fundamentals.

For this purpose, we have created a specific monthly database, collecting the number of events in which Spanish representatives have beaten foreign rivals, from January 1997 to December 2021. Spain has a long tradition in both the sport practice and the sport visualization. However, recent victories and Spain's golden age of sports have derived in great support from ample population groups in the last years. Not only have great triumphs been achieved in soccer, tennis, basketball, Formula 1 (F1) or MotoGP, but also in badminton with Carolina Marín or cycling with Alberto Contador and Induráin.

According to Nielsen, 2019, the five most followed sports in Spain are, in descending order: (1) Soccer: 7 out of 10 people in Spain show devotion to this sport. For instance, LaLiga has an audience of about 457,000 spectators per game, not counting more important games such as the Champions League, where it has reached 9 million spectators. Not only that, but we should also add those fans who come to the field of play. Also, women's soccer is attracting more and more interest, and is getting increasingly more federative licenses, so that it has become more attractive to the media. (2) Tennis: thanks to Rafael Nadal, tennis has become the second most followed sport in Spain, although the Spanish population has traditionally shown a preference for this sport. Besides the Grand Slam events in which Spanish tennis players participate, that tend to show large audience (approximately 4 million viewers), other national championships, such as the Mutua Madrid Open, also have a significant number of spectators (278,000 people, on average). Or as in the case of Conde de Godó, which surpassed the barrier of 100,000 viewers in 2018. (3) Basketball: the ACB borders 400,000 TV spectators-even without counting those followers of the Spanish national team in international tournaments-and a fan base of about 6,344 people on courts. In addition, Spanish players playing in foreign teams, especially in the NBA, have an average of about 4 million followers on social media networks, which makes them attractive to the media. (4) F1: similar to what has happened in tennis, thanks to the victories of Fernando Alonso, millions of Spaniards are glued to the television to watch main races. As Nielsen Sport assures, the signing of Carlos Sainz by Ferrari will help to maintain the interest in this sport. (5) MotoGP: similar to F1, the successes of motorcyclists such as Marc Márquez, Jorge Lorenzo, Dani Pedrosa and Alex Crivillé have helped to increase interest in this sport in recent years. The motorcycling audience has changed recently due to the fact that its rights have been distributed among private channels, but even so, the races have an average of 300,000 followers. In addition, Spain is part of the conglomerate of circuits that make up the world championship, including Jerez, Montmeló, Cheste and Aragón. The sixth place in the ranking is occupied by cycling, but due to its lower media coverage and the smaller number of followers in relation to other sports, we will only take into account the first five sports.

In addition, we will not consider victories (in this case gold medals) by Spanish representatives at the Olympic Games. The reason for this decision is the psychological factor that comes into play when, at the end of them, the total medal count is made and com-

pared with other countries such as the United States or China. While it is true that Spain has won gold medals in the Olympic Games in tennis (Rafael Nadal, Beijing 2008; Rio de Janeiro 2016) or swimming (Mireia Belmonte, Rio de Janeiro 2016), among others, when the total medal tally is made public, the positive effect and therefore the media impact is less. Therefore, we will not consider the victories/golds of Spanish representatives at the Olympic Games as a positive shock.

Furthermore, national championships such as the Davis Cup in tennis, Copa del Rey in soccer or the ACB in basketball, among others, are not taken into account, since in this case, the feeling of belonging is not manifested. With victories of a particular team over another national team, sentimental polarization is created, while some are joyful and enjoy a positive shock, others, within the same country/economy, feel dejected. That is why a positive shock in sport in national tournaments does not generate the same impact as when winning internationally, where even if a particular team/sportsman wins, and is not specifically the one admired, the feeling of belonging prevails more than when directly beating the team followed. In other words, confrontations at the national level create polarization while at the international level they create a feeling of belonging.

The database has been constructed by selecting all the victories of Spanish representatives in international championships in the five most followed sports throughout the study period. For soccer in particular, especially due to its media impact, not only the victories of the Spanish national team were considered, but also the Champions League and Europa League victories of Real Madrid, F.C. Barcelona, Atlético de Madrid, Sevilla F.C. and Valencia C.F., among others. Once an exploration of all the victories was conducted, we carried out a detailed investigation of the number of spectators of each event, for which finally those victories with five million spectators [5] or more were collected.

Apart from the mathematical estimation of this threshold, it is expected that this number underestimates the actual number of spectators, given that those represent only people that have been registered by the media platforms. This is because it is common that spectators view sport events collectively in bars or clubs, that count officially as one spectator, since bars tend to have a single contract[6]. There may also be some individuals who may not have witnessed the sport event but because of the interest it arouses and its media impact, they may end up shaping their expectations accordingly, and therefore, the effect of the positive shock increases.

Information related to the number of spectators for each event has been found in main Spanish digital sport newspapers such as Marca, Mundo Deportivo or AS, as well as on the official webpage of main Spanish TV channels and in Wikipedia, and harmonized to

[5] See appendix section 5.1 for a thoroughly explanation of the reasons that motivate the choice of five millions as a threshold for our analysis.

[6] In some cases, a spectator is not counted per television contract, but rather companies dedicated to providing information on spectators following sporting events make estimates of the population who has witnessed the event based on contractual data made public, people who attended the stadiums and the impact of the game.

avoid numerical discrepancies between them. One of the alternatives considered for the construction of the instrumental variable was to normalize the total number of spectators and assign it to each corresponding date. That is, instead of assigning two victories to May 2002 because two international tournaments were won in that month, it was considered to add the total number of Spanish spectators, both on television and on the field, and normalize the total audience, assigning May 2002 a five if the total number of spectators was five million.

Table 5.1 in the appendix reports the victories considered as an IV, with the corresponding number of spectators and the dates they materialized. We also report in Figure 5.1 the timeline of Spanish national teams' victories together with OECD recessions for Spain (grey bars). From the graph we can infer neither signs of seasonality nor a clear trend in the number of spectators interested in the event and the number of events won[7]. However, what we can see is that some events were won during crises, and the number of followers differ, so we should not expect an economically meaningful correlation between them. The eight victories considered add up a total of 71.9 million spectators, with the Spanish national soccer team's third and the second European Championships in July 2012 and June 2008 being the most watched events with 15.5 and 14.5 million, respectively, along with the World Cup in July 2010 with 13.9 million viewers. However, the impact of the World Cup was greater despite the lower number of viewers, but this was especially so because there were fewer Spaniards in South Africa watching the match than Spanish fans in Poland-Ukraine where the European Championship of 2012, for instance, was held.

3.3. Macroeconomic aggregates

As mentioned above, this study aims to analyze how a sentimental shock affects the performance of a series of macroeconomic aggregates. Among all, those of interest in this first approximation are the civilian unemployment rate, industrial production, consumer price index, the Spanish average rate of short-term interest rates[8], the real stock price (IBEX35 index deflated by the consumer price index, as in Lagerborg et al., 2020) and the uncertainty index elaborated for Spain by Ghirelli et al., 2019. Data regarding the consumer price index, civilian unemployment rate, industrial production and our benchmark rate are obtained from OECD statistics. The uncertainty index (EPU) series is obtained from the Economic Policy Uncertainty webpage for Spain, and the data regarding the closing nominal price of the IBEX35 market was obtained from Yahoo.com finance. In addition, and seasonally adjusted, the index of the general economic situation future

[7] We have controlled for the trend and for seasonality, and results were robust as well. Some of the tournaments considered are played during summers, and that is why it was important to check for seasonal effects.

[8] Average of the three month interbank offer rate attaching to loans given and taken amongst banks for any excess or shortage of liquidity over several months, and the rate associated with Treasury bills, Certificates of Deposit or comparable instruments, each of three month maturity.

tendency (ESFT) was obtained from the OECD statistics. All series are expressed in logarithms except the unemployment and the benchmark rates, and those that were not seasonally adjusted from their data source provider, have been adjusted by applying the Census X-13 method, except for the confidence index (ESFT) and the policy rate.

The time spectrum of the analysis spans from January 1997 to December 2019, although results will also be provided for the period from January 1997 to December 2013, in order to avoid possible distortions caused by the COVID-19 crisis and the aftermath of the 2008-2013 crisis.

3.4. Methodology

As conducted in Lagerborg et al., 2020, and using similar notation as in Gottschalk, 2001[9] we will base our benchmark analysis on identifying autonomous changes in consumer sentiments using the proxy SVAR estimator (or SVAR-IV) developed by Stock and Watson, 2012 and by Mertens and Ravn, 2013. In this scenario, the idea is the use of external instruments to account for the structural shocks of interest, that is, positive consumer sentiment, in a SVAR setting. Let Y_t be an n x 1 vector of endogenous variables perturbed by an n x 1 vector of structural shocks, e_t, that are mutually orthogonal. Thus, the model can be represented as:

$$\Gamma Y_t = B(L)Y_t + e_t \tag{3.1}$$

where the diagonal of the Σ_e gives us the variances of the endogenous variables and the off-diagonal part the covariances between them. Moreover, $B(L)Y_t$ represents the lags of the endogenous variables where L is the lag operator that satisfies $L^i x_t = x_{(t-i)}$. However, as in the normal SVAR setting, the starting point is the reduced form of the previous model, which is obtained by multiplying the inverse of the objective matrix Γ:

$$Y_t = B^*(L)Y_t + u_t \tag{3.2}$$

where $B^*(L) = \Gamma^{(-1)}B$, $u_t = \Gamma^{(-1)}e_t$, and the variance-covariance matrix of the reduced form is $\Sigma_u = \Gamma^{(-1)}\Sigma_e\Gamma^{(-1)'}$. The moving average representation of (3.2) needs a reparametrization to express the endogenous variables in Y_t as a function of current and past reduced form innovations, u_t:

$$Y_t = C(L)u_t \tag{3.3}$$

where $C(L) = (I - B^*(L))^{(-1)}$, and represents the response of an endogenous variable of interest in t+2, for instance, to a unit innovation in the disturbance in one of the terms in u_t

[9] See Miranda-Agrippino, 2015 for a more comprehensive explanation of the identification strategy in SVARs using IV.

at time t, holding all other innovations constant. However, as stated in Gottschalk, 2001, even though this term shows the responses of the economy to the reduced form disturbances, this is not interesting because these disturbances are devoid of economic content since they only represent a linear combination of the underlying structural innovations e_t, given by, $u_t = \Gamma^{(-1)}e_t$. Therefore, for the interpretation of the impulse response functions, it would be necessary to decompose (3.3):

$$Y_t = C^*(L)e_t \tag{3.4}$$

with $C^*(L) = C(L)\Gamma^{(-1)}$, containing the impulse responses of the endogenous variables to their structural innovations. Without loss of generality, we order the variable that represents consumer confidence first in the vector of observables and let, as in Lagerborg et al., 2020, s_t be a proxy for e_{1t}. The proxy SVAR needs to satisfy the following identifying assumptions:

$$\mathbb{E}[s_t u_{1t}] = \phi \neq 0 \tag{3.5}$$

$$\mathbb{E}[s_t u_{it}] = 0, i > 1 \tag{3.6}$$

The relevance condition in (5) requires correlation between the proxy variable and the first unobserved structural shock of interest, whereas the exogeneity condition in (3.6) states that the proxy needs to be uncorrelated with the rest of structural innovations, that is, orthogonality condition among the other unobserved shocks. Thus, if these identifying assumptions hold, we have that:

$$\mathbb{E}[s_t e_t] = \begin{pmatrix} \phi\Gamma^{-1}_{0,11} \\ \phi\Gamma^{-1}_{0,i1} \end{pmatrix}, i > 1 \tag{3.7}$$

where $\Gamma^{(-1)}_{(0,ij)}$ denotes the (i,j)'th entry of Γ^{-1}. Following the procedure in Lagerborg et al., 2020, we will scale the impulse responses so that the positive sentiment shock corresponds to a one percent increase in the consumer confidence index, i.e. $\Gamma^{-1} = +1$, and the remaining structural coefficients are obtained as follows:

$$\frac{\mathbb{E}[s_t e_{it}]}{\mathbb{E}[s_t e_{1t}]} = \Gamma^{-1}_{0,i1} \tag{3.8}$$

Using the same methodology as the one implemented in simple regressions with IV, we will implement the estimator with a 2SLS procedure and estimate the coefficients above by regressing $\hat{e}_t$ on $\hat{e_{1t}}$ using s_t as the instrument. With these coefficients, the impulse responses can be computed from equation (3.4).

4. EMPIRICAL RESULTS

As stated in Lagerborg et al., 2020, the benchmark specification of the vector of observables for Spain is:

$$Y_t = [esft_t, u_t, ip_t, cpi_t, r_t, unc_t, stck_t] \tag{4.1}$$

where $esft_t$ is the natural logarithm of the ESFT, u_t is the civilian unemployment rate, ip_t is the natural logarithm of the industrial production index, cpi_t is the natural logarithm of the consumer price index, r_t is the European policy rate, unc_t is the natural logarithm of the Ghirelli et al., 2019 uncertainty index for Spain, and finally, $stck_t$ represents the natural logarithm of the real stock prices. The VAR includes a constant and the lag length is set to 20 months[10].

4.1. Winning sport events as an IV

4.1.1. Exogeneity

Like any instrumental variable, winning sport events must satisfy two immovable conditions, namely, relevance and exogeneity. Relevance requires that the instrument be related to the variable to be instrumented, which is tested endogenous in the model, while the exogeneity condition requires the instrument not to be related to the rest of the variables not considered in the model. In other words, the use of sport victories by Spanish representatives as an instrumental variable for consumer confidence shocks must be assumed to be exogenous to the rest of the economic factors and thus, the identification strategy requires that they are orthogonal to current economic conditions. In this way, and considering that no victory has been decided negligently, victories have a component of randomness that make them a good potential instrument.

It could be argued that certain teams have more resources than others, or that the match has been played more intelligently and therefore skill factors come into play, which in turn are related to the economic development of the country in question. However, almost all the teams and national teams that compete in this type of championships have the same resources and normally the economic factors of the country do not put the team at a disadvantage, which leaves room only to randomness and how the match was planned (which not only depends on the strategic capabilities of each team but also on the effort and time dedicated to analyze the match, which could also be considered more or less the

[10]This lag length is chosen to follow the principle of parsimony, but the lag length that maximizes the first stage F-statistic, i.e the relevance criterion of our proxy instrument as done in Lagerborg et al., 2020 is 25 months.

same for all teams). Triumphs cannot neither be predicted by past economic conditions nor there is compelling evidence that these events are triggered by prevailing conditions in the economy.

4.1.2. Relevance

The other underlying idea of the proxy/IV is that won competitions by Spanish teams/-players, while unrelated to economic fundamentals, can influence the economy through consumer sentiments. This does require, of course, that households are aware of the events. As we have chosen the sports more followed by the Spanish population, they are likely to enter the information set of many households through news, social media and through social interactions and, therefore, may possibly impact on behavior.

Sports receive significant news coverage, reaching a large portion of the Spanish population. According to Statista, 2022, 2.6 million respondents visited public establishments to watch soccer games in 2020, while 5.2 million once a month and 15 million once a season. Regarding basketball, according to a study by Statista, 2021a, almost 2% of the Spanish population plays basketball on a weekly basis and almost more than 6% do so annually. In addition, 30% of the population claimed to have a basketball ball at home. The sport has almost 380,000 licenses, second only to the Spanish Football Federation, and has 3,600 clubs spread across the country. When it comes to tennis, Statista, 2021b shows that there are some 5,430 tennis courts spread across the country and some 70,151 licenses divided between men's and women's tennis, and categories such as fry, children's, cadet, junior, senior unqualified and qualified. Without mentioning MotoGP and F1, it can be seen that interest in sports in Spain is quite high, which means that not only do they get information irremediably through social networks or news, but it is practically half of the population that turns to these media for information.

On the other hand, there is also evidence of the positive effects of victories of national teams/players against international rivals. According to Durkheim, 1912, collective rituals fulfill a very relevant social function and favor affiliation, which is one of the pillars of happiness according to Seligman. Thereby creating a sense of collective unity. This feeling arises because people who participate in the rituals share attentional and emotional experiences which favors a state of collective perception called, by Durkheim, "collective effervescence". Moreover, this "collective effervescence" generates spillovers because, according to Páez and Rimé, 2014, social sharing has been shown to promote a positive emotional climate, emphasizing positive feelings such as trust and hope, and also favors other social functions such as social cohesion, cooperation and the perception of social support (Reddish et al., 2013; Páez et al., 2015). Therefore, and in some circumstances, situations of imitation may arise (Le Bon, 1896; Maines, 1989), generating another spillover on those who are not really fans of any of the sports studied. And can not only lead people who do not follow the sport to imitate the group happiness of those who do, but also encourage them to want to practice the sport, with the benefits that come

with doing so. However, as pointed out by Chen et al., 2018 regarding the behavior and mental health in Hong Kong male population before and after the 2006 World Cup finals, not always the effect of sport can become positive, such as hooligan behavior, poor diet during match days, excessive consumption of alcohol, etc. On the other side of the coin, and without being demagogic, these potential negative effects are very short-lived (usually during the same day of the event), while the positive effect, or increased happiness, is more long-lasting.

We report in Table 5.2 in the appendix the outcomes of the first-stage F-statistic for three samples, one from the first of January 1997 to 31st December 2019 to avoid the COVID-19 crisis, another for a longer sample period which covers from 1st January 1997 to 31st October 2021, and the last one up to December 2013. Moreover, we also report results for the null of standard conditional homoscedasticity and no serial correlation and for the case of HAR-robust F-statistics proposed by Olea and Pflueger, 2013[11]. Considering possible specifications as in Lagerborg et al., 2020, we will test whether the instrument is strong or weak when excluding the stock price, the uncertainty index and both[12]. Moreover, we also present the results of the F-statistic obtained from the benchmark VAR for different specifications of the instrumental variable. We also present in Table 5.3 in the appendix some results of the F-statistic when the number of lags is the optimal for relevance.

Table 5.2 clearly shows that the strongest and most consistent instrument to characterize a positive shock in the economy is the one that includes the victories of the Spanish soccer and basketball teams, where the standard F-statistics is 10.57, and 4.01 (higher than 3.8) when corrected for heteroscedasticity. When the sample is extended to December 2021, the heteroscedasticity-corrected F-statistic and the standard F-statistic decrease, because during this period, the number of sport wins stagnated due to COVID-19. However, when the time spectrum is reduced up to December 2013, the IV becomes stronger, with a standard F-statistic of 12.97 and a Montiel Olea-Pfluegger F-statistic of 6.92.

The rest of the potential instruments are farther away from passing the relevance test. For specifications in which variables are removed from the VAR model, the IV fails to pass the relevance test when equity prices and both stock prices and uncertainty are removed. Moreover, from Table 5.3 we can extract that the IV is relevant for any type of specification, where for the benchmark VAR up to December 2019, the standard F-statistic exceeds the critical point of 10% with an F of 14.10 and of 6.37 when corrected for heteroscedasticity. Given the relatively weak instrument test results, we will use for the purpose of the study a delta method and a delta method plus wild bootstrap for computing confidence intervals.

[11]The thresholds established to conclude the weakness or strength of the IV are 10% critical point or more for the standard conditional homoscedasticity F-statistic and 3.8 or more for the HAR-robust F-statistic, similar as done in Lagerborg et al., 2020.

[12]For the sake of clarity, the IV that is going to be used because of its consistency is the number of spectators of those events won by the Spanish national football and basketball teams.

4.2. Dynamic causal effects

4.2.1. Impulse response functions

Figure 5.2 in the appendix plots the impulse response functions for the baseline specification estimated using the delta method and wild bootstrap estimator for the covariance matrix[13]. The positive effect of a happiness shock causes an autonomous increase in consumer confidence, which persists for about 15 months. In line with this, there is also an increase in industrial production, which lasts about one year. From the twelfth month onward, there is a gradual fall that stabilizes from the second year onward, and around May of the same year in which the sentiment shock occurs, industrial production reaches its peak. Surprisingly, unemployment remains practically unchanged during the first year, and thereafter, it begins to rise until it stabilizes in the 28^{th} month after the shock. However, with respect to the 68% level bound, the effect starts to be insignificant after the 35^{th} month. This could be due to the short-lived positive effect caused by the shock, exhibiting the fact that negative shocks are more persistent and deeper than positive ones (Arias, 2016; Baumeister et al., 2001), making difficult for lagged variables such as unemployment to reflect the improvement. Another reason may be that more than a half of the victories studied took time during recessions and fed back the slow response of unemployment in bad times. Moreover, the cautious behavior of unemployment may also be due to the strong but short-lived effect of a happiness shock on retail sales. Using the seasonally adjusted OECD retail sales index, we notice in Figure 5.3 that the shock induces a high increase in retail sales but only during the first 10 months, reaching its peak at the very beginning. After the tenth month, the effect turns out negative but insignificant.

With respect to the consumer price index, the positive sentiment shock causes prices to increase immediately, and quickly decreases during fifteen months, after which it begins to increase again and then stabilizes. However, the effect at the 68 percent level is not significant during the whole period, and regarding the 90 percent level, we find little evidence that the effect is significant. The average rate of short-term interest rates increases after the shock and quickly stabilizes during almost four years. Regarding the stock market prices, the consumer sentiment shock leads to an increase in equity prices that lasts ten months, and after that, the effect is statistically insignificant. The effect on uncertainty, as of the 19^{th} month, is insignificant, but the sentiment shock leads to a huge decline of uncertainty that only lasts seven months.

In order to better understand the effect of a positive shock, we have computed the IRFs by applying a placebo analysis where the proxy was replaced by randomly reshuffled number of spectators, but the results are not illustrative since the effect is negligible and insignificant (poor instrument). We have also applied a Cholesky decomposition, but results are similar to those obtained in Figure 5.2. However, in Figure 5.4 we have

[13] In order to be conservative, we could have also used the procedure suggested by Montiel Olea et al., 2021 for parametric bootstrap inference.

computed, using delta method[14], the IRFs to a consumer sentiment shock until December 2013. By isolating the depressed period of time after the 2008-2013 crisis and taking victories up to that time (only excluding two victories), we get more insightful and significant results that can give us a better vision of how sentiments impact. The benchmark rate remains insignificant, and uncertainty is now more volatile and only significant in the first three months, where we can still see a huge decline. The behavior of the economic situation and the equity prices remain the same and the persistence of output increases (almost two years of increases). Finally, what is worth considering is the significance and the decline observed in unemployment (it takes ten months to become significant and decreases during five months), and the significance in the consumer price index. CPI decreases during almost one year, but after that it increases during fourteen months.

4.2.2. Local projections

For robustness analysis, we have also derived the dynamic causal effects using local projections, which imposes less restrictions than the proxy-SVAR method. Specifically, we will employ the LP-IV estimator, previously used in Lagerborg et al., 2020 and Ramey and Zubairy, 2018. Thus, we will require a new identification condition that expresses the following:

$$E[s_t e_{it+n}] = 0, \forall i, n \neq 0 \tag{4.2}$$

which means that the instrumental variable must be orthogonal to leads and lags of the structural shocks. Following the notation in Lagerborg et al., 2020, the impulse response function of the LP-IV estimator, H periods ahead is:

$$y_{i,t+h} - y_{i,t-1} = \alpha_h + \gamma_h esft_t + \phi_h(L)Y_{t-1} + \epsilon_{i,t+h}, h = 0, 1, ..., H \tag{4.3}$$

where $y_{i,t}$ is the i'th variable of the matrix of variables Y_t. Here we use s_t as an instrumental variable for ESFT using a two-stage least squares estimator, where the first stage is identical to the one derived with the proxy-SVAR.

Once the estimator to follow has been identified, Figure 5.5 in the appendix shows the impulse response functions of the variables used in the previous benchmark VAR, using 20 lags of the observables as controls, with 68 and 90 Newey-West confidence bounds and a period between January 1997 - December 2019. We have also set the horizon of the IRFs up to 24 months and results are less significant than those derived previously, but still showing that a positive sentiment shock leads to an increase of the consumer confidence.

[14]The IV is still relatively weak and the optimal lag that maximizes the F-statistic used to compute the IRFs is 18 months.

In response to a positive shock on happiness, the consumer confidence increases by about 3 months, less persistent than what was predicted using proxy-SVAR estimator. After the third-fourth month, it turns negative but insignificant. This causes output to increase as well for about 15 months, but insignificant at the 90% level. Output reaches the maximum just before the first year after the shock, and it is higher than the one estimated using the IV-SVAR estimator, confirming the sizeable but not persistent effect of the positive shock. Moreover, the LP-IV estimator also confirms the insignificant effect of the happiness shock on unemployment, obtaining similar results as in Ghomi et al., 2022 when using as a positive IV the Spanish lottery winnings.

In general, the effect of the shock is insignificant for the consumer price index, as well as for real stock prices. The average rate of short-term nominal rates increases slightly during the first two months but after that, the effect turns out to be insignificant. Something similar happens with the uncertainty index, where in some periods the effect is significant but for sure, the shock causes the index to decrease at the very beginning.

In an effort to obtain more robust estimates, we have done the same exercise as above, calculating the LP-IV estimator up to December 2013 with 18 lags. However, the results have been very similar to those obtained up to December 2019 with 20 lags.

5. CONCLUSION

The role of feelings in business cycles is still inconclusive. What has been empirically demonstrated, and not only through instrumental variables as in Lagerborg et al., 2020, is that positive (negative) shocks to consumer confidence actually cause an increase (decrease) in confidence that in turn leads to an expansion (contraction) of economic activity, which can be more or less persistent. When it comes to negative shocks, the effect is more evident in the labor market than the positive ones, which is in accordance to the higher persistence of the negative as opposed to the observed in this project lower persistence of the positive. Overall, and using the international victories of the national soccer and basketball teams as an instrumental variable, we have shown that a positive and exogenous change in consumer confidence generates greater economic activity, together with a fall in uncertainty. The effects on the nominal part of the economy are less clear, but it appears to be an increase in the average rate of short-term nominal rates and equity prices, as well as a delayed increase in the consumer price index. What is really obscured is the effect on the labor market, and more specifically on unemployment, where the impact is negligible both by means of a proxy-SVAR and LP-IV estimator, but significant and decreasing in a proxy-SVAR setting until December 2013.

Ghomi et al., 2022 showed, using local projections to analyze the dynamic effects of the transitory income shocks on the Spanish provinces that won the Christmas lottery, that the positive shock does not affect the unemployment rate and the CPI, taking for the unemployment half a year to react to the shock. In our case, the conclusion is very similar. Therefore, such conclusions, together with those derived from Lagerborg et al., 2020, could help establishing external validity of our results. As has been shown in other studies, monetary policy does not impact equilibrium allocations when a recession is occurring, but it does affect the probability with which they may occur. This is partly related to the conclusions obtained as to why the effects on the nominal part of the economy are ambiguous, since as mentioned, positive shocks have been explored during recessions. Even so, the effects found are strong but not very long-lasting.

There is still much room for research along these lines. While it is true that analyzing the impact of positive/negative shocks is important and illustrative, the study of complementary fiscal and/or monetary policies is equally relevant. An example of this, explained in Lagerborg et al., 2020, is that onerous unemployment insurance may make firms more reluctant to hire, just as aggressive monetary policies may be problematic in circumstances where they coincide with a fall in consumer confidence. An extension of the Thesis would have been the calculation of the forecast variance ratio to study the contribution of the shock to the business cycle.

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APPENDIX

Table 5.1

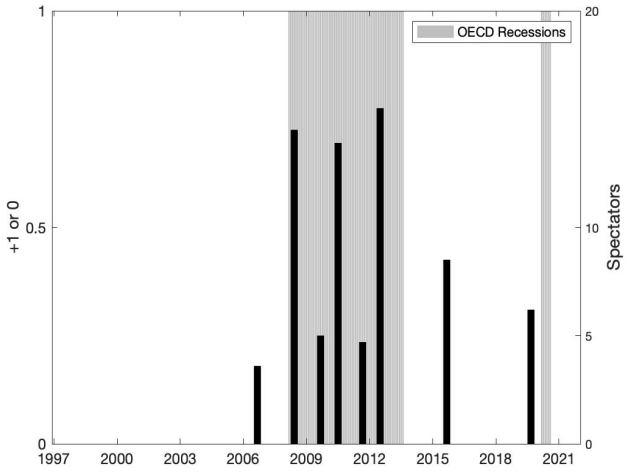
International victories with 5 million spectators or more

Victory	Total number of spectators	Date
Japan Basketball WorldCup	5 million	September 2006
Austria/Switzerland Football EuroCup	14.5 million	June 2008
Poland Basketball EuroCup	5.1 million	September 2009
South Africa Football WorldCup	13.9 million	July 2010
Lithuania Basketball EuroCup	5 million	September 2011
Poland/Ukraine Football EuroCup	15.5 million	July 2012
France Basketball EuroCup	8.5 million	September 2015
China Basketball WorldCup	6.2 million	September 2019

Source: Own elaboration

Figure 5.1

Timeline of the number of spectators at Spanish national teams' victories



Source: Own elaboration

Table 5.2

F-statistics for instrument relevance

Part 1: Benchmark VAR (20 lags)			
Sample	Instrument/proxy	$F^{homoscedastic}$	$F^{MontielOlea-Pflueger}$
1997:1-2013:12	$Spect_{nationteams}$	12.9723	6.9166
1997:1-2019:12	$Spect_{nationteams}$	10.5732	4.0123
1997:1-2021:12	$Spect_{nationteams}$	9.9541	4.7459
1997:1-2019:12	no stck	9.6867	3.8333
1997:1-2019:12	no unc	11.9587	5.1041
1997:1-2019:12	no stck, unc	9.0048	4.0348
1997:1-2019:12	$Victories_{total}$	1.5729	1.7094
1997:1-2019:12	$Spect_{total}$	3.7857	2.3798
1997:1-2019:12	$Dummy_{victories}$	1.0441	0.8520
1997:1-2019:12	$Victories_{withoutfootball}$	0.1315	0.1163
1997:1-2019:12	$Spect_{withoutfootball}$	0.5203	0.3947
1997:1-2019:12	$Victories_{nationteams}$	3.4507	0.9843
1997:1-2019:12	$Victories_{nationteamswithrest}$	0.2880	0.1717
1997:1-2019:12	$Spect_{nationteamswithrest}$	4.8563	1.9472
1997:1-2019:12	$Dummy_{+10million}$	5.7316	2.7478
1997:1-2019:12	$Spect_{+10million}$	5.9478	2.9778

Source: Own elaboration

Table 5.3

F-statistics for instrument relevance

Part 2: Benchmark VAR (25 lags)			
Sample	Instrument/proxy	$F^{homoscedastic}$	$F^{MontielOlea-Pflueger}$
1997:1-2019:12	$Spect_{nationteams}$	14.1022	6.3743
1997:1-2021:12	$Spect_{nationteams}$	14.5950	10.3944
1997:1-2019:12	no stck	9.8506	4.9278
1997:1-2019:12	no unc	13.7206	5.5712
1997:1-2019:12	no stck, unc	8.0503	3.3960

Source: Own elaboration

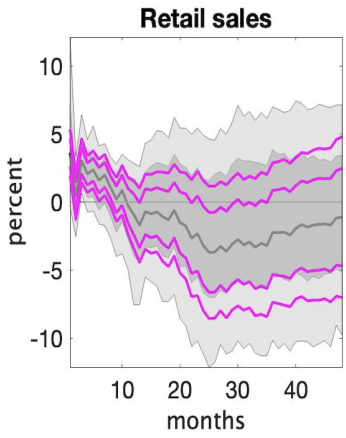
Figure 5.2

Consumer sentiment shock IRF: Benchmark Proxy SVAR December 2019

Source: Own elaboration

Figure 5.3

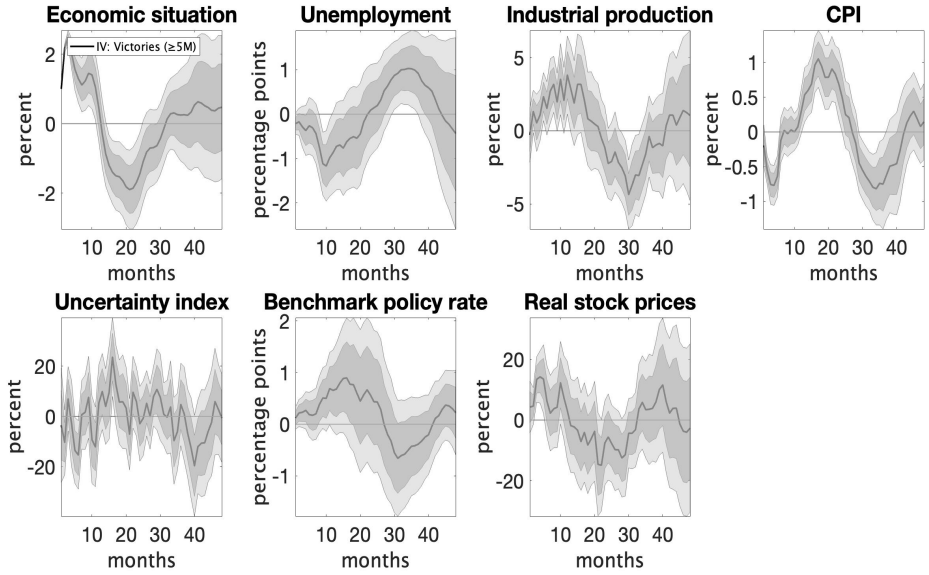
Retail sales response to the IV



Source: Own elaboration

Figure 5.4

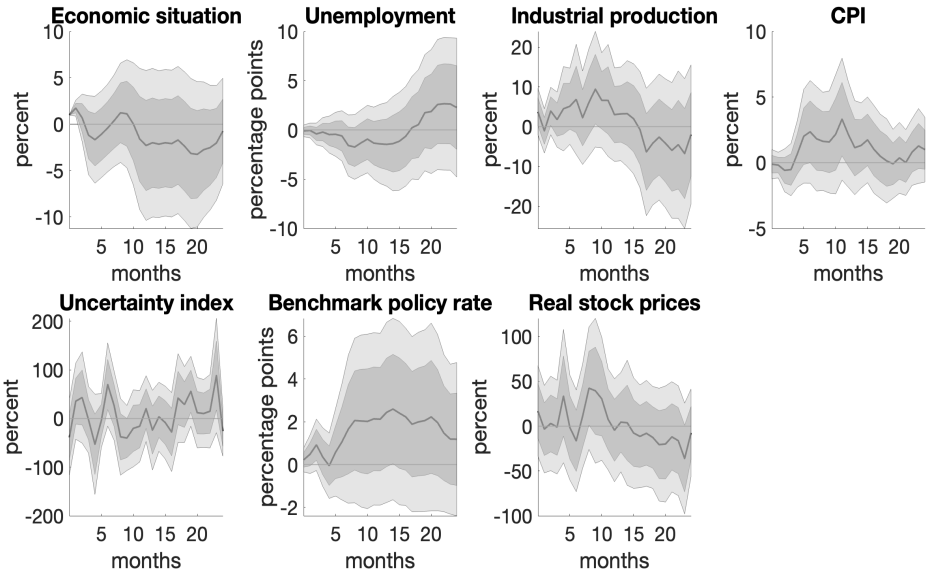
Consumer sentiment shock IRF: Benchmark Proxy SVAR December 2013



Source: Own elaboration

Figure 5.5

Consumer sentiment shock IRF: LP-IV



Source: Own elaboration

5.1. Threshold of 5 million spectators

We have investigated the number of fans that each team/sportsperson has in the Spanish territory in order to determine the threshold of fans above which international championships create greater impact than national tournaments. To do this, we have discarded Formula1, MotoGP and the Spanish national soccer and basketball teams because for all of them, their competitions require international participants. We also discarded tennis because at the national level, it generates less polarization since Rafael Nadal is usually the most followed and practically all the most media tournaments in this sport are at the international level. Therefore, we are left with soccer and basketball, counting on the fact that the most followed soccer and basketball team in Spain is Real Madrid for both. Respectively, each has 46% and 50% of the 25 million and 17 million fans according to a study by European Football Benchmark and Statista 2018 and 2021 (37.8% of the population according to Kantar's Global ScopeSport).

Thus, according to a study by Statista 2020 and a survey conducted by MediaPro, 5.2 million soccer fans go to public places to watch soccer matches at least once a month, while 2.6 million do so every weekend. In addition, 15 million Spaniards confess to going to a bar at least once every season. Then, assuming that the finals are the most attractive matches and that, according to a study by Kantar TNS, 69% of the people who watch this sport watch it at home, 31% (about 7.75 million people) watch it in bars and are not accurately counted, so if we consider victories with 5 million spectators, we would have to add about 7 million more of those who watch it in bars (assuming that of those 750.000, some went to the stadium, others were counted according to estimates by companies such as Kantar TNS and others did not watch the game), making a total of 12 million spectators, a little higher than the degree of polarization if Real Madrid won the national championship (11.5 million fans). For basketball, according to a Kantar TNS study, 6% of those who watch this sport watch it at home, while 94% watch it in bars or stadiums, so of the 8.5 million Real Madrid fans, about 8 million watch it away from home. Taking into account about 5 million fans (3 million less because they go to stadiums, counted by estimates or did not watch the match at all, according to Statista 2015), we notice that adding these to the 5 million threshold, we exceed the polarization region in national championships, where the number of Spanish fans is about 8.5 million. Adding up 5 million spectators exceed the polarization threshold, but this is needed to solve the problems in taking the real number of spectators into account. We have also considered 5 million spectators because for both sports, this number supposes the reasonable surplus in the polarization threshold.