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EFFECTS OF RECESSIONS**

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**BETRAYED BY THE ELITES: HOW CORRUPTION AMPLIFIES
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ABSTRACT: We investigate whether corruption amplifies the political effects of economic crises. Using Spanish municipal-level data and a difference-in-difference strategy, we find that local unemployment shocks experienced during the Great Recession (2008-2015) increased political fragmentation. This effect was four times larger in municipalities exposed to malfeasance than in municipalities without a history of political corruption. We bolster this evidence by showing that, conditional on province and population-strata fixed effects, there is no evidence of differential pre-trends. We also find that the interaction of unemployment and corruption harms the two traditional main parties and benefits especially the new party on the left (Podemos).

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1. Introduction

Besides its devastating effects on the economy, the Great Recession fueled political turmoil in many Western European countries. Elections held during the first stages of the crisis saw large vote losses for incumbent parties (Kriesi, 2014). However, the Great Recession also contributed to the disintegration of party systems (Hernández and Kriesi, 2016). Mainstream parties shrank, smaller parties grew, and new parties emerged. As a result, unstable coalition politics became the norm. The consequences have been visible in many countries and go from difficulties in forming government to the inability to pass budgets in time and to implement reforms (Mian et al., 2014).

Some recent studies have highlighted several factors that might be behind these political changes, such as the lack of consolidated political parties (Hernández and Kriesi, 2016) and the policy straitjacket and loss of accountability implied by the membership in the Euro area (Hobolt and Tilley, 2016; Algan et al., 2017). Without denying the importance of these explanations, in this paper we focus on a different story: whether the political effects of the crisis are conditioned by previous misbehavior of politicians, proxied by the exposition to corruption scandals related to the previous boom. Our contention is that the corruption surge affecting mainstream parties gave voters a reason to increase their punishment because of the crisis and to look for alternative parties, providing an extra boost to political fragmentation. One reason for this behavior may be the reduction in trust in political parties and institutions caused by the accumulation of evidence regarding malfeasance. A complementary story refers to the ability of voters to connect the evidence of malfeasance with the causes leading to the crisis. The proliferation of corruption scandals related to decisions relevant for the generation of the boom (e.g., local planning decisions, credit expansion by savings

banks) could have been interpreted ex post by voters as evidence that the political elites ruling the country were responsible for what happened.

In this paper, we use municipal data for Spain to estimate the political effects of the local unemployment shocks experienced during the crisis. Our main purpose is to study if the political changes caused by the economic crisis also have political roots. Concretely, we want to know if having experienced a local corruption scandal during the previous boom conditions the political effects of the unemployment shock.¹ As a way to capture the political changes brought about by the recession, our main outcome is the change in a political fragmentation index (the inverse of the 'Hirschman-Herfindhal' index) between the last national election of the boom period (that of 2008) and the first national election held after the end of the recession (that of 2015). We also estimate the effect of the unemployment shock on the vote for the two main national parties combined, on the vote for individual parties (incumbent and main challenger parties, and also non-mainstream parties, both old and new), and on turnout.

We rely on a novel database, which includes information on all local corruption scandals that broke out in Spain since the start of the boom, and high-quality administrative data on municipal unemployment for the same period. Our empirical strategy is a generalized difference-in-difference analysis. We regress the change in the fragmentation index between the 2008 and 2015 elections on the change in unemployment between these two years, and on province and population-strata fixed effects. This means that our identification relies on comparing municipalities that are on the same province and have a very similar population size. We validate this strategy by

¹ Unemployment and corruption are the two political problems that worry Spaniards the most. According to a survey by the *Centro de Investigaciones Sociológicas*, these two items were cited among the three largest problems of the country by 79.8% and 38.8% of respondents in December 2015 (the month the general election took place), respectively.

performing pre-trend placebo tests. We find that, in the ‘pure’ difference-in-differences specification with no fixed effects, fragmentation was already evolving differently in the past in the municipalities hit harder by the crisis. However, once the fixed effects are included, neither the unemployment shock, nor corruption or its interaction with unemployment have any effect on the lagged evolution of the outcome variable. In addition, we show that the results are robust to controlling for a wide range of political, socio-demographic, and economic variables.

Our results are striking. We do find that the increase in fragmentation between the 2008 and 2015 national elections was larger in places hit harder by the crisis. Moreover, and more relevant for the aim of the paper, we also find that the history of corruption substantially affects the political consequences of the economic crisis. In municipalities without a history of corruption, an increase of one standard deviation in the unemployment shock increased fragmentation by 4.2% of a standard deviation of the outcome variable. In the case of municipalities exposed to corruption, this number goes up to 19%. Thus, the effect of the unemployment shock on fragmentation is around four times larger in places exposed to corruption. We also find that the interaction of unemployment and corruption harms the two traditional main parties: the *PP* (*Partido Popular* or the People’s Party) and the *PSOE* (*Partido Socialista Obrero Español* or the Spanish Socialist Workers’ Party). Both new parties on the left (*Podemos*) and right (*Ciudadanos*) benefited from this, although the effects are larger and only significant for *Podemos*.

The paper contributes to four different literatures. First, our paper shares obvious links with the vast literature on economic voting (e.g. Lewis-Beck and Stegmaier, 2007). Following the suggestion of Margalit (2019b), we add to this literature by expanding the set of outcomes that can be affected by economic voting and by exploring the conditions

under which we might observe a response. Some papers have already considered the possibility that trust on institutions and politicians has an effect on the intensity of economic voting (see, e.g., Duch and Stevenson, 2001) but none has looked explicitly at the effect of past corruption scandals. Also, methodologically, our paper follows the lead of some recent papers that estimate the effects of localized economic shocks (Healy and Lenz, 2017; Hall et al., 2017) rather than individual perceptions of the economy.

Second, our results add to the literature that studies the political effects of the Great Recession (e.g., Kriesi, 2014; Hernández and Kriesi, 2016; Hobolt and Tilley, 2016). Our approach is complementary to the one used in this line of research, which relies mostly on cross-country data.

Third, our paper contributes to a recent, but fast-growing, strand of literature studying the impact of economic shocks on political fragmentation and polarization (Mian et al., 2014; Funke et al., 2016; Dal Bó et al., 2018), and on the rise of populism (Guiso et al., 2018a and 2018b; Algan et al., 2017; also see Margalit, 2019a, for a review). However, our story here is less about which specific type of party people want than about the causes of the political changes brought about by the Great Recession. Nevertheless, we also provide some results for specific new parties, thus adding to the literature on the determinants of their vote.²

Finally, our paper is germane to the literature on the electoral effects of corruption (Ferraz and Finan, 2008; Costas-Pérez et al., 2012; Chong et al., 2015). Our paper is concerned with how local corruption affects the performance of the party implicated in

² Concurrent work by Fernández-Albertos and Kuo (2018) studies the effect of unemployment on the share of the vote captured by *Podemos*. Other works that have focused on the emergence of new parties in Spain during the crisis are Cordero and Orriols (2016), Rodon and Hierro (2016), and Fernández-Albertos (2015). None of these papers provides a quantitative account of the drivers of party fragmentation in Spain.

the scandal in some future higher-tier election. Only a few papers have focused on the effect of corruption on party brands rather than specific candidates (Cavalcanti et al., 2018; Daniele et al., 2020; Muço, 2019). In addition, within this line of the literature, our study is related to a few works that focus on the long-run effects of corruption (see Solé-Ollé and Sorribas-Navarro, 2018, on the effect of trust in local politicians in Spain; and Aassve et al., 2019, on the effect on political attitudes and populist vote in Italy) and on the combined effects of economic hardship and corruption (Klansja and Tucker, 2013).

The rest of the paper is organized as follows. Section two provides the institutional details needed to understand the interest of the Spanish case and also the context of our empirical analysis. Section three develops the main hypothesis we test herein. Section four lays out the empirical specification and the data. Section five presents the results. The last section concludes.

2. The crisis in Spain

Spain is a good case of study to test our hypothesis. The crisis was especially acute and long-lasting. It was also followed by a political crisis, involving the collapse of trust in democratic institutions, and the fallout of traditional parties and emergence of new parties. The crisis was also accompanied by a surge in political scandals related to the previous boom period. In this section, we provide a brief description of the economic and political context surrounding the Spanish crisis.

2.1 Economic and political crises

Economic crisis. Spain was heavily affected by the Great Recession, the impact of which was first felt in 2007. By the first quarter of 2008 unemployment had started to rise, and by the third quarter of that same year the country's GDP had begun to fall. GDP dropped by 3.9% in 2009 and, while it recovered temporarily from 2010 to the second quarter of 2011, then dropped again in the period 2011-13 by more than 5%. Spain's

unemployment rate grew from 8% in 2007 to 27% in 2013, with only Greece among its EU partners suffering a higher unemployment rate.³ The rise in the unemployment rate between the 2008 and 2015 elections was 12.03 p.p.

During the first dip of the recession, the reaction of the government was to minimize it, blaming the global financial crisis, and telling people that the impact will be short lived. The second dip of the recession made evident that this was not the case. As a result, despite the high rise in unemployment during the first year of the crisis (in 2008), the stronger reaction against the government and the political elites in general took some time to occur.

Political crisis. In Spain, parliamentary elections are held every four years. Parties present closed lists and voters choose the party they want to support, their votes being allocated to seats using the d'Hondt rule with a threshold. Parliament comprises 350 seats and the electoral districts are the provinces. Representatives subsequently elect the prime minister by simple majority and the prime minister, in turn, decides the composition of the government. Although Spain is a multi-party system, traditionally there have been two main parties, the *PP* and the *PSOE*. The *PSOE* was the incumbent during the first dip of the recession; and was reelected in the 2008 election. The *PP* got in the national government after the 2011 election, just after the second dip of the recession started; this was the party in charge of implementing the fiscal adjustment and reform packages. The reduction in the vote share obtained by these two parties has been

³ The intensity of the economic crisis in Spain and the adjustment to it through employment destruction are attributable to various factors. First, the bursting of the country's massive real estate bubble in the financial crisis destroyed jobs in the construction industry and associated sectors (e.g., finance). Second, the rigidity of the labor market and the huge gap between the firing costs of those on permanent vs. temporary contracts meant firms adjusted primarily via employment and not wages (Bentolila et al., 2018).

considerable: from 82% in the 2008 national election to 73% in 2011 and to 52% in 2015. Until these elections, Spain had only had absolute majority governments or minority governments with the support of regionally based parties. Traditionally, a decline in support for the incumbent party was matched by an increase in support for the main opposition party. This still happened in the 2011 election, but not in the 2015 election, when both mainstream parties suffer a substantial vote loss.

The political landscape in the 2015 election was different due to the emergence of two new political parties: *Podemos* and *Ciudadanos*. *Podemos* was created in reaction to a wave of discontent manifest in the 15-M movement. This movement (which began on May 15, 2011) organized demonstrations and occupied public spaces to protest against the austerity measures passed in response to the economic crisis and against political corruption. The party first stood for a general election in 2015, winning 42 seats and a vote share of 13%. Meanwhile, *Ciudadanos* had been founded earlier, in 2006, in Catalonia, and had first stood at the 2008 general election (but failed to win a single seat). They opted not to stand at the 2011 election, but in 2015 they won 40 seats and a vote share of 14%. Electoral fragmentation, measured as the effective number of parties, increased from 2.7 before the crisis to 3.3 in the 2011 election and 5.4 in the 2015 election.

2.2. Political corruption

The housing boom that preceded the crisis was associated with a huge number of corruption scandals. According to Costas-Pérez et al. (2012), nearly 500 municipalities were affected by instances of corruption prior to the crisis. However, during the crisis, opportunities for corruption were curtailed with the collapse of the housing market. Yet, the public, the media, and the judiciary remained especially sensitive to corruption throughout the crisis years. As a result, more than 300 additional scandals (many of

them associated with instances of corruption perpetrated during the boom) were reported during the crisis. Most of these scandals involved local politicians accepting bribes in exchange for amendments to municipal land use plans and building permits (Fundación Alternativas, 2007).

During the boom years, it was generally thought that the electoral punishment of corrupt politicians in Spain was quite mild (Fundación Alternativas, 2007; Barberá et al., 2013). However, the crisis gave rise to considerable debate about the possible adverse effects of corruption on the legitimacy of democracy and trust. For example, in 2010 a prominent think-tank entitled its annual report “The erosion of confidence and well-being. Against citizens’ disaffection” (Fundación Alternativas, 2010). The report warned of the possible long-term effects of corruption on trust in government and the legitimacy of democracy. According to Eurobarometer data, Spain, together with Greece, was the European country that recorded the sharpest fall in satisfaction with democracy during the crisis (Armingeon and Guthmann, 2014). Recent research substantiates this story, showing that fragmentation (of the city council) is a powerful mediator of the long-run effects of corruption on trust (Solé-Ollé and Sorribas-Navarro, 2018).

As Figure 1 shows, 50% of the population mentioned corruption among Spain’s three main problems in 2015, according to a survey conducted by the *Centro de Investigaciones Sociológicas*. Interestingly, until 2009, corruption had been perceived as a problem by no more than 1% of the population. This means that concerns about corruption experienced a sharp upturn in a very brief period of time, a period that coincided with the onset of the economic crisis.

3. Theory

3.1. Economic voting

Voters might react to economic hardship in different ways. First, as posited by the economic voting literature, the most natural way for voters to express a grievance is by voting the incumbent out of office (Lewis-Beck and Paldam, 2000; Lewis-Beck and Stegmaier, 2007; Duch and Stevenson, 2008). The existing empirical evidence suggests that in normal circumstances this is followed by a concomitant increase in support for the main opposition party. Circumstances during the Great Recession, however, were far from normal. The economic slump was so entrenched that voters were left believing that none of the mainstream parties was capable of addressing the problems. In such a situation, seeking to punish the incumbent may not, in fact, result in an increased vote share for the traditional opposition parties, as voters might opt to support challenger parties (Hernández and Kriesi, 2016; Hobolt and Tilley, 2016) or to abstain (Rowe, 2015; Häusermann et al., 2017). There is a growing literature providing evidence that, in situations of severe crisis, voters may turn to less established political parties, because they are not seen as being responsible for the situation and/or because they propose new (not necessarily effective) ways of handling the problem.⁴

Of course, for this to happen, there should also be viable alternatives for which to vote (besides the mainstream parties). This was maybe not the case during the first stages of the crisis. In such a situation, voters may react to the discontent with mainstream parties in other ways. For instance, instead than voting for new parties they

⁴ See evidence of the effects of economic crises on the rise of populist parties in Europe (Algan et al., 2017; Guiso et al., 2018a and 2018b), of immigration on the vote for extreme-right parties (Halla et al., 2017), of globalization on polarization in the US and on the vote for extreme parties in Europe (Dippel et al., 2015; Autor et al., 2017; Funke et al., 2016), and of austerity on the vote for far-right parties (Galofré-Vilà et al., 2017; Dal Bó et al., 2018).

may simply abstain. Notice, however, that the literature on the effects of economic crises on turnout does not provide any clear prediction on the direction of this effect. Some authors do find that unemployment might actually foster voter abstention during economic crisis, because voters see governments too constrained and unable to respond (Häusermann et al., 2017), or because they find no alternatives to mainstream parties (Rowe, 2015). However, other authors suggest that unemployment might actually have a mobilizing effect during deep economic crisis (Burden and Wichowsky, 2012).

3.2. The amplifying effect of political corruption

A common theme in the literature on economic voting is the heterogeneity of the effects. For example, low levels of trust in political parties and government institutions might diminish the intensity of economic voting (Duch, 2001). Lack of trust in political parties means that voters expect a relatively high level of shirking or rent-seeking from public officials and a low level of policy effectiveness. This means that, in low-trust contexts, voters tend to believe that rent-seeking by politicians cannot be controlled through the threat of electoral defeat (Przeworski et al., 2000). They expect that replacing politicians that performed poorly will not improve things because all parties are basically the same. Of course, this may apply to established or mainstream parties but not to new parties that emerge during crises trying to convince voters that they are different. This is why in low-trust contexts we may observe either low economic or high economic voting but high fragmentation and maybe also low turnout (with the caveats introduced in the section above).

The exposition to corruption scandals in the years previous to the crisis may have had an impact on the level of trust in politicians and government institutions at the beginning of the crisis. Voters in places exposed to corruption scandals might be less inclined to believe that a bad incumbent can be replaced successfully by choosing a

candidate from another mainstream party. This is the first reason why we expect that, when a municipality is hit by an adverse economic shock, the turn towards non-mainstream parties will be larger if it has been exposed to political corruption.

Another reason that might explain the role of corruption as a moderator of economic voting is the ability of voters to use corruption scandals as an indicator of the responsibility in the generation of the crisis. The booms that precede most deep crises are characterized by a surge of private fraud, state capture by economic interests, and public corruption. There is abundant anecdotal evidence of the role of this type of behavior in the generation of the Great Depression (Galbraith, 1955) and also in the more recent recession (Mian et al., 2010 and 2013). Moreover, Herrera et al. (2020) show that crises might originate in political booms, that is, in artificially generated booms that boost the popularity of the incumbent. All of this is particularly true in Spain, where the crisis was related to the growth and burst of the housing bubble. Both mainstream parties were involved in the design of policies related to the real estate sector. Both had run regional and local governments, and so were responsible for the expansive land use policies and of the lax lending standards of saving banks (Fernández-Villaverde et al., 2013), and ultimately for the recession that followed.

However, since the crisis also had a global origin, voters had a hard time disentangling the influences of external forces and politicians' performance. Local corruption scandals might have helped voters attribute responsibility to politicians (or to political parties). This is due to the fact that corruption scandals might be interpreted as proof that the crisis was due to the greedy behavior of politicians rather than to bad luck. Moreover, if elections have a 'selection' function (Duch and Stevenson, 2010), corruption scandals might also reveal that some politicians (parties) did not do a good job during the boom and so are not the best suited to manage the crisis.

However, for this to happen, corruption must have two characteristics. First, voters must be able to associate it to political parties rather than to individual candidates. That is, in the case of local corruption scandals, the effects must spill over to co-partisans at higher offices. This might be the case in Spain, since some of the most prominent corruption scandals started at the local level but eventually affected regional and national politicians of the same party. Also, it has been commonplace that the two mainstream parties use the local corruption scandals affecting the competitor as a political weapon, and irrespective of whether they can be substantiated or not. Recent work by Dziuda and Howell (2019) shows that this type of behavior might end up hurting all parties.

Second, the effects of corruption scandals on the levels of political trust should be persistent. There are several motives why this can happen. For example, Solé-Ollé and Sorribas-Navarro (2018) show that trust in local politicians at the end of the boom was lower in municipalities with corruption scandals irrespective of whether the scandals broke at the beginning or at the end of the period.⁵ The authors suggest this is partly because attitudes themselves are persistent, and partly because corruption scandals trigger other changes (e.g., fragmentation and gridlock of local government) that also contribute to keep levels of trust low.

4. Empirical design

4.1. Unit of analysis

We study the effects of the unemployment shock and of the history of corruption at the local level. Given the heterogeneous spatial nature of the crisis, we expect its effects to

⁵ Aassve et al. (2019) show even more persistent effects of corruption: using Italian data they show that individuals voting for the first time just after a large country-level scandal at the beginning of the 1990s had less trust in politicians twenty years later.

be spatially differentiated. Although the earlier economic voting literature focused more on voters' perceptions of the economic situation (Kiewiet and Lewis-Beck, 2011), more recent studies show that local economic shocks are equally important (Healy and Lenz, 2017). There is also evidence that voters' knowledge about the government's macroeconomic performance is determined by the economic conditions of people considered similar to them and who live in close vicinity. For example, Ansolabehere et al. (2014) show that US voters rely on information about the situation of the state economy to evaluate the performance of the federal government. More recently, Alt et al. (2018) show that the evaluation of the state of the economy is determined by the employment situation of relatives and co-workers who live or work nearby. In the case of corruption, we can also expect voters to be both better informed and more concerned about scandals occurring nearby. In light of these insights, we examine the effects of local unemployment shocks and local corruption scandals.

Our main analysis uses municipal data while controlling for province fixed effects. In Spain, there are around 3,000 municipalities with more than 1,000 inhabitants (the ones constituting our sample) and 50 provinces, which coincide with the electoral districts used at the national legislative elections. As discussed in the next section, exploiting within-province variation is key for identification, which means that we have to use units that are smaller than the province. We believe the municipality is the right unit to study the effects of corruption, since the cases in our database refer to accusations made against local politicians. In the case of the unemployment shock, information at the level of the municipality is especially relevant as it informs us about the effect of the crisis on neighbors, relatives, and friends. However, the municipality might not capture the full effects of shocks to employment prospects, which may operate at the local labor market (LLM) level. For this reason, we also present some

results using LLMs. These are defined using commuting data from the 2001 Population Census (Boix and Galleto, 2004). There is a total of 806 LLMs covering the whole of Spain.

4.2. Empirical specification

Baseline equation and identification. We estimate the impact of the unemployment shock experienced during the Great Recession on political fragmentation (and other political outcomes) using the following ‘generalized’ difference-in-difference specification:

$$\Delta Fragmentation_i = \alpha \Delta Unemployed_i + X_i' \gamma + \lambda_j + \lambda_k + \varepsilon_i, \quad (1)$$

where $\Delta Fragmentation_i$ is the increase in political fragmentation in municipality i during the recession period (i.e., from the last national election held during the boom, in 2008, to the first national election held after the end of the recession, in 2015), and $\Delta Unemployed_i$ is the increase in unemployment in the same period. The vector X_i includes control variables in levels measured as of 2008 (or earlier) and λ_j and λ_k are province and population strata fixed effects. The α coefficient captures the effect of an increase in the treatment intensity (i.e., an increase in unemployment) on fragmentation.⁶

Regarding the period of analysis, we focus on the 2015 election because, as we explained in Section 2, the social reaction against the political management of the crisis—including the protest movements and the organization of the new parties—happened relatively late in time, clearly after the second dip of the recession. However, in complementary analysis, we also present results for the 2011 election.

⁶ Note that we are implicitly assuming linearity of the treatment effect. In the robustness section, we provide evidence in support of this assumption.

In terms of identification, the fundamental challenge is that places subject to larger unemployment shocks might have been on different trends prior to the Great Recession. In fact, pre-trend analyses in a ‘pure’ difference-in-difference estimation (i.e., without the fixed effects and controls) reveal that the parallel trend assumption does not hold: the evolution of fragmentation before the crisis in places experiencing larger unemployment shocks was different than in places hit by milder shocks. To deal with this issue, we consider the generalized difference-in-differences specification given by (1), which adds population-strata and province fixed effects, and a number of controls.

We define five population strata: less than 5 thousand inhabitants, from 5 to 10, from 10 to 20, from 20 to 50, and more than 50 thousand. The fixed effects account for the fact that both the economic impact of the crisis and the extent of the corruption epidemics were spatially clustered and might have had quite a distinct effect on urban and rural municipalities. For instance, some provinces are more heavily specialized in construction and/or in industrial sectors that supply to that sector. Also, provinces capture quite well the extent of provincial media markets and spatial differences in cultural and social traits. Moreover, the difference in the price of a seat from one province to another may have an effect on the probability of success of small parties and, thus, on their decision to stand and on their campaigning effort. The same applies to population size, because some of the drivers of political discontent are more prevalent in large cities (e.g., the real estate crisis). Therefore, we identify the effects of the rise in unemployment by relying solely on within-province and within-population strata variation.

We also add a bunch of pre-treatment covariates in levels included in X_i . These comprise political (fragmentation, voter turnout and parties’ vote shares at the 2008 election), socio-demographic (the mean age of the population, and percentages of

people with college education and of immigrants), and economic variables (the unemployment rate, housing prices, and municipal expenditures). These covariates account for the possibility that the aggregate effects of the crisis have different effects depending on the individual traits of voters and/or the economic environment in each municipality. For instance, there is ample evidence that the socio-economic profile of the voters abandoning the mainstream parties and turning towards challenger parties is very specific (see e.g., Fernández-Albertos, 2015). Moreover, these characteristics might be potentially correlated with the intensity of the crisis.

Pre-trend placebo tests in this generalized framework reveal that, once the fixed effects are included, political fragmentation evolved in a similar way in the past in places hit by high vs. low shocks during the Great Recession. The inclusion of the different sets of controls in levels does not affect at all our results.

That there are no differential pre-trends in the pre-treatment years bolsters the validity of the empirical approach. Notice, however, that it is still possible that there are post-treatment differential trends. Of course, this is untestable, but we perform a number of robustness checks to assess whether this could drive the results. Specifically, we expand equation (1) to control for changes brought about by the crisis that could be correlated with unemployment: the changes in housing prices, municipal expenditures, population size, and share of immigrants (all measured from 2008 to 2015). The crisis generated an important wealth loss on homeowners, which may be captured by the drop experienced by housing prices. The crisis also generated a collapse in municipal expenditures in places where the budget was funded disproportionately with construction-related revenues (Solé-Ollé and Viladecans-Marsal, 2019). Finally, municipalities hit harder by the crisis might also have experienced more outmigration or at least a slowdown of immigration flows. All these changes might potentially

confound the effect of the unemployment shock. In any case, the results also remain unchanged after including these controls in the equation, which increases our confidence that the increase in unemployment genuinely captures the impact of the crisis on household economies.

Heterogeneity. To study whether the effect of the unemployment shock on fragmentation is amplified by the prior experience of corruption we estimate the following equation:

$$\Delta Fragmentation_i = \beta \Delta Unemployed_i + \delta \Delta Unemployed_i * Corruption_i + \mu Corruption_i + X_i' \gamma + \lambda_j + \lambda_k + \varepsilon_i, \quad (2)$$

where $Corruption_i$ is a dummy variable equal to one if municipality i experienced at least one corruption scandal related to a local politician belonging to a mainstream party (i.e., either the *PSOE* or the *PP*) during the boom years (i.e., 1999-2007). We think these are the cases that fit better the story that the increase in the punishment of mainstream parties because of the crisis was related to a prior history of corruption. Note that some of these municipalities may have also experienced a corruption scandal in the crisis (2008-2015). In the robustness section, we report the results obtained when controlling for a dummy which identifies those municipalities that experienced a corruption scandal during the crisis (both on its own and interacted the unemployment shock) or when excluding them from the sample.

Regarding interpretation, notice that the β coefficient in equation (2) measures the impact of the unemployment shock on fragmentation in places that did not have an experience with corruption, while $\beta + \delta$ is a measure of the impact of the unemployment shock in places that did have that experience. Testing whether the

coefficient on the interaction term, β , is different from zero tells us whether the impact of the unemployment shock was larger in places also hit by corruption.⁷

In terms of identification, the estimation of equation (2) poses the same challenges than equation (1). For instance, we also assume here that, before the crisis, fragmentation was on the same path in municipalities affected and unaffected by corruption scandals. Since these corruption scandals break out during the boom, it could have happened that fragmentation already started to grow then. This would not necessarily invalidate our analysis but would affect the interpretation of the results. More problematic would be to find that fragmentation evolves differently in corrupt and non-corrupt municipalities even before the boom. Fortunately, we are able to discard this possibility, showing that fragmentation in these two types of municipalities did follow the same evolution over time. This also happens for the interaction between the unemployment shock and corruption. Among municipalities without a history of corruption, the evolution of fragmentation (during and before the boom) is similar irrespective of the size of the unemployment shock. The same happens in the case of corrupt municipalities.

However, the estimation of the interaction coefficient δ faces one added difficulty. Even if the effects of the unemployment shocks in non-corrupt and corrupt municipalities (i.e., β and $\beta + \delta$, respectively) are well identified, it is not clear that the difference between them (i.e., δ) tells us only about the effect of corruption on the

⁷ Although this is the main purpose of the paper, the results from the estimation of equation (2) also allow us to recover other interesting parameters. For example, provided that $\Delta Unemployed_i$ is demeaned, the coefficient μ can be interpreted as the impact of corruption in a municipality hit by the mean unemployment shock. Also, the marginal effect $\mu + \delta$ can be interpreted as the impact of corruption in a municipality that experienced an unemployment shock of one p.p. above the mean.

response to the unemployment shock. Since corruption could be correlated with many other confounders, the different sensitivity to the economic shocks might be generated by other factors rather than the exposition to corruption scandals. To deal with this issue, we assess the robustness of our results to adding interactions between the unemployment shock and possible confounders of corruption: political fragmentation, electoral volatility, turnout, and a left-right ideology index, all of them computed as historical averages (i.e., over all the elections prior to the boom). These political variables account for the possibility that corruption might be higher in places with historically low turnout, with right-leaning voters, and with low electoral competition (see Solé-Ollé and Viladecans-Marsal, 2012, and Solé-Ollé and Sorribas-Navarro, 2018, for evidence). In an even more demanding specification, we control for a full set of interactions between the unemployment shock and provincial fixed effects, thus estimating the interaction effect using only within-province variation. It is certainly reassuring that the estimate of the compounded effect of unemployment and corruption is robust to the inclusion of all interactions.

Estimation and inference. The above equations are estimated by ordinary least squares. To avoid our results being influenced by a myriad of small municipalities, we drop those with fewer than 1,000 residents. We also exclude from our analysis municipalities from two regions (Catalonia and the Basque Country) that have traditionally had a significantly different political scenario. In these regions, due to the existence of important regional parties, the two main national parties, the *PP* and the *PSOE*, have historically obtained a substantially lower vote share. Thus, they cannot be

considered the main parties in those regions.⁸ Additionally, we weight our observations by voting population (as of the 2008 census) to ensure our results reflect the effects on the average Spanish voter. The results without population weights would inform us about the effects for the average municipality, but not necessarily for the average voter.⁹ We cluster the standard errors at the province level.

4.3. Data description and sources

Political outcomes. The main political outcome studied is a fragmentation index (*Fragmentation*) computed using vote data from national elections at the municipality level. We use the inverse of the Hirschman-Herfindahl index, giving us the ‘effective number of parties’.¹⁰ Figure 2 shows the evolution of this index between 2000 and 2015. Several trends should be highlighted. First, the graph shows a small increase in fragmentation between the 2008 and 2011 elections (with the ‘effective number of parties’ increasing from 2.33 to 2.45), and a large spike between the 2011 and 2015 elections (from 2.45 to 3.81). Second, this increase ran parallel to the increase in unemployment. The unemployment rate jumped from around 5% in 2008 to close to 12% in 2011 and at around 13% in 2015.¹¹ Finally, neither unemployment nor fragmentation changed much between the 2000 and 2008 elections.

⁸ In the 2008 national election, the PP and the PSOE got a combined 51.9% vote share in Catalonia, and a 56.7% in the Basque Country. Remember that the vote share obtained by these two parties at that election for the whole Spain was 82%.

⁹ We also perform a robustness analysis to show that, qualitatively, the results obtained do not depend neither on the specific sample used nor on the weights scheme.

¹⁰ This index is computed as $Fragmentation = 1 / \sum_k (\#Votes\ Party\ k / \#Votes)^2$.

¹¹ Here we report the unemployment rate that we use in our empirical analysis, computed as the ratio between the number of unemployed people and the working age population. This number is smaller than the official unemployment rate, which is computed as a ratio over the number of people actively searching for a job. This information is not available at the local level.

We also study the effects on the vote for the two mainstream parties together (*%Vote main parties*) and also the vote for specific parties, either the two main parties (*%Vote incumbent, %Vote challenger*) or each of the non-mainstream parties, either the new parties (*Podemos* or *Ciudadanos*) or the old ones (*Izquierda Unida*, the former communist party, and other minor parties grouped together). Finally, we also look at the effects on turnout. The data on votes to parties at national elections at the municipality level are from the Spanish Ministry of Home Office.¹²

Unemployment. The unemployment rate is measured as the number of unemployed people in the municipality averaged over the 12 months of the year, over the working age population. The unemployment shock ($\Delta\%Unemployed$) is computed as the difference in the unemployment rate between the election years, i.e., from 2008 to 2015. The source of this variable is the Spanish Ministry of Employment. The quality of these data is very high on international standards. Notice that we are working with administrative data with census characteristics, something that contrasts with many indicators used in the literature which are based on estimates of economic activity and are thus prone to measurement error (see Healy and Lenz, 2017, for a further discussion of the advantages of using this type of data).

Corruption. To measure the history of corruption we use a dummy variable (*Corruption*) which is equal to one if the municipality experienced (at least) one local corruption scandal prior to the crisis (i.e. from 2000 to 2008) that affected one of the main parties (*PSOE* or *PP*).¹³ The source of these data is an updated version of the database employed by Solé-Ollé and Sorribas-Navarro (2018). The authors started with

¹² See Table A1 in the Online Appendix for the summary statistics of all variables.

¹³ We exclude from the control group those municipalities that experienced a corruption scandal that did not affect one of the two main parties.

a hand-coded list of corruption scandals compiled by the Spanish think-tank *Fundación Alternativas* in 2007 and extended it with internet-guided searches. For this project, we updated and improved this database using *Factiva*. We screened the period from January 1995 to January 2015 using as our keywords ‘corruption’ and the names of all Spanish municipalities. Almost no news items were found for the period prior to the 1999 election. We then implemented a machine learning algorithm to identify the news items referring to corruption scandals. In our sample, around 16% of the municipalities had a corruption scandal. Notice that we are measuring corruption as revealed by the media, which might differ from its actual incidence. However, provided that voters learn about corruption from the media, this is precisely what could influence their behavior (Costas-Pérez et al., 2012).

Another advantage of our data is that we have information regarding the moment of publication of the first news story and also regarding the period of time in which corruption activities presumably took place. This means that we are able to divide corruption cases into scandals that broke out during the boom and scandals that—even though might refer to episodes that happened in the boom—broke out during the crisis.

Control variables. Data for the socio-demographic variables *Mean Age* and *%Immigrants* are from the local registry data. The information comes from the Spanish National Institute of Statistics (*INE*). *%College educated* comes from census data. The last census before the treatment period begins (2008) was the 2001, so this variable refers to that year. *Housing prices* is measured as the selling price of new houses, in thousands of euros per square meter. The information comes from a new database recently released by the Spanish Property Registry. *Expenditures* are municipal current expenditures measured in thousand euros per capita and is obtained from the Ministry of Finance. Finally, in some specifications we include as additional controls interactions

between unemployment and possible confounders of corruption. Specifically, we consider historical fragmentation, turnout, electoral volatility, and ideology, computed as averages using data for elections prior to treatment (that is, from 1983 to 2004). The volatility measure is the Pedersen index (Pedersen, 1979), computed by multiplying by $\frac{1}{2}$ the sum of the absolute value of the change in vote shares of all the parties in two consecutive elections. The ideology variable has been computed as the weighted average of the ideological placement of each party, the weights being the parties' vote shares at the national legislative elections.¹⁴

5. Results

5.1 The effect of unemployment on political fragmentation

As a first step, we estimate the average effect of the local unemployment shock experienced during the period 2008-15 on the change in fragmentation during this period, without taking into account the history of corruption of each municipality. We estimate the generalized difference-in-difference specification given by equation (1), which includes province and population strata fixed effects, and also pre-treatment political, socio-demographic, and economic controls: fragmentation, vote shares and turnout at the 2008 election, mean age, education level, share of immigrants, initial unemployment rate, housing prices, and local spending per capita.

Column (1) of Table 1 reports the results of this estimation. An increase of one p.p. in the unemployment rate led to an increase of 0.018 in the fragmentation index. This implies that a one standard deviation of the unemployment shock (2.50 p.p.) increased the fragmentation index by 0.45 ($=0.018 \times 2.50$), or 8.3% of a standard deviation of the

¹⁴ Information regarding the ideological placement of parties is drawn from surveys carried out by the *Centro de Investigaciones Sociológicas*.

dependent variable (which is 0.54). The effect is statistically significant at the 1% level.¹⁵

Columns (2)-(5) of Table 1 show the estimates for several pre-trend placebo tests. The year above each column tells us that we are using as dependent variable the increase in fragmentation between that year and 2008, which is our base year. Besides of this, we are estimating exactly the same specification than before, including the fixed effects and controls already described. All the coefficients are very close to zero and statistically insignificant, which indicates that—both during and before the boom—fragmentation was on the same path in municipalities that were hit by small and by large unemployment shocks during the recession. These pre-trend placebo tests are displayed graphically in Figure 3. Each dot (line) shows the point estimate (confidence interval) of a regression of the change in fragmentation between each year and 2008. The graph clearly shows that the unemployment shock only had a significant and meaningful effect on fragmentation in the 2015 election.

Notice that the inclusion of the province and population strata fixed effects is crucial to get rid of the pre-trends in political fragmentation. These fixed effects may account for important confounders of the unemployment shocks that are constant across municipalities belonging to the same province or that are similar in size. Figure A1 displays the same graph obtained when relying on a ‘pure’ differences-in-difference specification, that is, excluding the fixed effects and the controls from the specification. This graph does show evidence of non-negligible pre-trends: larger unemployment shocks are associated with larger initial values of fragmentation (relative to its 2008

¹⁵ We omit the coefficients for all control variables from the table for the sake of simplicity, but they are available in Table A2. Most of the socio-economic variables are statistically significant and the results are meaningful: for example, we find that the increase in the fragmentation index is higher where there are more unemployed, educated, and young people.

value). Figure A2 in the Appendix displays the same analysis when controlling for the fixed effects but not for the other controls. The results are similar to the ones discussed in the main text, clearly suggesting an absence of pre-trends. The coefficients for the elections held during the crisis are, however, a bit less precisely estimated than when we add the whole set of controls. For this reason, we keep reporting the full specification, with both fixed effects and controls, in the rest of the paper.

5.2 Heterogeneity: The amplifying effect of corruption

Table 2 shows the results of estimating equation (2). Column (1) adds only corruption. Column (2) also includes its interaction with the unemployment shock (which is demeaned so we can interpret the corruption coefficient as the marginal effect at the mean value of the unemployment shock). Columns (3)-(6) show pre-trend placebo tests.

The results reveal that an increase of one p.p. in the unemployment shock led to a mild and non-significant increase of 0.009 in the fragmentation index if the municipality had not experienced a corruption scandal in the past. This implies that an increase of one standard deviation of the unemployment shock increased fragmentation by 4.2% of a standard deviation of the outcome variable. By contrast, the unemployment shock increased the fragmentation index by 0.041 ($=0.032+0.009$) if the municipality had been exposed to corruption. In terms of standard deviations, this represents a 19% effect. Thus, the effect of the unemployment shock on fragmentation is around four times larger in places exposed to corruption. Note that all pre-trend placebo tests are close to zero and insignificant, not only for the unemployment shock, but also for the interaction term. These results are represented graphically in Figure 4, which plots the estimated effect of unemployment in the presence of corruption, in the absence of it, and the difference between the two.

The results in Table 2 also reveal that corruption had a direct impact on fragmentation. The coefficient on *Corruption* is 0.053 and significant at the 5% level. This represents 9.8% of the standard deviation of the dependent variable. Figure 5 represents graphically the estimated effects of corruption. This graph also reveals an absence of pre-trends: fragmentation was on the same path before the crisis in municipalities hit vs. not hit by a corruption scandal. Note that this also indicates that there were no political repercussions of local scandals for higher levels of government during the boom. This result is consistent with the previous results that suggest a mild punishment of corrupt mayors during the boom (Fernández-Vázquez et al., 2016) and also with the fact that concerns about corruption among the Spanish population took off very late (recall Figure 1).

The results presented so far include the full set of covariates described in Section 4. In Section 5.4, we study the sensitivity of the estimated effects to the control variables, by adding controls sequentially to the regressions. In that section, we also provide a number of robustness checks. Before proceeding to those analyses, in the next subsection we provide some additional results.

5.3 Additional results

Effect on main parties and on the incumbent. In Table 3 we report the effect of the unemployment shock, corruption, and their interaction on the vote share of the two main parties (*PSOE* and *PP*).

The first two columns show the effects on the sum of votes for these two parties. The results mirror those of the fragmentation index. Unemployment seems to have mildly reduced the vote for the main parties in the absence of corruption, but this effect is not significant. However, in the presence of corruption, unemployment significantly harmed the main parties, which lost votes by around 0.4 p.p. Finally, corruption

significantly reduced the combined vote share of the *PP* and the *PSOE*. The coefficient indicates a drop of 1.2 p.p., which is equivalent to 12,1% of the standard deviation of this variable.

The next four columns of Table 3 show the effects for the two main parties separately. Notice that the *PP* was the incumbent in this election. What is striking in these results is that the effects are very similar in size for both parties, suggesting that both paid a price for taking on government responsibilities at some point during the crisis. Corruption significantly reduced the vote shares of both parties. It seems that the unemployment shock and its interaction also did, although these effects are not statistically significant at conventional levels. This indicates that the vote loss of the that party that was the incumbent (the *PP*) did not represent a vote gain for the main opposition party (the *PSOE*). One explanation for these results, that is consistent with the increase of the fragmentation index, is that these votes went mostly to the new parties. Hence, these results evidence that the increase in fragmentation is not simply due to a punishment to the incumbent party, and that this election did not follow a traditional economic voting party, where the main opposition party capitalizes from the losses of the incumbent in a situation of economic crises.

Effect on non-mainstream parties and turnout. Table 4 presents the results for non-mainstream parties and for turnout. The unemployment shock increased the vote for *Podemos* but did not affect much the vote for *Ciudadanos*. In the absence of corruption, the effect of the unemployment shock is close to zero and non-significant for both parties. The interaction coefficient is positive for both parties but larger and only significant for *Podemos*. The estimates imply that, in places with a history of corruption, a one standard deviation rise in the unemployment shock increased the vote share of *Podemos* by 0.70 p.p., or around a 10% of the standard deviation of this variable. Both

parties benefited from corruption scandals affecting mainstream parties. In a municipality with the mean unemployment shock, corruption increased the vote share of *Podemos*' vote by 0.79 p.p., and that of *Ciudadanos*' by 0.34 p.p., which represent a 11.5% and a 7.8% of the standard deviation of these variables, respectively. These results are consistent with what we know about *Podemos* and *Ciudadanos*. *Podemos* is a left-wing party with a clear anti-elite rhetoric: *Podemos* blamed the elites both for corruption and for the generation of the crisis that hit on the lower class. *Ciudadanos* also had an anti-corruption agenda, but was a liberal reformist party and was quite well considered by the economic elites of the country. It makes therefore sense that both parties reaped some electoral benefits out of the corruption scandals of the main parties, but it also makes sense that only in the case of *Podemos* the effects of the unemployment shock and corruption reinforce each other. Clearly, of the two parties, the behavior of *Podemos* is the one that is more in line with one of the mechanisms that could explain the link between the corruption and the intensity of economic punishment at the polls: the one suggesting that corruption helps voters attribute responsibility for the generation of the crisis to the main parties.

Finally, we do not find significant effects on the vote for old (non-mainstream) parties or on turnout. All parties, especially *Izquierda Unida*, had been around for a while, and had participated in coalition governments (at the local and regional level) with mainstream parties, meaning that voters might not have considered them as a genuine alternative to the mainstream parties. In the case on turnout, the coefficients for the unemployment shock, corruption, and their interaction are close to zero and non-significant. This might at first sight be surprising, given the potentially demobilizing effect of crisis on turnout. Remember, however, that the predictions of the literature regarding this effect are varied. Notice also that, after the appearance of the

new parties, many people that would have opted to abstain, had now a viable alternative for which to vote.

Effect on the 2011 election. Throughout the paper, we focus on the 2015 election, which was the first one after the end of the recession. As explained, despite the high rise in unemployment during the first year of the crisis (in 2008), the stronger reaction against the government and the political elites in general took some time to take place. This is reflected in the fact that, in the first election after the beginning of the crisis, that of 2011, there were no new parties in the political landscape (*Podemos* was not founded until 2014, and *Ciudadanos* was mostly confined to Catalonia and did not run).

Here we study what happened in the 2011 election. We follow the same empirical strategy, with the only difference that we consider unemployment growth from 2008 to 2011 (instead of 2015) as the treatment variable. The results are laid out on Table 5. The first three columns consider the fragmentation index as the outcome. We do not see any effect of the unemployment shock on fragmentation in the 2011 election. The point estimate is very close to zero and non-significant. Corruption, by contrast, did increase fragmentation in 2011. Having been exposed to a corruption scandal increased the fragmentation index by 0.039 units in the municipality with the average unemployment shock, i.e., an effect similar to that on the 2015 election. We do not see any interaction between unemployment shock and corruption in this election, that is, no matter whether the municipality had been exposed to a corruption scandal, the unemployment shock did not affect political fragmentation in this election. Figure A3 displays graphically these results, and the associated pre-treatment placebo tests. We can see that there are also no pre-trends in this specification.

In column (4), we consider the effect on the two main parties' combined vote share. The results mirror those for fragmentation: corruption reduces the vote share of

the main parties, while unemployment does not have any effect. In columns (5) and (6), we show the effects on the incumbent (the *PSOE*) and the main challenger (the *PP*) separately. Both parties seem to have been punished for corruption, but the effects are not significant. Regarding the unemployment shock, it reduced the vote for the incumbent and increased it by a similar amount for the challenger. This suggests that this election followed a more traditional economic voting pattern: the votes lost by the incumbent went to the main opposition party. This in contrast with the effects for 2015, in which the vote loss of the incumbent (the *PP* in this case) did not represent a vote gain for the main opposition party (the *PSOE*).

5.4 Robustness checks

We perform several checks to assess the robustness of our results. First, the results presented so far include the full set of covariates described in Section 4. In Figure 6, we examine the sensitivity of the estimated effects to the control variables, by adding controls sequentially to the regressions. The figure plots the estimated effect of the unemployment shock on fragmentation for those municipalities that experienced a local corruption scandal in the past, for those that did not, and the difference between them. Each line in the graphs correspond to a regression that controls for a different set of control variables. In the first regression we only include provincial and population-strata fixed effects. In the second, third, and fourth regressions we add political, socio-demographic, and economic controls, sequentially (hence, the estimates from the fourth regression correspond to the ones displayed in column (2) of Table 2). In the fifth and sixth regressions, we include the historical political variables, and then their interaction with the unemployment shock. Finally, in the seventh regression, we include an

interaction of unemployment growth and corruption with the provincial fixed effects.¹⁶ The estimated coefficients are remarkably stable across specifications, revealing that they do not depend on which specific set of controls is included.

Second, Table 6 reports the results when we control for changes brought about by the crisis that could be correlated with unemployment: the changes in housing prices, local public spending, population size, and share of immigrants (all measured from 2008 to 2015). We introduce all these variables both on their own and interacted with the unemployment shock. The effect of the unemployment shock and its interaction with previous corruption remain unchanged when these controls are included.¹⁷

Third, the main results rely on data on corruption scandals that broke out during the boom (1999-2007). In Table A4, we show that these results are robust to controlling for corruption scandals breaking out during the crisis (2008-2015) (columns (2) and (5)) and to dropping municipalities that did not have a corruption scandal during the boom but had it during the crisis (columns (3) and (6)).

Fourth, Table A5 reports the results when we allow for non-linearities in the unemployment effect. We present results using three dummies for each tercile of the unemployment shock. In column (2), we can see that experiencing a medium-size unemployment shock (relative to a small shock, which is the omitted category) increases the fragmentation index by 0.056, while suffering from a large shock does so by 0.100 (significant at the 1% level). In column (4), we see that there is also a positive

¹⁶ In this regression we can only identify the effect of the interaction. Thus, we only plot the difference in the effect of the unemployment growth on the fragmentation index, depending on whether the municipality experienced a local corruption scandal in the past or not.

¹⁷ Table A3 shows that the results from equation (1), i.e., without including corruption or its interaction with the unemployment shock, are also robust to adding these controls.

and significant interaction of unemployment and corruption under a non-linear specification.

Fifth, Tables A6 and A7 report the results obtained with different samples (excluding small or large municipalities) or with different weighting schemes (or no weighting). In all of these cases the results remain very similar to the baseline.

And sixth, Table A8 reports results using local labor markets (LLM). We include at the same time unemployment shocks for the municipality and for the rest of the LLM. Similarly, we introduce the corruption dummy for the municipality and a variable that measures the share of the rest of municipalities in the LLM with corruption. The results indicate that unemployment in the rest of the LLM mildly increased fragmentation. Corruption in the rest of the LLM does not have an effect on fragmentation. One possible interpretation is that individuals are more directly affected by corruption that happens in their own municipality and use corruption in neighboring municipalities as a yardstick.¹⁸ Importantly, our baseline coefficients, which capture the effects of the municipal unemployment shock, corruption, and their interaction, barely change when adding the rest-of-LLM variables, as can be gathered from comparing the coefficients in columns (1) and (2).

5. Conclusion

In this paper, we investigate whether corruption amplifies the political effects of economic crises. Through a difference-in-difference analysis using municipal-level data from Spain, we do find evidence in favor of this hypothesis. Our analysis shows, first,

¹⁸ There are two reasons why individuals may be more affected or outraged by corruption that happens in their own municipality: the corrupt politicians are those that they have elected at the municipal elections, and the divested money comes from the municipal budget, which is partially financed with municipal taxes.

that the unemployment shock causes an increase in political fragmentation. Second, that the impact of the unemployment shock on political fragmentation is substantially larger in places that have been exposed to local corruption. And third, that local corruption has a direct impact on fragmentation in general elections, indicating that there are spillovers from the behavior of local politicians to their party at a higher-tier election.

We find similar effects when we look at the effect on the vote for the two mainstream parties combined. In the case of the new parties, the strongest effects are on *Podemos*, the left-wing party that emerged from the protest movements of the 15-M. Although *Ciudadanos*, a liberal reformist party that was quite successful in the 2015 elections, also reaped some benefits out of the corruption scandals affecting mainstream parties, only for *Podemos* did corruption clearly amplify the effect of the unemployment shock. This is consistent with the idea that corruption helped voters to attribute responsibility of the generation of the crisis to the political elites of the country.

In sum, our paper shows that previous misbehavior of politicians amplifies the political changes caused by the economic crisis. Thus, the political changes in the aftermath of the Great Recession have both economic and political roots. Our results also suggest that elections work as an accountability mechanism, with corrupt parties being punished during recessions. However, we also find that this takes some time to happen. An interesting avenue for future research is to study what factors (e.g. the electoral system, or the penetration of social media) may explain the timing of the political changes.

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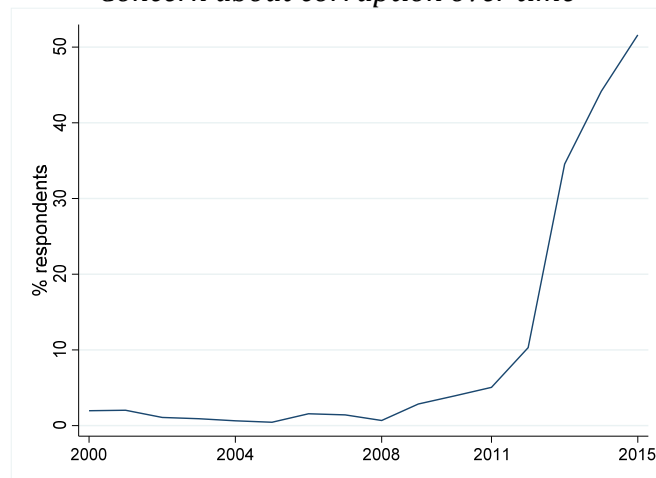
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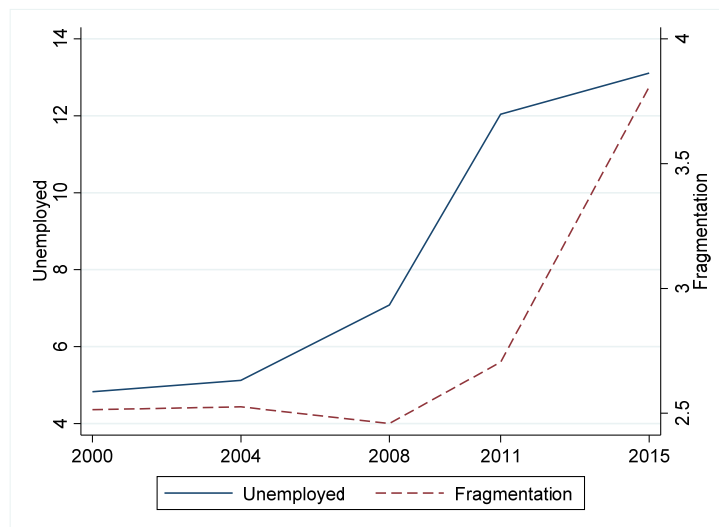
Figures

Figure 1:
Concern about corruption over time



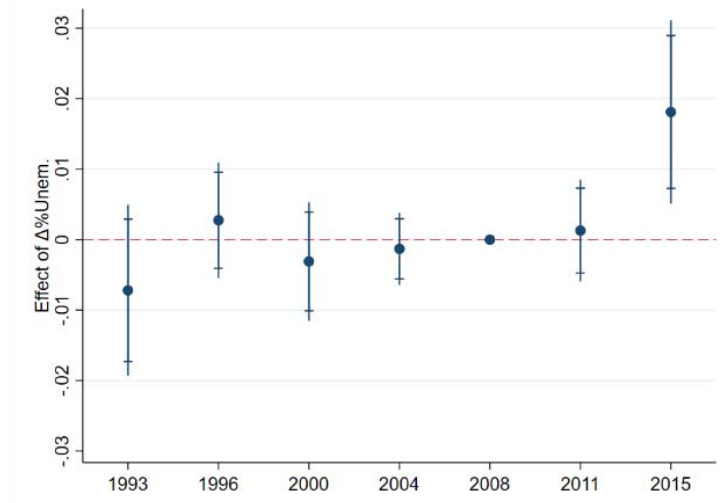
Notes: Data from barometer surveys conducted by the *Centro de Investigaciones Sociológicas* (CIS). Share of respondents that identify corruption as being among Spain's three main problems.

Figure 2:
Unemployment and fragmentation over time



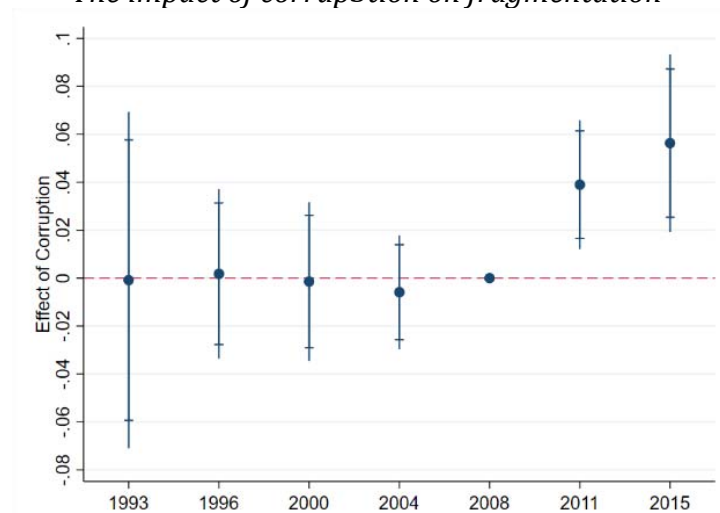
Notes: %Unemployed = #Unemployed over working age population; Fragmentation = 'Effective number of parties'. Both variables are computed as the mean across municipalities in our sample.

Figure 3:
The impact of the unemployment shock on fragmentation



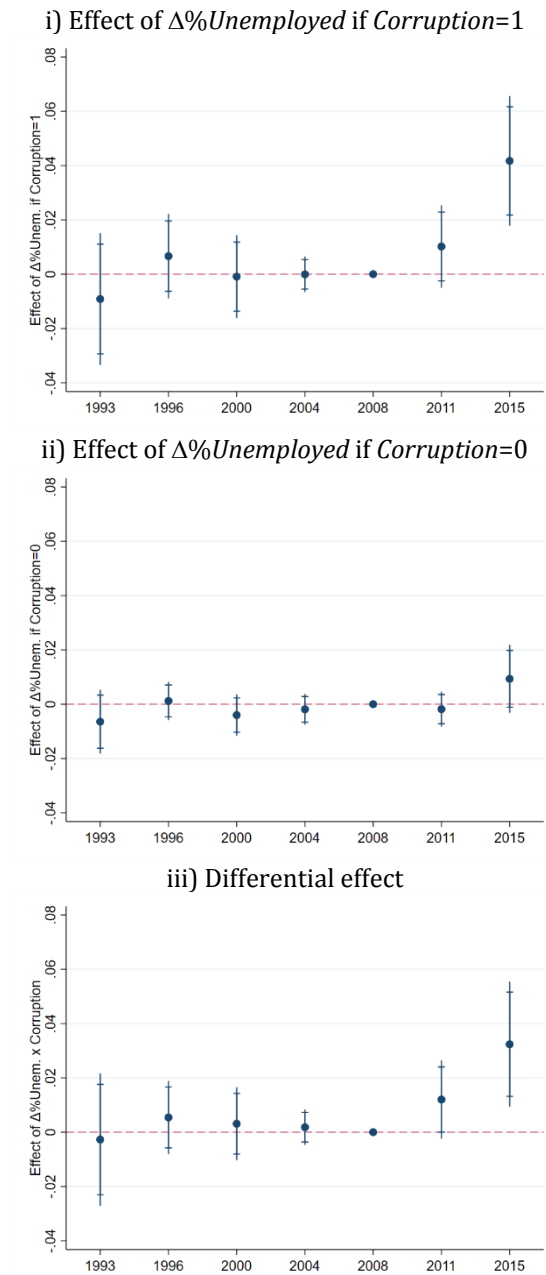
Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) $\Delta\%Unemployed$ = increase in the unemployment rate during the crisis (2008-2015). (3) The sample and control variables are the same as in Table 1. (4) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

Figure 5:
The impact of corrup3tion on fragmentation



Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) *Corruption* =dummy equal to one if the municipality has experienced at least one corruption scandal affecting either the *PP* or the *PSOE* from 1999 to 2007; $\Delta\%Unemployed$ = Increase in the unemployment rate during the crisis (2008-2015). (3) The control variables and sample are the same as in Table 1. (4) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

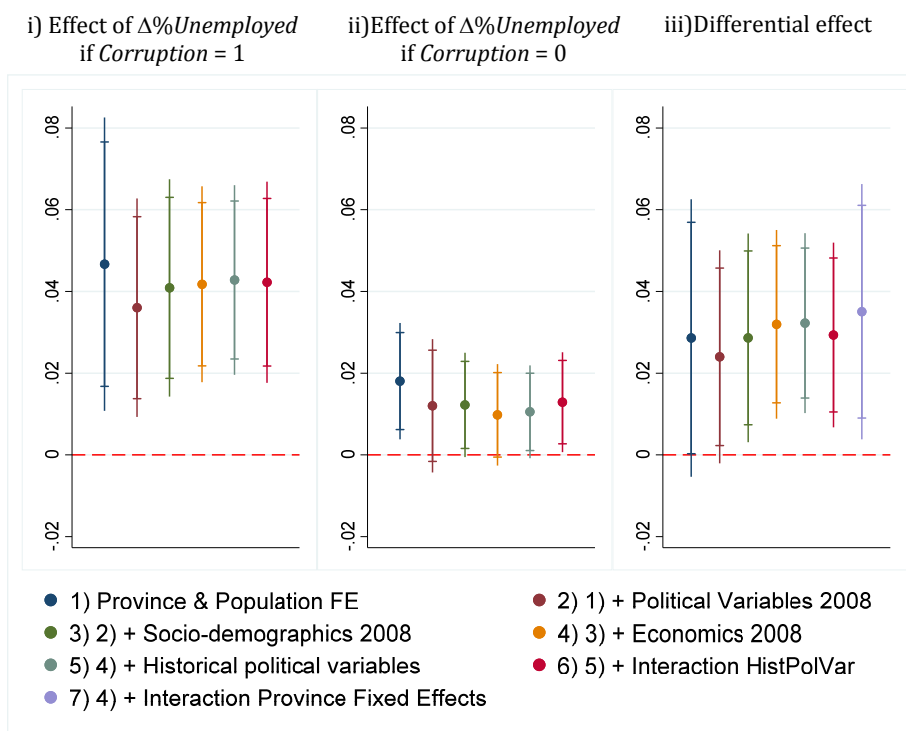
Figure 4:
*The impact of the unemployment shock on fragmentation:
The amplifying effect of corruption*



Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) *Corruption* = dummy equal to one if the municipality has experienced at least one corruption scandal affecting either the *PP* or the *PSOE* from 1999 to 2007; $\Delta\%Unemployed$ = Increase in the unemployment rate during the crisis (2008-2015). (3) The sample and control variables are the same as in Table 2. (4) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

Figure 6:

The impact of the unemployment shock on fragmentation: robustness.



Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2) *Corruption* = dummy equal to one if the municipality has experienced at least one corruption scandal affecting either the *PP* or the *PSOE* from 1999 to 2007; $\Delta\%Unemployed$ = increase in the unemployment rate during the crisis (2008-2015). (3) Controls included in the different regressions: 1) provincial and population strata fixed effects; 2) controls in 1) + Political variables in the base year (2008) (fragmentation index, turnout, parties' votes shares); 3) controls in 2) + Socio-demographics controls at the base year (mean age of the population, percentages of educated people, share of immigrants); 4) controls in 3) + economic controls at t0 (unemployment rate, municipal expenditure, housing prices); 5) controls in 4) + historical political variables (fragmentation, volatility, ideology and turnout); 6) controls in 5) + Interaction of $\Delta\%Unem.$ with the historical political variables; 7) controls in 4) + Interaction of $\Delta\%Unem.$ and *Corruption* with the provincial fixed effects. (4) S.e., clustered at the province level, 95% and 90% confidence intervals reported.

Tables

Table 1:
The impact of the unemployment shock on fragmentation

	(1)	(2)	(3)	(4)	(5)
		Pre-trend analysis			
	2015	1993	1996	2000	2004
$\Delta\%Unemployed$	0.018*** (0.006)	-0.007 (0.006)	0.003 (0.004)	-0.003 (0.004)	-0.001 (0.003)
R ²	0.785	0.648	0.563	0.559	0.457

Notes: (1) Sample=Spanish municipalities with more than 1,000 residents in 2008, excluding Catalonia and the Basque Country; N=2228. (2) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. *Fragmentation* = 'Effective Number of Parties', computed with the vote shares of all the parties running at the elections. (3) $\Delta\%Unemployed$ = Increase in the unemployment rate during the period 2008-2015. (4) OLS estimation weighted by voting population; controls are province and population strata fixed effects, political (fragmentation, parties vote shares, and turnout), socio-demographic (mean age of the population, percentages of educated people, share of immigrants), and economic (unemployment rate, local spending pc, housing prices) variables in the base year (2008). (5) S.e., clustered at the province level shown in parentheses, * p<0.1, ** p<0.05, *** p<0.01.

Table 2:
*The impact of the unemployment shock on fragmentation:
The amplifying effect of corruption*

	(1)	(2)	(3)	(4)	(5)	(6)
			Pre-trend analysis			
	2015	2015	1993	1996	2000	2004
$\Delta\% Unemployed \times Corruption$	--	0.032*** (0.011)	-0.003 (0.012)	0.005 (0.007)	0.003 (0.007)	0.002 (0.003)
$\Delta\%Unemployed$	0.019*** (0.006)	0.009 (0.006)	-0.006 (0.006)	0.001 (0.004)	-0.004 (0.004)	-0.002 (0.003)
<i>Corruption</i>	0.056*** (0.018)	0.053** (0.020)	-0.001 (0.035)	0.001 (0.017)	-0.002 (0.016)	-0.006 (0.011)
R ²	0.787	0.790	0.648	0.563	0.559	0.457

Notes: (1) *Corruption* =dummy equal to one if the municipality has experienced at least one corruption scandal affecting either the PP or the PSOE from 1999 to 2007. (2) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table 3:
The impact of the unemployment shock and corruption on the vote for the main parties

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta\% \text{ Vote Main Parties}$		$\Delta\% \text{ Vote Incumbent (PP)}$		$\Delta\% \text{ Vote Challenger (PSOE)}$	
$\Delta\% \text{ Unemployed} \times \text{Corruption}$	---	-0.371* (0.215)	---	-0.199 (0.124)	---	-0.171 (0.127)
$\Delta\% \text{ Unemployed}$	-0.130 (0.124)	-0.024 (0.121)	-0.062 (0.069)	-0.005 (0.073)	-0.068 (0.076)	-0.019 (0.076)
<i>Corruption</i>	-1.262*** (0.293)	-1.227*** (0.304)	-0.567*** (0.172)	-0.548*** (0.169)	-0.695** (0.282)	-0.679** (0.290)
R ²	0.852	0.853	0.878	0.878	0.761	0.761

Notes: (1) The dependent variable is the increase in the vote share of the main parties; $\Delta\% \text{ Vote Main Parties}$ is the increase in the combined vote share of the *PP* and the *PSOE* from 2008 to 2015. (2) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table 4:
The impact of the unemployment shock and corruption on the vote for non-mainstream parties and on turnout

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	<i>Δ% Vote New Parties</i>				<i>Δ% Vote Old Parties</i>				<i>Δ% Turnout</i>	
	<i>Podemos</i>		<i>Ciudadanos</i>		<i>Izquierda Unida</i>		<i>Other parties</i>			
<i>Δ% Unemployed × Corruption</i>	---	0.266** (0.123)	---	0.087 (0.090)	---	-0.033 (0.047)	---	0.013 (0.060)	---	-0.034 (0.051)
<i>Δ% Unemployed</i>	0.089 (0.096)	0.013 (0.096)	-0.025 (0.074)	-0.050 (0.067)	0.041 (0.038)	0.051 (0.042)	-0.004 (0.052)	-0.007 (0.049)	0.022 (0.042)	0.032 (0.043)
<i>Corruption</i>	0.817*** (0.260)	0.792*** (0.244)	0.351* (0.201)	0.343* (0.198)	-0.121 (0.105)	-0.111 (0.102)	0.242* (0.137)	0.241* (0.138)	0.022 (0.155)	0.025 (0.152)
R ²	0.793	0.794	0.854	0.854	0.437	0.437	0.847	0.847	0.655	0.655

Notes: (1) *New Parties* = Parties running for the first time at the 2015 elections; *Old Parties*=parties already running before 2015; (2) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table 5:
The impact of the unemployment shock and corruption at the 2011 election

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Fragmentation			$\Delta\%$ Vote Main Parties	$\Delta\%$ Vote Incumbent (PSOE)	$\Delta\%$ Vote Challenger (PP)
$\Delta\%$ Unemployed. \times Corruption	--	--	-0.001 (0.009)	-0.008 (0.181)	-0.020 (0.120)	0.012 (0.122)
$\Delta\%$ Unemployed	-0.000 (0.004)	0.000 (0.004)	0.000 (0.004)	-0.005 (0.065)	-0.219*** (0.065)	0.214*** (0.069)
Corruption	--	0.039*** (0.013)	0.039** (0.015)	-0.575** (0.267)	-0.270 (0.220)	-0.305 (0.295)
R ²	0.842	0.843	0.843	0.830	0.565	0.806

Notes: (1) The dependent variables are: i) in columns (1) to (3) the increase in *Fragmentation* from 2008 to 2011; in column (4) the increase in the vote share of the main parties; %Vote Main is the combined vote share of the PP and the PSOE from 2008 to 2011; in column (5) the increase in the vote share of the incumbent (PSOE) from 2008 to 2011; in column (6) the increase in the vote share of the main challenger (PP) from 2008 to 2011. (2) $\Delta\%$ Unemployed= Increase in the unemployment rate during the period 2008-2011. (3) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

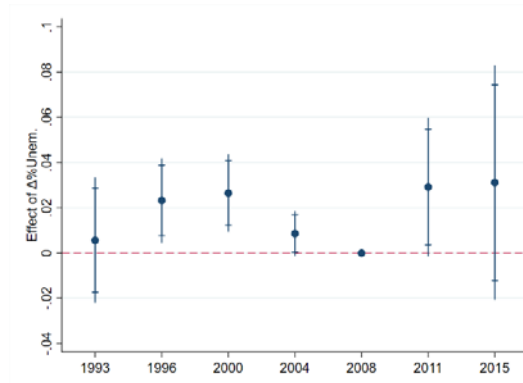
Table 6:
The impact of the unemployment shock and corruption on fragmentation:
Robustness to post-treatment controls

	(1)	(2)	(3)	(4)	(5)
$\Delta\%$ Unemployed \times Corruption	0.029** (0.011)	0.035*** (0.012)	0.034*** (0.011)	0.025** (0.011)	0.027** (0.011)
$\Delta\%$ Unemployed	-0.002 (0.008)	0.008 (0.007)	0.011* (0.006)	0.008 (0.006)	-0.002 (0.008)
Corruption	0.054*** (0.020)	0.058*** (0.020)	0.049** (0.020)	0.048** (0.018)	0.047*** (0.016)
R ²	0.786	0.803	0.791	0.796	0.808
Observations	2,149	2,021	2,228	2,228	1,952
Δ Housing Prices	YES	NO	NO	NO	YES
Δ Public Spending	NO	YES	NO	NO	YES
$\Delta\%$ Immigrants	NO	NO	YES	NO	YES
Δ Population	NO	NO	NO	YES	YES

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015 (2). See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported. (3) Additional controls included: increases in housing prices, local current expenditures per capita, share of immigrants and population size (increases computed from 2008 to 2015), and their interactions with $\Delta\%$ Unemployed.

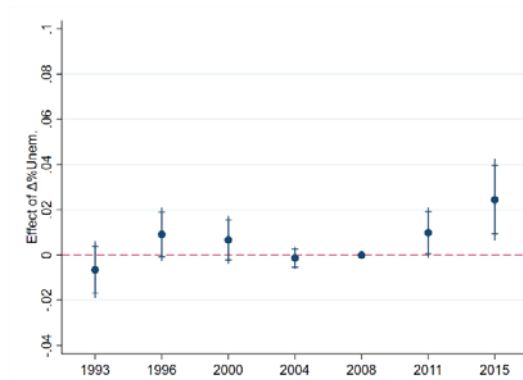
Online Appendix

Figure A1:
The impact of the unemployment shock on fragmentation: Pure DiD



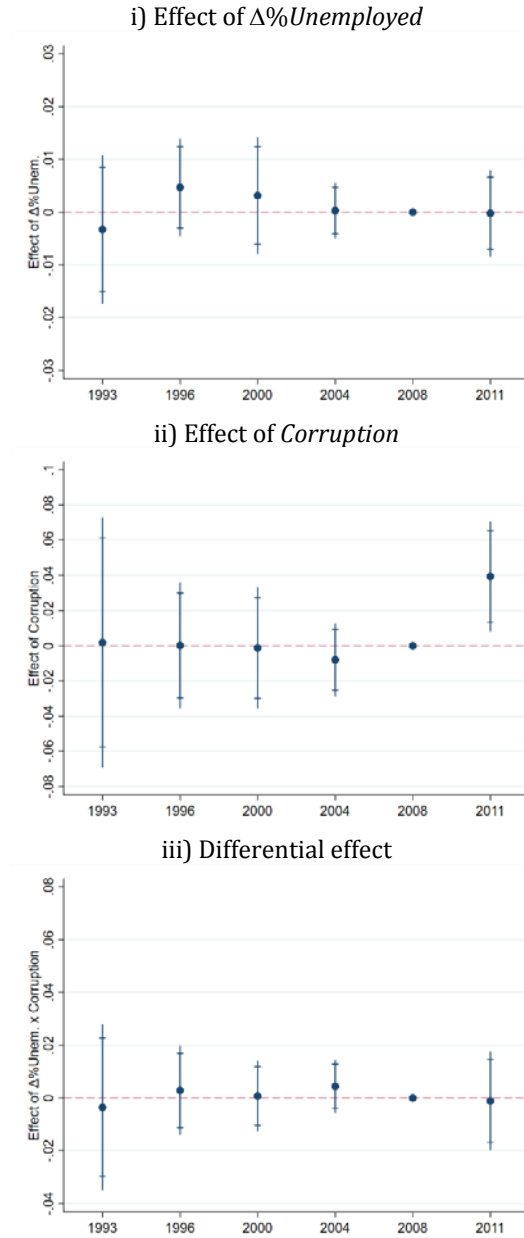
Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) $\Delta\%Unemployed$ = Increase in the unemployment rate during the crisis (2008-2015). (3) No fixed effects or controls included. (4) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

Figure A2:
The impact of the unemployment shock on fragmentation: Controlling for province and population-strata fixed effects



Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) $\Delta\%Unemployed$ = Increase in the unemployment rate during the crisis (2008-2015). (3) The control variables are province and population strata fixed effects. (4) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

Figure A3:
 The impact of the unemployment shock and corruption on fragmentation at the 2011 election:



Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to the year indicated in the x-axis. (2) $\Delta\%Unemployed$ = Increase in the unemployment rate during the crisis (2008-2011); *Corruption* = dummy equal to one if the municipality has experienced at least one corruption scandal affecting either the *PP* or the *PSOE* from 1999 to 2007. (3) Panel i) corresponds to equation (1); Panels ii) and iii) correspond to equation (2). (4) The control variables and sample are the same as in Table 5. (5) S.e. clustered at the province level, 95% and 90% confidence intervals reported.

Table A1:
Summary statistics

	Mean	Min	Max	S.D.	Obs.
a) 2015 Election					
<i>Δ</i> Fragmentation	1.342	-0.597	2.736	0.539	2228
<i>Δ</i> %Vote Main Parties	-25.885	-50.737	8.551	10.353	2228
<i>Δ</i> %Vote PP	-9.159	-29.316	20.170	7.426	2228
<i>Δ</i> %Vote PSOE	-16.726	-35.079	3.224	5.858	2228
<i>Δ</i> %Vote Podemos	16.196	2.894	41.940	6.835	2228
<i>Δ</i> %Vote Ciudadanos	11.154	0.861	31.745	4.855	2228
<i>Δ</i> %Vote Izquierda Unida	0.763	-22.699	13.127	2.071	1983
<i>Δ</i> %Turnout	-4.407	-18.974	34.160	3.321	2228
b) 2011 Election					
<i>Δ</i> Fragmentation	0.234	-1.275	1.876	0.335	2228
<i>Δ</i> %Vote Main	-6.546	-33.422	18.935	5.989	2228
<i>Δ</i> %Vote PSOE	-13.011	-31.433	8.096	3.834	2228
<i>Δ</i> %Vote PP	6.465	-14.737	30.358	5.011	2228
c) Treatments					
<i>Δ</i> %Unemployed (2015-2008)	5.938	-2.024	19.881	2.504	2228
<i>Δ</i> %Unemployed (2011-2008)	5.103	-3.480	14.071	2.134	2228
<i>Corruption</i>	0.158	0.000	1.000	0.365	2228
d) Socio-demographics controls					
<i>Mean age</i> (2008)	42.668	30.887	59.359	4.805	2228
<i>%College educated</i> (2001)	34.260	9.380	66.400	8.429	2228
<i>%Immigrants</i> (2008)	8.446	0.000	76.936	8.991	2228
e) Economics controls					
<i>%Unemployed</i> (2008)	5.445	0.300	16.200	2.235	2228
<i>Local spending p.c.</i> (2009)	0.765	0.008	114.729	2.433	2228
<i>Housing prices</i> (2008)	1.361	0.116	4.385	0.557	2228
f) Base-year political controls					
<i>Fragmentation</i> (2008)	2.265	1.334	3.517	0.292	2228
<i>%Vote PSOE</i> (2008)	46.444	8.432	85.636	10.889	2228
<i>%Vote PP</i> (2008)	44.535	7.461	86.034	11.416	2228
<i>%Vote Izquierda Unida</i> (2008)	3.337	0.000	55.361	3.965	2228
<i>%Vote Regional Parties</i> (2008)	1.939	0.000	50.000	5.764	2228
<i>%Turnout</i> (2008)	79.206	36.842	93.624	5.776	2228

Table A2:
The impact of the unemployment shock on fragmentation: All coefficients reported

	(1)	(2)	(3)
$\Delta\%$ Unemployed \times Corruption	--	--	0.032*** (0.011)
$\Delta\%$ Unemployed	0.018*** (0.006)	0.019*** (0.006)	0.009 (0.006)
Corruption	--	0.056*** (0.018)	0.053** (0.020)
Fragmentation (2008)	0.524*** (0.181)	0.529*** (0.183)	0.510*** (0.175)
%Votes PSOE (2008)	0.039*** (0.011)	0.039*** (0.011)	0.039*** (0.011)
%Votes PP (2008)	0.031*** (0.011)	0.031*** (0.010)	0.031*** (0.011)
%Votes Izquierda Unida (2008)	0.029*** (0.010)	0.029*** (0.009)	0.029*** (0.010)
%Votes Regional Parties (2008)	0.017* (0.009)	0.017* (0.009)	0.016* (0.009)
%Turnout (2008)	-0.021*** (0.004)	-0.021*** (0.004)	-0.020*** (0.004)
Mean age (2008)	-0.049*** (0.005)	-0.049*** (0.005)	-0.049*** (0.005)
%College Educated (2008)	0.008** (0.003)	0.008** (0.003)	0.008** (0.003)
%Immigrants (2008)	-0.003 (0.002)	-0.004 (0.002)	-0.003 (0.002)
%Unemployed (2008)	0.011* (0.006)	0.011* (0.006)	0.013** (0.006)
Local spending p.c. (2008)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
Housing Prices (2008)	0.091** (0.034)	0.086*** (0.030)	0.090*** (0.031)
R ²	0.785	0.787	0.790

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2). See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table A3:
*The impact of the unemployment shock on fragmentation:
Robustness to post-treatment controls*

	(1)	(2)	(3)	(4)	(5)
$\Delta\%Unemployed$	0.018*** (0.006)	0.018** (0.007)	0.017*** (0.006)	0.018*** (0.006)	0.017** (0.007)
R ²	0.780	0.797	0.785	0.790	0.799
Observations	2,149	2,021	2,228	2,228	1,952
Δ Housing Prices	YES	NO	NO	NO	YES
Δ Local spending	NO	YES	NO	NO	YES
Δ %Immigrants	NO	NO	YES	NO	YES
Δ Population	NO	NO	NO	YES	YES

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015 (2). See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported. (3) Additional controls included: increases in the housing prices per square meter, current expenditures per capita, share of immigrants and population size (increases computed from 2008 to 2015).

Table A4:
*The impact of the unemployment shock on fragmentation:
Robustness to post-treatment corruption*

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta\% Unemployed \times Corruption$	---	---	---	0.032*** (0.011)	0.032*** (0.011)	0.030** (0.011)
$\Delta\%Unemployed$	0.019*** (0.006)	0.019*** (0.007)	0.020*** (0.007)	0.009 (0.006)	0.009 (0.006)	0.012* (0.006)
<i>Corruption</i>	0.056*** (0.018)	0.054*** (0.020)	0.051** (0.023)	0.053** (0.020)	0.049** (0.021)	0.045* (0.025)
R ²	0.787	0.787	0.790	0.790	0.790	0.792
Observations	2,228	2,228	2,093	2,228	2,228	2,093
<i>Control for Corrup.(crisis)</i>	NO	YES	NO	NO	YES	NO
<i>Drop Corruption (crisis)</i>	NO	NO	YES	NO	NO	YES

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015 (2). Columns (2) and (5) control for the corruption scandals reported during the crisis, and (5) also for the interaction with $\Delta\%Unemployed$. Columns (3) and (6) drop municipalities that did not have a corruption scandal during the boom but had it during the crisis. (3) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table A5:
*The impact of the unemployment shock on fragmentation:
 Robustness to possible non-linearities*

	(1)	(2)	(3)	(4)
$\Delta\% \text{ Unemployed} \times \text{Corruption}$	--.--	--.--	0.032*** (0.011)	--.--
$\Delta\% \text{ Unemployed (High)} \times \text{Corruption}$	--.--	--.--	--.--	0.126** (0.055)
$\Delta\% \text{ Unemployed (Med)} \times \text{Corruption}$	--.--	--.--	--.--	0.150** (0.060)
$\Delta\% \text{ Unemployed}$	0.018*** (0.006)	--.--	0.009 (0.006)	--.--
$\Delta\% \text{ Unemployed (High)}$	--.--	0.100*** (0.032)	--.--	--.--
$\Delta\% \text{ Unemployed (Med)}$	--.--	0.056 (0.039)	--.--	0.003 (0.029)
<i>Corruption</i>	--.--	--.--	0.053** (0.020)	-0.047 (0.045)
R ²	0.785	0.786	0.790	0.790

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2) $\Delta\% \text{ Unemployed(High)}$ is a dummy variable equal to one the unemployment shock that municipality *i* experienced during the crisis is in the first tercile of the unemployment shock distribution; $\Delta\% \text{ Unemployed(Med)}$ is a dummy variable equal to one the unemployment shock that municipality *i* experienced during the crisis is in the second tercile of the unemployment shock distribution. (3) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table A6:
*The impact of the unemployment shock on fragmentation:
 Robustness to different samples*

	(1)	(2)	(3)	(4)
	Pop.>1,000	All	Pop.>1,000 & Pop.<50,000	Pop.>1,000 & Pop.<500,000
$\Delta\% \text{ Unemployed} \times \text{Corruption}$	0.032*** (0.011)	0.033*** (0.012)	0.024** (0.012)	0.032** (0.013)
$\Delta\% \text{ Unemployed}$	0.009 (0.006)	0.008 (0.005)	0.010* (0.006)	0.008 (0.006)
<i>Corruption</i>	0.053** (0.020)	0.053** (0.020)	0.039 (0.026)	0.043* (0.022)
R ²	0.790	0.784	0.756	0.754
Observations	2,228	4,026	2,150	2,198

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table A7:
*The impact of the unemployment shock on fragmentation:
 Robustness to different weights*

	(1)	(2)	(3)	(4)	(5)
	Voting Pop. 2000	Average Voting Pop.	Population 2000	Average Population	No Weights
$\Delta\% \text{ Unemployed} \times \text{Corruption}$	0.032*** (0.011)	0.032*** (0.011)	0.032*** (0.012)	0.032*** (0.012)	0.027** (0.010)
$\Delta\% \text{ Unemployed}$	0.009 (0.006)	0.010 (0.006)	0.008 (0.007)	0.009 (0.006)	0.007 (0.004)
<i>Corruption</i>	0.053** (0.020)	0.054** (0.020)	0.052** (0.020)	0.054** (0.020)	0.057** (0.023)
R ²	0.790	0.791	0.777	0.781	0.724
Observations	2,228	2,228	2,228	2,227	2,228

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

Table A8:
*The impact of the unemployment shock on fragmentation:
 Local labor markets*

	(1)	(2)
$\Delta\%Unemployed. \times Corruption$	0.032*** (0.011)	0.031*** (0.011)
$\Delta\%Unemployed (LLM) \times Corruption (LLM)$	--	0.009 (0.029)
$\Delta\%Unemployed$	0.009 (0.006)	0.006 (0.005)
$\Delta\%Unemployed (LLM)$	--	0.009* (0.005)
<i>Corruption</i>	0.053** (0.020)	0.058*** (0.018)
<i>Corruption (LLM)</i>	--	0.009 (0.055)
R ²	0.790	0.792
Observations	2,228	2,217

Notes: (1) The dependent variable is the increase in *Fragmentation* from 2008 to 2015. (2) LLM refers to the unemployment shock or corruption that affected the rest of municipalities in the same Local Labor Market. Local Labor Markets defined following Boix and Galletto (2004). (3) See notes in Table 1 for the definition of the sample, the controls included in the regressions, and the s.e. reported.

2015

- 2015/1, Foremny, D.; Freier, R.; Moessinger, M-D.; Yeter, M.: "Overlapping political budget cycles in the legislative and the executive"
- 2015/2, Colombo, L.; Galmarini, U.: "Optimality and distortionary lobbying: regulating tobacco consumption"
- 2015/3, Pellegrino, G.: "Barriers to innovation: Can firm age help lower them?"
- 2015/4, Hémet, C.: "Diversity and employment prospects: neighbors matter!"
- 2015/5, Cubel, M.; Sanchez-Pages, S.: "An axiomatization of difference-form contest success functions"
- 2015/6, Choi, A.; Jerrim, J.: "The use (and misuse) of Pisa in guiding policy reform: the case of Spain"
- 2015/7, Durán-Cabré, J.M.; Esteller-Moré, A.; Salvadori, L.: "Empirical evidence on tax cooperation between sub-central administrations"
- 2015/8, Batalla-Bejerano, J.; Trujillo-Baute, E.: "Analysing the sensitivity of electricity system operational costs to deviations in supply and demand"
- 2015/9, Salvadori, L.: "Does tax enforcement counteract the negative effects of terrorism? A case study of the Basque Country"
- 2015/10, Montolio, D.; Planells-Struse, S.: "How time shapes crime: the temporal impacts of football matches on crime"
- 2015/11, Piolatto, A.: "Online booking and information: competition and welfare consequences of review aggregators"
- 2015/12, Boffa, F.; Pingali, V.; Sala, F.: "Strategic investment in merchant transmission: the impact of capacity utilization rules"
- 2015/13, Slemrod, J.: "Tax administration and tax systems"
- 2015/14, Arqué-Castells, P.; Cartaxo, R.M.; García-Quevedo, J.; Mira Godinho, M.: "How inventor royalty shares affect patenting and income in Portugal and Spain"
- 2015/15, Montolio, D.; Planells-Struse, S.: "Measuring the negative externalities of a private leisure activity: hooligans and pickpockets around the stadium"
- 2015/16, Batalla-Bejerano, J.; Costa-Campi, M.T.; Trujillo-Baute, E.: "Unexpected consequences of liberalisation: metering, losses, load profiles and cost settlement in Spain's electricity system"
- 2015/17, Batalla-Bejerano, J.; Trujillo-Baute, E.: "Impacts of intermittent renewable generation on electricity system costs"
- 2015/18, Costa-Campi, M.T.; Paniagua, J.; Trujillo-Baute, E.: "Are energy market integrations a green light for FDI?"
- 2015/19, Jofre-Monseny, J.; Sánchez-Vidal, M.; Viladecans-Marsal, E.: "Big plant closures and agglomeration economies"
- 2015/20, Garcia-López, M.A.; Hémet, C.; Viladecans-Marsal, E.: "How does transportation shape intrametropolitan growth? An answer from the regional express rail"
- 2015/21, Esteller-Moré, A.; Galmarini, U.; Rizzo, L.: "Fiscal equalization under political pressures"
- 2015/22, Escardíbul, J.O.; Afcha, S.: "Determinants of doctorate holders' job satisfaction. An analysis by employment sector and type of satisfaction in Spain"
- 2015/23, Aidt, T.; Asatryan, Z.; Badalyan, L.; Heinemann, F.: "Vote buying or (political) business (cycles) as usual?"
- 2015/24, Albæk, K.: "A test of the 'lose it or use it' hypothesis in labour markets around the world"
- 2015/25, Angelucci, C.; Russo, A.: "Petty corruption and citizen feedback"
- 2015/26, Moriconi, S.; Picard, P.M.; Zanj, S.: "Commodity taxation and regulatory competition"
- 2015/27, Brekke, K.R.; Garcia Pires, A.J.; Schindler, D.; Schjelderup, G.: "Capital taxation and imperfect competition: ACE vs. CBIT"
- 2015/28, Redonda, A.: "Market structure, the functional form of demand and the sensitivity of the vertical reaction function"
- 2015/29, Ramos, R.; Sanromá, E.; Simón, H.: "An analysis of wage differentials between full-and part-time workers in Spain"
- 2015/30, Garcia-López, M.A.; Pasidis, I.; Viladecans-Marsal, E.: "Express delivery to the suburbs the effects of transportation in Europe's heterogeneous cities"
- 2015/31, Torregrosa, S.: "Bypassing progressive taxation: fraud and base erosion in the Spanish income tax (1970-2001)"
- 2015/32, Choi, H.; Choi, A.: "When one door closes: the impact of the hagwon curfew on the consumption of private tutoring in the republic of Korea"
- 2015/33, Escardíbul, J.O.; Helmy, N.: "Decentralisation and school autonomy impact on the quality of education: the case of two MENA countries"
- 2015/34, González-Val, R.; Marcén, M.: "Divorce and the business cycle: a cross-country analysis"
- 2015/35, Calero, J.; Choi, A.: "The distribution of skills among the European adult population and unemployment: a comparative approach"
- 2015/36, Mediavilla, M.; Zancajo, A.: "Is there real freedom of school choice? An analysis from Chile"

- 2015/37, Daniele, G.: "Strike one to educate one hundred: organized crime, political selection and politicians' ability"
- 2015/38, González-Val, R.; Marcén, M.: "Regional unemployment, marriage, and divorce"
- 2015/39, Foremny, D.; Jofre-Monseny, J.; Solé-Ollé, A.: "'Hold that ghost': using notches to identify manipulation of population-based grants"
- 2015/40, Mancebón, M.J.; Ximénez-de-Embún, D.P.; Mediavilla, M.; Gómez-Sancho, J.M.: "Does educational management model matter? New evidence for Spain by a quasiexperimental approach"
- 2015/41, Daniele, G.; Geys, B.: "Exposing politicians' ties to criminal organizations: the effects of local government dissolutions on electoral outcomes in Southern Italian municipalities"
- 2015/42, Ooghe, E.: "Wage policies, employment, and redistributive efficiency"

2016

- 2016/1, Galletta, S.: "Law enforcement, municipal budgets and spillover effects: evidence from a quasi-experiment in Italy"
- 2016/2, Flatley, L.; Giuliatti, M.; Grossi, L.; Trujillo-Baute, E.; Waterson, M.: "Analysing the potential economic value of energy storage"
- 2016/3, Calero, J.; Murillo Huertas, I.P.; Raymond Bara, J.L.: "Education, age and skills: an analysis using the PIAAC survey"
- 2016/4, Costa-Campi, M.T.; Daví-Arderius, D.; Trujillo-Baute, E.: "The economic impact of electricity losses"
- 2016/5, Falck, O.; Heimisch, A.; Wiederhold, S.: "Returns to ICT skills"
- 2016/6, Halmenschlager, C.; Mantovani, A.: "On the private and social desirability of mixed bundling in complementary markets with cost savings"
- 2016/7, Choi, A.; Gil, M.; Mediavilla, M.; Valbuena, J.: "Double toil and trouble: grade retention and academic performance"
- 2016/8, González-Val, R.: "Historical urban growth in Europe (1300–1800)"
- 2016/9, Guio, J.; Choi, A.; Escardíbul, J.O.: "Labor markets, academic performance and the risk of school dropout: evidence for Spain"
- 2016/10, Bianchini, S.; Pellegrino, G.; Tamagni, F.: "Innovation strategies and firm growth"
- 2016/11, Jofre-Monseny, J.; Silva, J.I.; Vázquez-Grenno, J.: "Local labor market effects of public employment"
- 2016/12, Sanchez-Vidal, M.: "Small shops for sale! The effects of big-box openings on grocery stores"
- 2016/13, Costa-Campi, M.T.; García-Quevedo, J.; Martínez-Ros, E.: "What are the determinants of investment in environmental R&D?"
- 2016/14, García-López, M.A.; Hémet, C.; Viladecans-Marsal, E.: "Next train to the polycentric city: The effect of railroads on subcenter formation"
- 2016/15, Matas, A.; Raymond, J.L.; Dominguez, A.: "Changes in fuel economy: An analysis of the Spanish car market"
- 2016/16, Leme, A.; Escardíbul, J.O.: "The effect of a specialized versus a general upper secondary school curriculum on students' performance and inequality. A difference-in-differences cross country comparison"
- 2016/17, Scandurra, R.I.; Calero, J.: "Modelling adult skills in OECD countries"
- 2016/18, Fernández-Gutiérrez, M.; Calero, J.: "Leisure and education: insights from a time-use analysis"
- 2016/19, Del Rio, P.; Mir-Artigues, P.; Trujillo-Baute, E.: "Analysing the impact of renewable energy regulation on retail electricity prices"
- 2016/20, Taltavull de la Paz, P.; Juárez, F.; Monllor, P.: "Fuel Poverty: Evidence from housing perspective"
- 2016/21, Ferraresi, M.; Galmarini, U.; Rizzo, L.; Zanardi, A.: "Switch towards tax centralization in Italy: A wake up for the local political budget cycle"
- 2016/22, Ferraresi, M.; Migali, G.; Nordi, F.; Rizzo, L.: "Spatial interaction in local expenditures among Italian municipalities: evidence from Italy 2001-2011"
- 2016/23, Daví-Arderius, D.; Sanin, M.E.; Trujillo-Baute, E.: "CO2 content of electricity losses"
- 2016/24, Arqué-Castells, P.; Viladecans-Marsal, E.: "Banking the unbanked: Evidence from the Spanish banking expansion plan"
- 2016/25 Choi, Á.; Gil, M.; Mediavilla, M.; Valbuena, J.: "The evolution of educational inequalities in Spain: Dynamic evidence from repeated cross-sections"
- 2016/26, Brutti, Z.: "Cities drifting apart: Heterogeneous outcomes of decentralizing public education"
- 2016/27, Backus, P.; Cubel, M.; Guid, M.; Sánchez-Pages, S.; Lopez Manas, E.: "Gender, competition and performance: evidence from real tournaments"
- 2016/28, Costa-Campi, M.T.; Duch-Brown, N.; García-Quevedo, J.: "Innovation strategies of energy firms"
- 2016/29, Daniele, G.; Dipoppa, G.: "Mafia, elections and violence against politicians"
- 2016/30, Di Cosmo, V.; Malaguzzi Valeri, L.: "Wind, storage, interconnection and the cost of electricity"

2017

- 2017/1, **González Pampillón, N.; Jofre-Monseny, J.; Viladecans-Marsal, E.**: “Can urban renewal policies reverse neighborhood ethnic dynamics?”
- 2017/2, **Gómez San Román, T.**: “Integration of DERs on power systems: challenges and opportunities”
- 2017/3, **Bianchini, S.; Pellegrino, G.**: “Innovation persistence and employment dynamics”
- 2017/4, **Curto-Grau, M.; Solé-Ollé, A.; Sorribas-Navarro, P.**: “Does electoral competition curb party favoritism?”
- 2017/5, **Solé-Ollé, A.; Viladecans-Marsal, E.**: “Housing booms and busts and local fiscal policy”
- 2017/6, **Esteller, A.; Piolatto, A.; Rablen, M.D.**: “Taxing high-income earners: Tax avoidance and mobility”
- 2017/7, **Combes, P.P.; Duranton, G.; Gobillon, L.**: “The production function for housing: Evidence from France”
- 2017/8, **Nepal, R.; Cram, L.; Jamasb, T.; Sen, A.**: “Small systems, big targets: power sector reforms and renewable energy development in small electricity systems”
- 2017/9, **Carozzi, F.; Repetto, L.**: “Distributive politics inside the city? The political economy of Spain’s plan E”
- 2017/10, **Neisser, C.**: “The elasticity of taxable income: A meta-regression analysis”
- 2017/11, **Baker, E.; Bosetti, V.; Salo, A.**: “Finding common ground when experts disagree: robust portfolio decision analysis”
- 2017/12, **Murillo, I.P.; Raymond, J.L.; Calero, J.**: “Efficiency in the transformation of schooling into competences: A cross-country analysis using PIAAC data”
- 2017/13, **Ferrer-Esteban, G.; Mediavilla, M.**: “The more educated, the more engaged? An analysis of social capital and education”
- 2017/14, **Sanchis-Guarner, R.**: “Decomposing the impact of immigration on house prices”
- 2017/15, **Schwab, T.; Todtenhaupt, M.**: “Spillover from the haven: Cross-border externalities of patent box regimes within multinational firms”
- 2017/16, **Chacón, M.; Jensen, J.**: “The institutional determinants of Southern secession”
- 2017/17, **Gancia, G.; Ponzetto, G.A.M.; Ventura, J.**: “Globalization and political structure”
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- 2017/19, **García-Quevedo, J.; Mas-Verdú, F.; Pellegrino, G.**: “What firms don’t know can hurt them: Overcoming a lack of information on technology”
- 2017/20, **Costa-Campi, M.T.; García-Quevedo, J.**: “Why do manufacturing industries invest in energy R&D?”
- 2017/21, **Costa-Campi, M.T.; García-Quevedo, J.; Trujillo-Baute, E.**: “Electricity regulation and economic growth”

2018

- 2018/1, **Boadway, R.; Pestieau, P.**: “The tenuous case for an annual wealth tax”
- 2018/2, **García-López, M.Á.**: “All roads lead to Rome ... and to sprawl? Evidence from European cities”
- 2018/3, **Daniele, G.; Galletta, S.; Geys, B.**: “Abandon ship? Party brands and politicians’ responses to a political scandal”
- 2018/4, **Cavalcanti, F.; Daniele, G.; Galletta, S.**: “Popularity shocks and political selection”
- 2018/5, **Naval, J.; Silva, J. I.; Vázquez-Grenno, J.**: “Employment effects of on-the-job human capital acquisition”
- 2018/6, **Agrawal, D. R.; Foremny, D.**: “Relocation of the rich: migration in response to top tax rate changes from spanish reforms”
- 2018/7, **García-Quevedo, J.; Kesidou, E.; Martínez-Ros, E.**: “Inter-industry differences in organisational eco-innovation: a panel data study”
- 2018/8, **Aastveit, K. A.; Anundsen, A. K.**: “Asymmetric effects of monetary policy in regional housing markets”
- 2018/9, **Curci, F.; Masera, F.**: “Flight from urban blight: lead poisoning, crime and suburbanization”
- 2018/10, **Grossi, L.; Nan, F.**: “The influence of renewables on electricity price forecasting: a robust approach”
- 2018/11, **Fleckinger, P.; Glachant, M.; Tamokoué Kamga, P.-H.**: “Energy performance certificates and investments in building energy efficiency: a theoretical analysis”
- 2018/12, **van den Bergh, J. C.J.M.; Angelsen, A.; Baranzini, A.; Botzen, W.J. W.; Carattini, S.; Drews, S.; Dunlop, T.; Galbraith, E.; Gsottbauer, E.; Howarth, R. B.; Padilla, E.; Roca, J.; Schmidt, R.**: “Parallel tracks towards a global treaty on carbon pricing”
- 2018/13, **Ayllón, S.; Nollenberger, N.**: “The unequal opportunity for skills acquisition during the Great Recession in Europe”
- 2018/14, **Firmino, J.**: “Class composition effects and school welfare: evidence from Portugal using panel data”
- 2018/15, **Durán-Cabré, J. M.; Esteller-Moré, A.; Mas-Montserrat, M.; Salvadori, L.**: “La brecha fiscal: estudio y aplicación a los impuestos sobre la riqueza”
- 2018/16, **Montolio, D.; Tur-Prats, A.**: “Long-lasting social capital and its impact on economic development: the legacy of the commons”

2018/17, Garcia-López, M. À.; Moreno-Monroy, A. I.: “Income segregation in monocentric and polycentric cities: does urban form really matter?”

2018/18, Di Cosmo, V.; Trujillo-Baute, E.: “From forward to spot prices: producers, retailers and loss averse consumers in electricity markets”

2018/19, Brachowicz Quintanilla, N.; Vall Castelló, J.: “Is changing the minimum legal drinking age an effective policy tool?”

2018/20, Nerea Gómez-Fernández, Mauro Mediavilla: “Do information and communication technologies (ICT) improve educational outcomes? Evidence for Spain in PISA 2015”

2018/21, Montolio, D.; Taberner, P. A.: “Gender differences under test pressure and their impact on academic performance: a quasi-experimental design”

2018/22, Rice, C.; Vall Castelló, J.: “Hit where it hurts – healthcare access and intimate partner violence”

2018/23, Ramos, R.; Sanromá, E.; Simón, H.: “Wage differentials by bargaining regime in Spain (2002-2014). An analysis using matched employer-employee data”

2019

2019/1, Mediavilla, M.; Mancebón, M. J.; Gómez-Sancho, J. M.; Pires Jiménez, L.: “Bilingual education and school choice: a case study of public secondary schools in the Spanish region of Madrid”

2019/2, Brutti, Z.; Montolio, D.: “Preventing criminal minds: early education access and adult offending behavior”

2019/3, Montalvo, J. G.; Piolatto, A.; Raya, J.: “Transaction-tax evasion in the housing market”

2019/4, Durán-Cabré, J.M.; Esteller-Moré, A.; Mas-Montserrat, M.: “Behavioural responses to the re)introduction of wealth taxes. Evidence from Spain”

2019/5, Garcia-López, M.A.; Jofre-Monseny, J.; Martínez Mazza, R.; Segú, M.: “Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona”

2019/6, Domínguez, M.; Montolio, D.: “Bolstering community ties as a means of reducing crime”

2019/7, García-Quevedo, J.; Massa-Camps, X.: “Why firms invest (or not) in energy efficiency? A review of the econometric evidence”

2019/8, Gómez-Fernández, N.; Mediavilla, M.: “What are the factors that influence the use of ICT in the classroom by teachers? Evidence from a census survey in Madrid”

2019/9, Arribas-Bel, D.; Garcia-López, M.A.; Viladecans-Marsal, E.: “The long-run redistributive power of the net wealth tax”

2019/10, Arribas-Bel, D.; Garcia-López, M.A.; Viladecans-Marsal, E.: “Building(s and) cities: delineating urban areas with a machine learning algorithm”

2019/11, Bordignon, M.; Gamalerio, M.; Slerca, E.; Turati, G.: “Stop invasion! The electoral tipping point in anti-immigrant voting”

2020

2020/1, Daniele, G.; Piolatto, A.; Sas, W.: “Does the winner take it all? Redistributive policies and political extremism”



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