Essays in Political Economy

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is composed by my own work with the exceptions of Chapters 2 and 3. Chapter 2 was jointly co-authored with Marco Di Cataldo, PhD student in the Department of Geography, and I contributed 70% of this work which has constituted my job market paper. Chapter 3 was jointly co-authored with Luigi Minale, Assistant Professor of Economics at Carlos III, and I have contributed 55% of this work.

I can confirm that Chapter 2 of my thesis was copy edited for conventions of language, spelling and grammar by Maya Judd.

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"As soon as any man says of the affairs of the State,' what does it matter to me?', the State may be given up for lost."
Jean-Jacques Rousseau

"What matters is not establishing whether you are afraid or not, but it's to be able to live with your own fear without being influenced by it. This is my understanding of courage"
Giovanni Falcone

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To me, every word of this thesis is special. Not because of any academic or technical merit they may contain, but because of the many personal stories that lie behind them. In reading these words, I relive a panoply of feelings, images and moments from the last five years. And, most importantly, in these words I see the faces of the important people that have lived through this difficult, but fascinating, journey with me. I wish to express my gratitude to some of them.

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Abstract

The papers in this thesis study distortions and inefficiencies that impede the correct functioning of democratic systems. I specifically focus on two phenomena: organised crime and media bias. The first paper presents an analysis of the consequences of the collusion between criminal organisations and politicians on the allocation of public resources and the collection of fiscal revenues. To measure the presence of criminal organisations it exploits newly collected data on public spending, local taxes and elected politicians at the local level. Differences-in-differences estimates reveal that infiltrated local governments not only spend more on average on construction and waste management and less on police enforcement, but also collect fewer fiscal revenues. In addition, I uncover key elements of local elections associated with mafia-government collusion. In particular, Regression Discontinuity estimates show that infiltration is more likely to occur when right-wing parties win local elections. The second paper moves on to the study of media bias and persuasive communication. In democracies voters rely on media outlets to learn about politically salient issues. This raises an important question: how strongly can media affect public perceptions? This paper uses a natural experiment – the staggered introduction of the Digital TV signal in Italy – to measure the effect of media persuasion on the perceptions individuals hold. It focuses on crime perceptions and, combining channel-specific viewership and content data, this paper shows that the reduced exposure to channels characterized by high levels of crime reporting decreases individual concerns about crime. The effect is particularly strong for the elderly who are more exposed to television and less to other sources of information. Finally, it shows that such change in crime perceptions is likely to have relevant implication for voting behaviour. The third paper continues on the study of persuasive communication by investigating whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. In order to test these claims empirically, I collect a unique and new dataset on news from the main media outlets in a set of 5 European Countries from September 2007 to September 2014. I restrict my search to news related to sovereign debt and, in particular, to media stories related to political aspects of the debt. Time series and dynamic panel regressions reveal that, conditional on a full set of controls and falsification tests, the frequency of news is correlated to an increase in bond

prices. Both time series and panel analysis reveal a certain extent of country heterogeneity in the effect. In particular, an increase in the number of news leads to an increase in bond yields of peripheral countries. Finally, this paper also shows how it is not just the amount of news that matters, but also their tone. More precisely, negative news in country i at time $t-1$ increases significantly the sovereign bond yield of country i at time t. On the opposite positive news leads to a decrease in sovereign bond yields.

In sum, the three chapters of this thesis aim to contribute to the academic study of organised crime and media bias. First, this thesis provides new conceptualisation in the study of these phenomena. Second, it exploits set of newly collected dataset which will eventually constitute a public good for all the researchers interested in the study of these topics. Finally, to overcome the difficult identification challenges that the above questions pose, this thesis contributes to the literature by proposing a set of rigorous ways to claim causality in the results.

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1 Introduction

Philosophers (Hobbes, 1651; Locke, 1675; Rousseau, 1762) taught us that only a voluntary agreement between individuals to devote power to a legitimate superior political authority might prevent "*men to be wolves to other men*".[1] This is the essence of the social contract upon which the modern notion of democracy is based. Elected representatives act in the interest of citizens, and citizens monitor and judge the elected government through their voting rights. However, are modern democracies immune from what Hobbes described as "*the solitary, poor, nasty, brutal and short*" aspects of human nature?[2] This fundamental question inspires the work that I present in my thesis, where I study distortions and inefficiencies that impede the correct functioning of democratic systems. I specifically focus on two phenomena: organised crime and media bias. Both represent institutional failures which have the potential to undermine the social contract between citizens and public officials (Shleifer and Vishny, 1993; Mauro, 1995; Glaeser and Saks, 2006). In the public domain, illegal agreements between elected representatives and colluding parties may alter the legislative process, compromising policies that aim to improve the welfare of citizens. Similarly, in a fast-changing world, exposure to biased media not only affects the beliefs and decisions of individuals, it also limits their capacity to monitor the actions of politicians and therefore to hold them accountable.

The main goal of this thesis is simple. First, I provide new measures of both organised crime and media bias. Second, I analyse how these concepts influence public policy decisions. To address such a wide and complex subject in a rigorous way, I have operationalised the key concepts and identified a set of precise research questions. *What is the impact of organised crime on the provision of public goods and on the allocation of public resources? How strongly can media affect public opinions? What is the role of information in fostering coordination?*

These questions are examined in three different papers that constitute the chapters of this thesis. In Chapter 2 (co-authored with Marco Di Cataldo), I present an analysis of the consequences of the collusion between criminal organisations and politicians on the allocation of public resources and the collection of fiscal revenues. By using sophisticated econometrics strategies, Chapter 2 not just

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[1] Thomas Hobbes, De Cive, 1651

[2] *Ibidem*

proposes a new way to measure organised crime presence, but also sheds light on the consequent impact on public policy decisions. The collusion between criminal organisations and local politicians does not have an effect on total spending, but it does affect the allocation of public resources towards sectors of specific interests for criminal organisations. In Chapters 3 and 4, I turn my attention to the second important theme of this thesis: media bias and persuasive communication. Chapter 3 (co-authored with Luigi Minale) presents a study of the impact of information on individuals' perceptions of salient topics in the political debate and how this might affect their ultimate voting decisions. We show that, when individuals are less exposed to bias news, they appear to be less concerned about crime. In Chapter 4, I investigate the impact of information on perceptions but in a very different setting. I study the case of the European Sovereign Crisis and I test whether different amount and type of news media might be correlated with the outbreak of the crisis.

Answering the above questions poses significant theoretical and empirical challenges. In particular, the identification of causal mechanisms is not trivial. My thesis consequently uses innovative micro-level data and advanced econometric techniques to draw policy relevant conclusions from observational data. The core of my work is empirical and, as a consequence, the choice of the setting is crucial. Chapters 2 and 3 focus on the case of Italy. There are a number of reasons why the Italian context represents a compelling case study to tackle my research questions. In the analysis of collusion between members of criminal organisations and local politicians (Chapter 2), Italy represents an ideal testing ground not just because it is home to the first form of organised crime, but also because of its unique institutional and regulatory setting which, combined with distinctive data availability, constitutes the core of our identification strategy. Chapter 2 argues that the choice of Italy does not represent a threat to the external validity of the results. The presence of criminal organisations is an important phenomenon in a variety of different settings. Particularly in developed, countries the nature of the relationship between organised crime and politics has evolved over time and it is now less straightforward than what it is used to be. Chapter 2 will present evidence of how countries such as Japan, US, Russia and Spain show similar over time trends in the number of illegal earning re-invested into the legal economy. Chapter 3 continues in the study of Italian case by investigating the influence of news media on individuals' beliefs and perceptions about crime. The reason for

choosing Italy is twofold. First, for over a decade, Italy presented an incredibly concentrated television market with a tendency to over-report crime-related news. Second, to identify the causal effect of biased news on individual perceptions we rely on the peculiar implementation of a television reform which has been introduced across Italian Regions at different points in time. However, similarly to Chapter 2, the external validity of the results is not limited to the Italian case. The mismatch between perceptions and reality is extremely relevant and applicable to a number of different countries (Della Vigna and Kaplan,, 2007; Enikopolov et al., 2011; Durante and Knight, 2012). In chapter 4, I investigate the impact of a variation and amount of information on financial investors' behaviour. In this paper I move from the Italian setting to a cross-country approach and I study the case of the European Sovereign Crisis and, more precisely, I focus on the following five countries: Italy, France, Greece, Spain and Germany. I argue that, in order to understand the outbreak of the crisis, there is a need to go beyond a mere analysis of the economic fundamentals, and I study whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors.

The three chapters of this thesis add different types of contribution to the academic study of organised crime and media bias. The first important contribution born out of my doctorate is a new conceptualisation in the study of these phenomena. Second, I build my analysis on a set of newly collected dataset which will eventually constitute a public good for all the researchers interested in the study of these topics. Finally, to overcome the difficult identification challenges that the above questions pose, this thesis contributes to the literature by proposing a set of rigorous ways to claim causality in the results. In the remainder of this introductory chapter, I discuss the core themes in more detail, and highlight the substantive contributions that each paper makes to the existing literature. I then discuss the data that I use and the methodological contribution of the thesis.

1.1 Dissertation in Summary

ORGANISED CRIME, CAPTURED POLITICIANS AND THE ALLOCATION OF PUBLIC RESOURCES

Organised crime is a widespread phenomenon in both developed and developing countries (Gambetta, 1993; Pinotti, 2015; Acemoglu et al., 2013). Its presence reflects institutional failure and has the potential to influence key aspects of legal economic activity, ultimately undermining the long term development of any society (Shleifer and Vishny, 1993; Mauro, 1995; Glaeser and Saks, 2006). Its strength, as well as its influence on the legal economy, relies on diffused external complicity, i.e. an increasingly close relationship between organised crime groups and public officials (Dickie, 2005). Thanks to the development of such networks, organised crime has become highly pervasive and fully integrated into the everyday socio-economic and political life of many countries in the world (Triglia, 2001; Allum and Sieber, 2003). Yet, an understanding of the extent to which these dynamics condition the choices and activities of policy-makers is still lacking. What impact does collusion between members of criminal organisations and politicians have on important public policy decisions such as the allocation of public resources and the collection of fiscal revenues? In chapter 2 (co-authored with Marco Di Cataldo), we tackle this question by investigating a particular aspect of organised crime activity: its "infiltration" within local governments. Such infiltration occurs when criminal groups manage to capture local politicians who in turn manipulate policy decisions in their favour. We study the case of Italy and, more precisely, we focus on three Southern regions over the period 1998 – 2013. To capture the presence of organised crime, we exploit the staggered enforcement of a national law allowing for the dissolution of a municipal government upon evidence of collusion between elected officials and a criminal organisation. We then compare municipal governments with and without infiltration before and after such infiltration occurs. Difference–in–differences estimates reveal that infiltrated local governments not only spend more on average on construction and waste management and less on police enforcement, but also collect fewer fiscal revenues. In addition, we uncover key elements of local elections associated with government-mafia collusion. In particular, Regression Discontinuity estimates show that infiltrations are more likely to occur when right-wing parties win local elections. This work belongs to

a growing group of studies on organised crime, conflict, state capacity and corruption. Chapter 2 contributes to this literature in several dimensions. First, it introduces an innovative way to measure the collusion between criminal organisations and politicians. Most of the literature has so far measured the presence and intensity of mafia activity by employing proxies such as the number of mafia-related crimes, murders, and violent attacks (Alesina et al., 2016; Daniele and Marani, 2011; Olivieri and Sberna, 2014; Barone and Narciso, 2015), historical or geographical indicators (Bandiera, 2003; Dimico et al., 2012; De Feo and De Luca, 2013; Buonanno et al., 2015; Buonanno et al., 2016), or artificial constructs for counterfactual analysis (Pinotti, 2015). These measures aim to capture the impact of organized crime in a broad sense, encompassing the entire range of possible actions perpetrated by such criminal groups. They do not, however, take into consideration an important fact: particularly in developed countries, organised crime has evolved over time, progressively reducing the use of violence and becoming increasingly integrated within the boundaries of democratic society, to the point that mafia activities may no longer even be recognisable as criminal enterprises. As a consequence, organised crime uses violence only as a last resort when previous strategies have failed. Indeed, violence is a suboptimal strategy in that it attracts too much attention from enforcement authorities, undermining the primary objective of influencing policy decisions. Hence, the consequences of successful criminal strategies that do not employ violence have yet to be empirically identified. By focusing on collusion between organised crime and politicians, we contribute to the current literature by shedding light on this more silent but equally dangerous phenomenon and, in doing so, assess its impact on economic and political outcomes.

The second important contribution of Chapter 2 is indeed the identification of the consequences for public policy of the collusion between criminal organisations and politicians. Thanks to an innovative and unique disaggregated dataset on public spending, we are able to show precisely that the main objective of organised crime is to bias the allocation of resources towards specific sectors (i.e. construction, waste management and police enforcement) which in turn benefits the firms under their control. In addition, this study provides an analysis of the welfare effect of such collusion by showing that infiltrated municipalities collect fewer fiscal revenues. Finally, chapter 2 uncovers several important empirical regularities between the characteristics of local elections and the probability of

collusion between organised crime and local politicians. More precisely, we focus on the systematic correlation between collusion and elections won by right-wing parties, implementing a regression discontinuity based on close elections. Our results show that the probability of infiltration increases when the right-wing party barely wins an election. We contribute to the literature that studies how criminal organisations choose their political counterparts (Alesina et al., 2016; Pinotti and Stanig, 2016; De Feo and De Luca, 2013) by providing evidence of a causal link between organised crime and local politicians. In sum, this chapter represents the first empirical study which measures the non-violent collusion between criminal organisations and local politicians, and identifies its consequences for important public policy decisions such as the allocation of public resources and the collection of fiscal revenues.

THE EFFECT OF NEWS MEDIA ON ATTITUDES: EVIDENCE FROM CRIME PERCEPTIONS IN ITALY

The second main theme of my dissertation is media bias. In a representative system of government, policy outcomes are affected by the political preferences and beliefs of voters. Voters in turn rely on media outlets to learn about politically salient issues. This raises an important question: how strongly can media affect public perceptions? In Chapter 3 (co-authored with Luigi Minale), we tackle this question by investigating the influence of news media on beliefs and perceptions individuals have about crime.

We do so in the context of Italy, a country where, for over a decade, a significant share of traditional analogue TV channels has been under the influence of Silvio Berlusconi in his dual role as media tycoon and Prime Minister. We document how these TV channels systematically over-represent crime news compared to others. We then study if and to what extent individuals revise their crime perceptions once exposure to news provided by this group of channels is reduced.

We focus on crime perceptions for two reasons. First, crime is at the top of people's concerns in many countries, and is thus often at the centre of the political debate.[3] Secondly, there is evidence of a puzzling mismatch between individual perceptions and actual data when it comes to crime rates. This is most probably

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[3]As Appendix Figure A1 shows, people rank consistently crime among the first five (out of 15) most important perceived problems in a number of European countries. Source: Eurobarometer.

due to the fact that people, by having little observational experience about crime, might tend to collect a relevant share of information about it through indirect and secondary sources. Thus the providers of such information (i.e. the media) are likely to play an important role in the formation of crime perceptions.

However, estimating the causal effect of the exposure to specific media on individuals' beliefs poses difficult identification issues, as people self-select news media according to their news content (see Gentzkow and Shapiro, 2010; Durante and Knight, 2012). We identify the causal effect by exploiting the staggered introduction of the digital TV signal across Italian regions. Between 2008 and 2012, Italy gradually shifted from analogue to digital TV transmission: on specific dates, which varied by region, the analogue signal was switched off and substituted with the digital one. Around the digital switchover dates, the number of nationally available free TV channels increased from about 7 to more than 50 within days. Such a supply shock was accompanied by a drastic drop in the viewing shares of the six main traditional analogue channels (Rai and Mediaset) from 82% in June 2008 to 60% in June 2012, mostly in favour of the newly available digital channels.[4] We exploit the exogenous shift in viewing shares described above to study if and to what extent individuals revise their perceptions about crime when exposure to potentially biased news is reduced. We find that the increase in the number of available TV channels - and the consequent lower exposure to news broadcast by partisan ones - led individuals to revise downward their perceptions of crime. The estimated negative effects of crime concern are larger for individuals who spend more time watching television while using less frequently other media such as the internet, radio and newspapers. Such individuals, by gathering information mainly through TV and placing high weight on information coming from it, were likely to be more exposed to the potential pre-reform bias, thus responded more to changes in TV content. Older individuals spend more time watching TV and have much less frequent access to other media than their younger counterparts. In fact, individuals aged above 65 (and above 51 in some specifications) drive most of our estimated effect. Crime is a salient topic of the political debate and, as a consequence, is likely to be one of the drivers of voters' decisions. We indeed provide evidence that high concerns about crime are correlated with support for the centre right coalitions. Then, using survey data we

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[4]Source: AUDITEL data. http://www.auditel.it

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provide descriptive evidence to show that 2.4% of individuals older than 51 would have changed their vote from centre right to centre left once they were exposed to a reduced amount of crime news.

This paper fits into the growing literature of media bias and persuasive communication. Most of these studies have investigated the impact of news media on political outcomes (Della Vigna and Kaplan, 2007; Enikopolov et al., 2011; Durante and Knight; 2012). Yet the mechanisms through which news affects individual voting decisions are still unclear. We contribute to these studies looking at attitudes and perceptions of politically salient topics. More precisely, by providing causal evidence of the impact of news media on individual perceptions, we shed light on one of the possible mechanisms through which media might ultimately affect voting outcomes. Moreover, by exploiting unique viewership and news content data, we are able to take the first step toward a measurement of the elasticity of individuals' beliefs to specific news reporting intensity. Individual perceptions and beliefs are a central theme of my dissertation. The next chapter will indeed investigate the role of news media in affecting investors' opinions and in anticipating the beginning of the European Sovereign Crisis.

THE POWER OF NEWS: COORDINATION AND CRISIS

Chapter 4 of my dissertation further explores the study of the economics and politics of information. In particular, I theoretically and empirically assess the impact of political information flows on sovereign volatility during the European Debt Crisis. The European Sovereign Crisis presents an interesting case study due to the challenge of explaining its outbreak through a simple analysis of economic fundamentals. *Why, for example, did the Greek spread escalate from 140 basis points in early November 2009 to nearly 600 basis points in late March 2010?*

In this paper, I tackle this question by arguing that, in order to understand the outbreak of the debt crisis, there is a need to go beyond a mere analysis of economic fundamentals. First, I present evidence that a significant part of the surge on government bond spreads in the Eurozone was disconnected from underlying changes in a number of economic indicators.[5] I then study whether the

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[5]The analyis will cover the standard measure of economic fundamentals (De Grauwe 2012). Precisely: Budget Deficit (as % of GDP); Debt (as % GDP); current account; inflation; unemployment. Also I look at measure of international risks such as VIX Index, CDS derivatives

amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. Precisely, I focus on political information which, by its nature, is not immediately quantifiable, more subjective and difficult to interpret. I define political information as all the news about political stories/events related to the country's sovereign debt. This includes, but is not limited to, news reports on economic policy uncertainty, stability of the government, policy making and legislative behaviours. I document a change in the frequency of this type of news related to sovereign debt in the months and weeks preceding the crisis (when markets were not in turmoil) and I investigate, theoretically and empirically, whether the noise and uncertainty generated by these information flows might have anticipated the outbreak of the debt crisis.

In order to test these claims empirically, I collect a unique and new dataset on news from the main media outlets in a set of 5 European Countries from September 2007 to September 2014. Precisely I focus on Spain, Italy, Greece, Germany and France. I then restrict my search to news related to sovereign debt and, in particular, to media stories related to political aspects of the debt. Furthermore, I also gathered data on "opinion pieces" written by prominent opinion makers. An opinion piece is an article, published in a newspaper or magazine, that mainly reflects the author's opinion about the subject. Opinion pieces are featured in many periodicals. In order to select which authors to follow, I have run qualitative interviews among a sample of traders and asked them to provide a list of opinion makers which are most commonly read by investors. I then manually coded the tone of each news and opinion in my dataset.

Time series and dynamic panel estimations reveal that, conditional on a full set of controls and falsification tests, the frequency of news is correlated to an increase in bond prices. Specifically, dynamic panel regressions show a positive and significant variation of the bond yield in countries where there was a change in the number of sovereign debt related news items per day, compared to countries where there was no change. The estimates reveal a significant correlation between both news at time t and t-n on variation of spreads at time t. Interestingly, I find a similar effect when I analyse the correlation between articles written by a set of opinion makers which are daily followed by traders and the movements in spreads.

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market.

The results are robust to the introduction of a full set of controls, past values of the dependent variable and of the explanatory variables, country fixed effects, time fixed effects and linear time trends. Both time series and panel analysis reveal a certain extent of country heterogeneity in the effect. More precisely, both an increase in the total number of news and an increase in the country related news do have a differential effect with peripheral countries exhibiting more severe consequences on the spread.

It is not just the amount of news that matters, but also its tone. Basman et al. (2015) investigate the effect of the tone of news on investors' expectations and beliefs. I adopt a similar approach by studying whether positive news has a different impact on bond yields than negative news. I find that the tone of the news does indeed have a significant effect on bond yields. More precisely, negative news in country i at time t-1 increases significantly the sovereign spread of country I at time t. On the contrary, positive news leads to a decrease in sovereign spread. The results are remarkably stable across specifications and to the introduction of a full set of controls, municipal fixed effects, time fixed effects and linear time trends.

This paper fits into the literature looking at the determinants of bond yields (Arghyrou and Kontonikas, 2014; Manganelli and Wolwswijz, 2009; Alesina et al., 1992, Bayouni et at., 1995) and aim to contribute to it. Most of the studies have indeed focused on two main factors to explain the sovereign debt crisis. First, they look at measures of international risk such as the Vix index or the derivatives market, arguing that a high value of international risk leads to an increase in yields spread (Geyer et al., 2004, Longstaff et al. 2007, Favero et al., 2010, Sgherri and Zoli, 2009). Second is the fiscal position of a country, and in particular the measures of debt and deficit, and their impact on the credit risk of the sovereign debt. These set of studies share two common characteristics. First, in both these clusters politics is not considered as an important factor. Second, they rely on the assumption that markets have perfect information about the status of fundamentals. The global financial crisis, and the European Debt Crisis, have challenged the heart of these assumptions: developed economies are not immune from the financial markets contagion and volatility triggered by political uncertainty (Leblang and Satyanath, 2013 and Phillips, 2014).

This paper differs from these studies in several dimensions and it makes a number of contributions. First, it provides evidence that, although important in

the unfolding of the crisis, neither proxies of economic fundamentals nor measures of international risk can be used to explain the outbreak of the European sovereign crisis. Second, it incorporates the important role of politics in the analysis of the onset of the European crisis. It does so not by looking at standard institutional proxies but rather at the day to day policy making processes. Third, it provides a new dataset to measure the political uncertainty generated by variation in the frequency, types and availability of information flows.

1.2 Data

Another important contribution of this thesis is the collection and analysis of new datasets that will constitute a public good for other scholars interested in tackling similar but also other research questions. The analysis presented in chapter 2 relies on an innovative and newly collected dataset of temporal and geographical variations of infiltrated municipalities. In order to measure the collusion between criminal organisations and politicians, we identified all the municipalities that experienced government dissolution due to mafia infiltration from 1991 to 2013, exploiting information on the date of the dissolution available from the Italian Ministry of the Interior. The treatment variable, i.e. the number of infiltration years, was manually created as a dummy variable taking value 1 from the year of the last regular election before the dissolution, until the moment at which the municipal government was dissolved, and zero otherwise. Importantly, the outcome variables in chapter 2 are based on non-digitalised data from the Italian Ministry of the Interior's Financial Statements database. It contains yearly statistics on the public finances of Italian Municipalities for a number of different spending categories. In order to ensure capture of the true effect under investigation, Chapter 2 also draws on a number of municipal level time-varying characteristics obtained by multiple sources and, importantly, on measures of mafia violence and the local level.[6]

In Chapter 3, our primary data source is the Multipurpose Household Survey, by the Italian National Statistical Agency (ISTAT). From this survey, we employ two measures of perceptions about crime. The first is the answer to the question that asks "*What do you think are the priority problems of the country?*" We construct an indicator variable for the individuals reporting crime as one of the three

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[6]Italian Ministry of Interior, Italian Ministry of Justice, FBI, UNDC, DIA, DEA

priority problems in Italy. These variables capture individuals' concern about crime, or, in other words, the level of salience of crime as a priority problem to be tackled at the national level. In Chapter 3, we also attempt to quantify the effect of exposure to crime news on crime perceptions. To do so, we combine unique data on prime-time news programs for each TV channel with: a) the monthly amount of crime-related news reported; and b) the region-specific monthly viewership. To measure the shift in audience shares induced by the Digital Reform, we gathered unique data about monthly, region-specific, viewing shares for each TV channel available from 2007 until 2013. The data have been extracted from the official Auditel dataset. To measure the number of crime news items reported by each TV channel, we use data on prime-time newscasts collected by the "Pavia Observatory", an independent research institute specializing in media analysis that works in collaboration with the University of Pavia. We obtained data on the monthly number of crime-related news items broadcast during primetime news programs for each one of the main traditional TV channels and some others, from 2007 until 2013.

In Chapter 4, I study whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. Measuring uncertainty is not trivial. I present a new dataset by focusing on news related to sovereign debt and, in particular, to media stories on political aspects of the debt. Political news is less straightforward to interpret since it encompasses elements of subjectivity and time inconsistency. I apply two different research methodologies to collect a unique and new dataset. The first method involved the analysis of professional databases such as Factivia Dow Jones. I retrieved articles from two major newspapers in every country under analysis. I then formulated a query looking at specific keywords. The second research methodology involves the use of social media and, more precisely, Twitter. Using Phyton programming language, I interacted directly with the twitter API interface and, using a set of given keywords, I retrieved 3,640 news items. In addition, I have set the search to collect data on articles written by prominent *opinion makers*. In order to select across opinion pieces, I have run interviews with a sample of traders and asked them to provide a list of opinion makers which are more commonly read. The analysis then benefits from a variety of data sources which are listed and explained in details in chapter 4.

1.3 Methodology

As argued by Falleti and Lynch (2009), "*a recent surge of interest in the expla-nations of mechanisms and the concomitant increase in the level of sophistication of qualitative positivist methodologies, have given political scientists new tools to bring to bear on the search for causal explanations*".[7] This paper fits into the "causality turn" of modern political science and it contributes to it by proposing rigorous methodological approaches. More specifically, as seen previously, all three chapters put forth and test causal hypotheses using observational data. Tackling the research questions that this thesis studies poses significant theoretical and empirical challenges. The identification of causal mechanisms is not trivial. This is particularly the case in observational studies where the treatment assignment cannot be controlled by the researcher and, as a consequence, the identification of a causal effect is complicated because the selection of treatment might be bi-ased. To address this challenge, my thesis uses innovative micro-level data and advanced econometric techniques to identify causal effects from which to draw policy relevant conclusions.

In Chapter 2, the ideal setting to study the effect of the collusion between criminal organisations and local politicians would be to randomise organised crime across municipalities. This, of course, cannot be done. The approach of this the-sis is therefore to set up the best identification strategy to replicate as closely as possible a randomised experiment. In Chapter 2, we employ a Difference – in – Differences design to compare the effect of criminal collusion in municipalities with and without the infiltration before and after such infiltration is terminated by the national government. We are careful in testing that the assumptions behind this model are well-respected. We show that there is no statistical difference in pre-trends between treatment and control groups and that our results are robust to changes in specification, Placebo tests, and the introduction of a full set of con-trols. Chapter 2 also investigates the relationship between organised crime and local politics. We show that municipalities where the right-wing parties win the elections are positively correlated to criminal infiltrations. Although interesting, this result cannot be interpreted causally. The electoral victory of a right-wing candidate is plausibly correlated with a wide range of socioeconomic character-istics of the municipality. To address this topic in a more causal fashion, we

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[7]Falleti and Lynch (2009), p. 1143

implement a regression discontinuity design (RDD) based on close elections. We investigate whether the probability of infiltration is a function of the victory of right wing parties. We compare municipalities where right wing parties won local elections by a narrow margin to municipalities where right-wing parties lost by a narrow margin. The underlying assumption of this empirical exercise is that municipalities where right-wing candidates won or lost by a narrow margin are similar across all characteristics, except for the ideological leaning of the incumbent politician.

Chapter 3 faced a similar problem. Understanding the impact that the media have in affecting individuals' beliefs is a difficult task. Estimating a causal effect poses difficult identification issues, as people self-select news media according to their news content (see Gentzkow and Shapiro, 2010 and Durante and Knight, 2012). To overcome this problem, we exploit a quasi-natural experiment, i.e. the staggered introduction of the Digital TV signal in Italy. We employ a Difference – in – Differences strategy to test if individuals revise their perceptions about crime when exposure to news programs broadcast by such specific groups of channels is reduced, identifying a reduced-form (*Intention to Treatment*) effect of the Digital Reform. In the second part of the paper, we attempt to quantify the effect of exposure to crime news on crime perceptions. To do so, we combine unique data on prime-time news programs for each TV channel in terms of: a) the monthly amount of crime-related news reported; and b) the region-specific monthly viewership. We use the switch to digital signals to predict exogenous changes in the exposure to crime news induced by the policy, and estimate the effect on crime perceptions through a two-step method (*Instrumental Variables*).

In Chapter 4 I employ different techniques to investigate whether a different type and tone of news media might have anticipated the beginning of the crisis. Given that I am working with high frequency data, I employ different Time Series techniques. I used AROMA and GARCH models to control for non-stationarity in the data. Time series help to control for seasonality, autocorrelation across time, and non-stationarity across the errors. However, conditional on controls, the resulting variation in outcome variable would suffer from an omitted variable bias. Precisely, these estimations do not take into account time-varying specific factors, country-level fixed characteristics and any shocks that vary across countries. For this reason, Chapter 4 also employs Dynamic Panel Regressions conditional on fixed effects, time effect and linear and non-linear time trends.

1.4   Road Map

The remainder of this thesis proceeds as follows. Chapter 2 studies the collusion between criminal organisations and politicians and its impact on public policy decisions and on local political outcomes. Chapters 3 presents our study of the impact of media bias on individuals' attitudes and on voting. In Chapter 4, I study the European Sovereign Debt Crisis and I attempt to provide an explanation of its outbreak. Finally, in Chapter 5, I present my conclusions where I will summarise the main results of each chapter and I will also consider the wider significance of the findings for future research and their policy relevance.

2 Organised Crime, Captured Politicians and the Allocation of Public Resources

2.1 Introduction

Organised crime is detrimental to the efficiency of any democratic or economic system (Gambetta, 1993; Pinotti 2015, Acemoglu et al., 2013). Its presence reflects institutional failure and has the potential to influence key aspects of legal economic activity, ultimately undermining the long run development of any society (Shleifer and Vishny, 1993; Mauro, 1995; Glaeser and Saks, 2006). Its strength, as well as its influence on the legal economy, relies on the diffused external complicity, i.e. an increasing close relationship between organised crime groups and public officials such as national or local politicians and public administrators (Dickie, 2005). Thanks to the development of such networks, organised crime has become highly pervasive and fully integrated into the everyday socio-economic and political life of many countries in the world (Trigilia, 2001; Allum and Sieber, 2003).

Yet understanding the extent to which these dynamics condition the choices and activities of policy-makers is far from easy. What impact does collusion between members of criminal organizations and politicians have on the allocation of public resources and on the collection of fiscal revenues? In this paper, we tackle this question by investigating a particular aspect of organised crime activity: its "infiltration" within local governments. Such infiltration occurs when criminal groups manage to capture local politicians who in turn manipulate policy decisions in their favour. We study the case of Italy, country home to the first form of the organised crime, by using a unique yearly municipal-level dataset for the three Italian regions where organised crime is most widespread and rooted: Calabria, Campania and Sicily.[8]

In order to measure the presence of organised crime, we exploit the staggered enforcement of National Law 164/1991, which allows for the dissolution of a municipal government upon evidence of collusion between elected officials and

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[8]A focus on southern regions rather than on Italy as a whole has the advantage of restricting the sample to a relatively homogenous area in terms of unobservable elements such as culture or social capital, traditionally considered as highly diversified across this country (Putnam, 1993). Municipalities are chosen as the unit of analysis because infiltrations often occur at the local level, where the central State's control over electoral and legislative processes is weaker (Cantone and Di Feo, 2014). The dataset is available from 1998 to 2013.

criminal organisations. Importantly, the enforcement of this law within a given municipality at a specific point in time represents a sudden shock to both the local political establishment and the organised crime group, given that its occurrence and timing is solely determined at the national level and kept secret until its implementation.

More specifically, we exploit the enforcement of this policy to identify and compare municipal governments with and without infiltration before and after such infiltration occurs. Differences-in-differences estimates reveal that the capture of local governments by organised crime does not affect the total level of public spending but does have consequences both for the allocation of public resources and the collection of fiscal revenues. In particular, infiltrated local governments modify capital account expenditures in sectors that are strategic to the interests of organised crime. For example, according to our estimates, infiltration leads to a 14% increase in the share of total investments in construction and waste management. This effect is economically sizeable since it translates into approximately an additional 180 euros per capita allocated to this spending component. In addition, infiltration leads to a 29% decrease in the annual share of investment in police force. In practice, considering that average investment in law enforcement across municipalities is relatively low (0.4% of total investment spending), during infiltration years such investments are nearly absent. Moreover, infiltrated municipalities exhibit a lower ability to collect fiscal revenues, with the effect primarily driven by a 15% decrease in revenue inflows from the waste and garbage tax, translating into a loss of 130 euros per capita in collected revenues on a yearly basis. We show that there is no statistical difference in pre-trends between treatment and control group and that our results are robust to changes in specification, Placebo tests, and the introduction of a full set of controls.

Our estimates could pick up some non-mafia related effects (e.g. low quality of politicians, unstable governments) or be determined by political characteristics of the municipal elections correlated with infiltrations. To address this issue, we perform a series of further tests, ensuring that our results are driven by mafia collusion and not by any of these potentially unobserved components. More specifically, we identify a set of political characteristics of municipal elections that could be correlated with the probability of infiltration. Although descriptive, this exercise is noteworthy in that it uncovers several interesting empirical correlations, namely a relationship between infiltrations and elections where (1) there is just one can-

didate running for office, (2) the mayor is running for her second and last term, and (3) the right-wing party wins the election. Using our differences-in-differences setting, we show that none of these factors have an impact on public spending or on revenue collection.

In the final part of the paper, we focus on the systematic correlation between collusion and elections won by right-wing parties, implementing a regression discontinuity design based on close elections. Our results show that the probability of infiltration increases when the right-wing party barely wins an election. However, closely elected right-wing governments are not systematically related to variations in public spending during infiltration periods. These results further corroborate our main hypothesis that the observed variation in public spending is due to collusion between organised crime and politicians as opposed to any other unobserved factors.

We are not the first to empirically study the presence and effect of organised crime. An important strand of the economic literature focuses on the impact of mafia-government linkages on political and electoral outcomes. For example, Alesina et al. (2016) investigate how criminal organisations strategically use violence to influence elections and get captured politicians elected. Pinotti and Stanig (2016) exploit as-if random variation in the presence of organised crime in northern Italy, so as to study its impact on the quality of local governance. Other studies have examined how criminal organisations choose their political counterparts (Acemoglu, 2002; Dal Bo', 2006; Buonanno et al., 2015), uncovering different strategies. De Feo and De Luca (2013) argue that the mafia sells votes to the party that has more core supporters and it is therefore expected to win. Buonanno et al. (2016) find a systematic correlation between the strength of Cosa Nostra and the proportion of votes for the main Italian conservative party.

The large majority of these studies have measured the presence and intensity of mafia activity by employing proxies such as the number of mafia-related crimes, murders, and violent attacks (Alesina et al., 2016; Daniele and Marani, 2011; Olivieri and Sberna, 2014; Barone and Narciso, 2015), historical or geological indicators (Bandiera, 2003; Dimico et al., 2012; De Feo and De Luca, 2013; Buonanno et al., 2015; Buonanno et al., 2016), or artificial constructs for counterfactual analysis (Pinotti, 2015). These measures aim to capture the impact of organized crime in a broad sense, encompassing the whole range of possible actions perpetrated by such criminal groups. They do not, however, take into

consideration an important fact: organised crime in Italy has evolved over time, progressively reducing the use of violence and becoming increasingly integrated within the boundaries of democratic society, to the point that mafia activities may no longer even be recognisable as criminal enterprises. While in conflict with the State, criminal organisations do not wish to displace the latter but rather to co-exist with it through the creation of a network based on mutual interests. As a magistrate member of the AntiMafia District Directorate (DDA) commented, "*Today's mafia no longer kills, no longer makes noise, and this makes it less identifiable as a criminal group. Our fight against them has therefore never been so difficult*".[9] Criminal organisations use violence only as a last resort when previous strategies have failed. Indeed, violence is a suboptimal strategy in that it attracts too much attention from enforcement authorities, undermining the primary objective of influencing policy decisions. The use of violence may reveal the extent, but not the real strength, of organised crime. More importantly, the consequences of successful criminal strategies that do not employ violence have yet to be empirically identified. By focusing on collusion between organised crime and politicians, we aim to shed light on this more silent but equally dangerous phenomenon and in doing so, assess its impact on economic and political outcomes.

Although there exists a large body of evidence on the distortion effect of corruption and the quality of governance for government spending (e.g. Tanzi and Davoodi, 1997; Mauro, 1998; Gupta et al., 2001; Rajkumar and Swaroop, 2008; Bandiera et al., 2009; Gennaioli and Onorato, 2010; Coviello and Mariniello, 2014; Crescenzi et al., 2016), empirical research investigating the rent-seeking behaviour of organised crime is relatively scarce. A notable exception is the recent paper by Barone and Narciso (2015), which argues that the presence of organised crime affects the distribution of national public funds to firms.[10] However, the degree to which the allocation of public resources is influenced by organised crime remains a puzzle. Our paper contributes to this literature by providing the first empirical analysis of the impact of collusion between organised crime and local politicians

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[9]Interview with Giuseppe Borrelli, member of the Naples AntiMafia District Directorate *(Direzione Distrettuale Antimafia),* on the italian television program 'Report', May 5th, 2016.

[10]More specifically, the paper analysed the role of organised crime in the allocation of national public subsidies to businesses, with a focus on Sicilian Municipalities. Their dependent variable is both the probability of receiving funding (extensive margin) and the amount of the margin (intensive margin). Organised crime is measured by number of mafia related crimes. The case study is Sicilian municipalities. Results show that organised crime positively affects both the probability of obtaining funding and the amount of public funds.

on public spending, showing that rather than aiming to affect the overall level of public spending, or engage in patronage by providing jobs in the public administration, the main objective of illegal organisations is to re-direct resources towards specific investment sectors.

The national law 164/1991 examined here has previously been employed in the empirical literature (Acconcia et al., 2014; Daniele and Geys, 2015, 2016; Galletta, 2016).[11] Our approach differs, however, from previous studies in that we aim to capture the impact of organised crime infiltrations within local governments rather than evaluate the effect of the 1991 law. More specifically, our focus is on the period *before* the enforcement of the law, i.e. *before* the dissolution of mafia-infiltrated municipalities took place.

The rest of the paper is organised as follows: section 2 provides background on organised crime infiltrations and local public spending; section 3 focuses on the institutional setting used as a basis for the difference-in-differences analysis, as well as discusses our identification strategy and the quasi-natural experiment we rely on; section 4 discusses the data and section 5 presents the main results; section 6 reports a set of robustness tests so as to demonstrate that the estimated effects are truly driven by the mafia and studies in-depth the relationship between right-wing parties and infiltration; section 6 concludes.

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[11]Acconcia et al. (2014) exploit temporary contraction in public investment occurring in post-dissolution periods to obtain estimates of the fiscal multiplier for Italian provinces. Daniele and Geys (2015; 2016) provide an assessment of the impact of the 1991 law on different post-dissolution outcomes, such as elected politicians' levels of education and turnout at local elections. Galletta (2016) empirically investigates the presence of spillover effects resulting from the strengthening of law 164/1991.

2.2 Organised Crime and Political Capture

According to recent estimates, the total combined annual revenue of the Italian mafia is €10.7 billion, with the Camorra and the 'Ndrangheta being the most profitable organisations (Figure 2.11).The main sources of revenue are illegal activities such as drug trafficking, extortion and corruption (Figure 2.2). These activities generate a turnover approximately equal to 1.6% of the Italian GDP which, in per capita terms, translates into 400 euros per year.

However, as stated by Schelling (1971), burglars may operate in the underworld, but they seek to govern the real world. In fact, since the 1970s, organised crime groups have become increasingly sophisticated and their business model has shifted from one based on extortion to one based on entrepreneurship (Gambetta, 1993; Mete, 2016; Varese, 2000). The nature of the relationship between the mafia and the State has consequently also changed: rather than representing an enemy to fight, the government has instead become an opportunity to exploit. As Figure 2.3 shows, as a result of this shift a significant portion of the massive liquidity generated by illegal activities is then re-invested into the legal economy, not just in Italy but also in the United States.

A very high share of criminal organisations' profits thus come from public investments. Indeed, public finances are seen in the literature as one of the areas most severely affected by the presence of corruption and collusive behaviour.[12] However, empirical evidence on whether and how government expenditures are conditioned by collusion between politicians and criminal organizations remains limited. This paper aims to fill this gap by studying a specific activity of criminal organisations: infiltration within local municipal governments.

According to Italian National Law 164/1991, *infiltration* occurs when organised crime captures local politicians in order to manipulate policy decisions in their favour. This criminal strategy can be perpetrated in different ways. It can, for example, occur directly, as in the case of Pompei (in the province of Naples)

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[12]While the effect of corruption on overall level of public spending has been reported as insignificant (Mauro, 1997), there is a substantial body of evidence emphasizing how collusion or corruption impact the cost-effectiveness of public investments (Shleifer and Vishny, 1993; Tanzi and Davoodi, 1997; Cadot et al., 2006; Crescenzi et al., 2016) as well as the specific spending sectors in which governments decide to invest (Mauro, 1998; Ehrlich and Lui, 1999; Gupta et al., 2001; Rajkumar and Swaroop, 2008). Coviello and Mariniello (2014) exploit sharp discontinuities in the values of auctions to test whether publicizing a public procurement auction affects entry and the cost of procurement.

where "*the speaker of the municipal council has been identified as the main link between the local administration and the local mafia boss, who has also been arrested in the same investigation*".[13] Alternatively, it can be indirect, such as through contamination of the electoral competition. This was the case in Plati' (in the province of Reggio Calabria), where "*the party winning the electoral competition benefitted from electoral favours from the local mafia group, who was able to divert a large number of votes and aimed to mantain political control of the territory*".[14] Finally, infiltration can occur simply through the use of threats and intimidations. To this regard, Africo (in the province of Reggio Calabria) was dissolved because "t*he policy decisions of the municipal council were not made freely and without bias because local politicians were repeatedly intimidated and threatened by criminal organisations*".[15] These examples are crucial to clarify just how infiltration is defined: it is not simply the physical presence of criminal members within the local government, but also any direct or indirect link between criminal organisations and politicians.

Perhaps most importantly, the cases described above have in common the absence of violence. Violence can, in fact, be seen as the failure of an effective threat. More specifically, it is a suboptimal strategy in that attracts too much attention from enforcement authorities thus undermining criminal groups' main objective, that of influencing policy decisions. Criminal organisations are now less explicit, more subtle, and comparable to special interest groups (Grossman and Helpman, 2001; Dal Bo and Di Tella, 2006; Wolton 2016), who through use of intimidation and threats aim to protect and promote their interests by influencing and manipulating official policy makers to their own advantage.[16] The impact, however, of an effective and successful threat remains unclear and is thus precisely the empirical question we attempt to tackle in this paper.

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[13]Official Gazette (*Gazzetta Ufficiale*) – Decree of the President of the Republic no. 133 of June 2001: http://www.gazzettaufficiale.biz/atti/2001/20010223/01A10530.htm

[14]Official Gazette (*Gazzetta Ufficiale*) – Decree of the President of the Republic no. 119 of Marzo 2012: http://www.gazzettaufficiale.biz/atti/2012/20120093/12A04237.htm

[15]Official Gazette (*Gazzetta Ufficiale*) – Decree of the President of the Republic: http://www.gazzettaufficiale.biz/atti/2014/20140194/14A06583.htm

[16]The main difference between the Mafia and a "legal" interest group is the use of violence, intimidation and physical punishment. For a good review on related theoretical models, see Dal Bo, 2007. Wolton (2016) argues that "only a strong pro change special interest group is willing to bear the cost of outside lobbying activities". In this paper, we argue that organised crime, with its range of strategies used to influence policy making, can be seen as a special form of outside lobbying.

We test whether elections represent the main opportunity for criminal organisations to infiltrate local governments. Elections could be seen as a "recruitment process" whereby a new bargaining table between criminals and politicians is established (Dal Bo, 2006). This might particularly be the case in Southern Italy where political turnover is very high: 71% of local administrators leave local politics within 5 years and 93% within 10 years (Daniele and Geys, 2015). If compliance with the mafia's will is functional to the future political career of corrupt mayors (Cantone and Di Feo, 2014), it can be expected that collusions would bring about a system in which local politicians respond to the interests of criminal groups, rather than those of the local community of citizens. Control over local politicians facilitates the capture of public procurement contracts, in turn enabling criminal organisations to provide business opportunities to the firms they control as well as reinvest liquidity generated from illicit activities and, more broadly, strengthen their control over the local territory.[17] Infiltration consequently has the potential to systematically distort policy-making throughout the entire period in which corrupt politicians are in power.

In this paper, we empirically estimate the impact of this distortion on local public finance and, in doing so, aim to gain a deeper understanding of the strategic behaviour of criminal groups when they infiltrate local governments. Does organised crime affect the overall level of public spending and the efficiency of the administration? Does mafia patronage inflate the hiring of new personnel within the public sector? Or do criminal organisations try to bias the allocation of investment expenditures towards specific sectors? It is difficult *a priori* to identify a mafia *modus operandi* and the impact of the latter on the allocation of public resources and on revenue collection at the local level. These are ultimately the empirical questions we aim to address in this paper.

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[17]Although the economic dimension of these organisations is global, the heart of their business model is still very much based on the social consensus and legitimisation they enjoy at the local level (Mete, 2015).

2.3 Empirical Strategy

2.3.1 Law 164/1991: dissolution of municipal governments due to mafia infiltration

The rise in mafia infiltration within local administrations throughout the 1980s led the Italian central government to introduce a tougher set of anti-mafia measures in the early 1990s. In an effort to end collusion between local politicians and members of organised crime, a new law was introduced in 1991, imposing the dissolution of a city council upon evidence of 'mafia infiltration' within the local government; that is, electoral competition contaminated by the mafia and/or policy decisions taken by the government but clearly rigged by a criminal organisation (D.L. 31/05/1991 n.164).[18] According to law 164/1991, the national government can decree the dissolution of a municipal government "*when evidence emerges regarding direct or indirect links between members of the local government and criminal organisations [. . .] jeopardising the free will of the electoral body and the sound functioning of the municipal administration*".[19]

The dissolution of a local government requires a number of steps. First, a proposal for dissolution must be put forth by the provincial prefect, who has been informed by either magistrates or the police of the risk of infiltration of a municipal government. The prefect then establishes a commission composed of the vice-prefect and officials from different law enforcement bodies (the *Polizia di Stato*, the military *Carabinieri* and the *Guardia di Finanza)*. The commission investigates the local government's activity over a period of three to six months, producing a report which the prefect sends to the *Ministry of Interior*. Any proposal for dissolution signed by the *Minister* must also be approved by the *Cabinet* (Council of Ministers - *Consiglio dei Ministri*) and the *President of the Republi*c before being implemented. Municipalities where the local government is dissolved are therefore those where the mafia infiltration has been attested to by the Italian judicial system and confirmed by multiple political institutions. Importantly, infiltrated municipalities are unaware that they are under investigation, as the

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[18]Some of the most common reasons for dissolving a local government under law 194/1991 include: administrators or bureaucrats having an affinity with/kinship relation to members of the criminal organisations or individuals with recurrent criminal records; permits awarded illegitimately due to bid rigging; severe infringement of building regulations; absence of rigorous inspections in the execution of public works; significant flaws in tax collection; cases of clientelism; illegal elections.

[19]http://www.gazzettaufficiale.biz/atti/2001/20010223/01A10530.htm

process of dissolution is kept fully secret until its implementation. Once the investigation is concluded, both the members of the criminal organisation and the local politicians are arrested.

Upon removal of the infiltrated local administration, the central government appoints three non-elected, external commissioners, who govern the municipality for a period of 12 to 24 months and often make significant cuts to financial flows into public investment projects (Acconcia et al., 2014; Galletta, 2016). At the end of the transition period, regular elections are held.

As shown in figure 2.4, the large majority (and in some years all) of the dissolutions occurred in the three regions which form the focus of our study. Figure 2.5 illustrates the number of dissolved municipal governments due to mafia infiltration from the introduction of the law up until 2015. In total, there have been 258 detected cases of mafia infiltration into local governments over this period.

That said, within these three regions, the geographical distribution of dissolution varies significantly. As shown in figure 2.4, detected cases of mafia infiltration tend to be clustered in several specific areas within these regions. In Campania, the large majority of dissolutions occurred in the north-west, particularly in the provinces of Caserta and Naples – the area where the *Camorra* is traditionally strongest. Similarly, in the region of Calabria most detected infiltrations were located in the south, in the provinces of Reggio Calabria and Vibo Valentia, where the '*Ndrangheta* is known to be centred. Finally, while dissolutions in Sicily are more widespread, the majority are concentrated in the province of Palermo, the heart of *Cosa Nostra.*

2.3.2 Identification Strategy

We rely on law 164/1991 to identify cases of mafia infiltration within local governments of the municipalities in our sample regions. Our identification strategy is based on a difference-in-differences (DiD) setting and exploits the time and geographical variation of dissolutions over time. The impact of criminal infiltrations is estimated by comparing municipal governments with and without infiltration before and after such infiltration is ended by the national government. We use the dissolution of a municipal government to identify our treatment period. For example, as shown in figure 2.6, the municipality of Casoria, in the province of Naples (Campania), held local elections in 2002. The elected government was

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later dissolved at the end of 2005 and commissioners took over until the following elections, at the beginning of 2008. Our treatment period thus ranges from the election in 2002 to the dissolution in 2005. This decision reflects our aim to identify the period of time during which organised crime was plausibly colluding with the local government.[20] The control group is composed by all non-dissolved governments and by dissolved governments before the infiltration started and after it was ended. In this example, all years before 2002 and after 2007 make up the control period.[21] Crucially, due to the fact that external commissioners have specific duties regarding the administration of public finance, all years between the dissolution of a government and the subsequent elections are excluded from the sample. Therefore, in the case of Casoria, the years 2006 and 2007 are not considered in the estimations.

Unlike classic DiD strategies, our setting is based on a treatment period beginning at different points in time for the treated municipalities. This framework has the advantage of allowing us to restrict the full sample to those municipalities that experienced at least one dissolution due to criminal infiltration. Such an approach makes it possible to obtain a sample of very similar municipalities, minimising unobservable heterogeneity. This is also the reason why we always run our analysis with both the full (all municipalities of all our regions) and restricted sample (only the dissolved municipalities of our sample). Performing this sample restriction is indeed important because as seen in figure 2.4, the geography of dissolutions reflects significant concentrations in specific provinces of the sample regions. More specifically, the figure indicates that there are provinces with very few or no dissolutions at all and that the intensity of mafia activities in these territories is lower with respect to the core areas where the criminal organisations are primarily based.[22] Finally, an additional peculiarity of our setting is that the treatment period turns on and the off, i.e. municipalities remain infiltrated until they are dissolved.

Threats to identification. There are some potential concerns relative to our

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[20]In both Daniele and Geys (2015; 2016) and Galletta (2016) the treatment period refers to the years **after** the enforcement of the policy.

[21]We also perform an analysis where we limit the control to the years before infiltration (i.e. excluding the years after dissolution). Estimates are reported in appendix A.15

[22]On a more technical note, this could present a concern for the other coefficients in the regression analysis. However, once controlled for municipality fixed effects, the coefficient of interest is not affected by never dissolved municipalities.

identification strategy. First, the application of law 164/1991 may be imperfect. Some municipalities could have been infiltrated but not dissolved because judicial authorities did not detect the collusion. Similarly, some dissolutions may have been done erroneously if there was no real infiltration. Fortunately, these issues do not represent a concern for our estimation strategy. Infiltrated municipal governments that are not dissolved would indeed belong entirely to the control group, causing attenuation bias in the empirical results. Similarly, periods of erroneously detected infiltration would instead belong to the treated years, again biasing the estimated impact of infiltrations towards zero. This means that the point estimate of regression coefficients is likely to be larger (in absolute value) than the one observed.[23]

Econometrically, an additional concern for our analysis is that judicial investigators might start their investigations precisely in those municipalities that present anomalies on their balance sheets. In this case, selection into treatment (*i.e. being dissolved by the national government*) would be correlated with the outcome variable *(i.e. public spending and revenue collection)*. We tackle this important issue in Section 2.6 showing that our results do not change, when we exclude from sample those municipalities for which the main motive driving the investigation and dissolution was related to either public spending or revenue collection.

Another potential issue for our estimates could arise if the dissolution of municipal governments has been manipulated politically. In other words, it may be that the decision over which local governments to dissolve – or not to dissolve – is driven by political considerations. If, for example, the main party of the national government does not want to 'lose' the control of a local government ruled by the same party or an allied party of the same political coalition.

This distorted use of law 164/1991 is, however, unlikely to happen for several reasons. First, the dissolution process is initiated and carried forward by the Italian Anti-Mafia Investigation Directorate (*Direzione Investigativa Antimafia*), one of the most efficient investigative bodies of the Italian State.[24] This is an

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[23]For further discussion of this issue, refer to is results section.

[24]The Anti-Mafia Investigation Department (DIA) was founded in 1991, under the authority of the Minister of Interior and the coordination of the National Anti-Mafia Directorate (*Direzione Nazionale Antimafia*). The DIA's operations include pre-emptive investigations and judicial investigations. They also study the characteristics, objectives, and methods of organised crime as well as examine the latter's domestic and international contacts.

organisation composed of highly trained and specialised individuals from the three main polices forces (*Polizia di Stato*, *Carabinieri* and the *Guardia di Finanza*), whose experience is often valued and requested by other countries and institutions needing consults on the fight against organised crime.[25]

In addition, the multiplicity of actors involved in the dissolution decision, from national MPs to the Minister and the Cabinet to the President of the Republic, makes any form of manipulation of the law improbable.[26]In order, however, to provide as much evidence as possible, we perform a test to rule out the possibility of systematic political manipulations. If dissolutions were manipulated, we would expect to observe that the political colour of provincial and national governments is significantly associated to the political colour of dissolved municipal governments. As shown in Appendix A1, which refers to the restricted sample of dissolved municipalities in the 1998-2013 period, there is no statistically significant correlation between the colour of national or provincial governments and that of municipal governments. Indeed, given the political cost generated by a dissolution for the national government –e.g. high national media coverage and political competitors exploiting the latter by asking for the government's resignation – it is extremely unlikely that the national government would strategically choose to dissolve municipal governments governed by opposing parties. It is important to note, however, that even if this was true, our estimates would bias downwards, since strategically manipulated dissolutions would be coded as treated, causing an attenuation bias of coefficients.

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[25]For example, the Italian Prosecutor Antonio Ingroia, who extensively investigated the Sicilian Mafia, was appointed Director of the United Nation-backed judicial watchdog in Guatamala, the International Commission against Impunity in Guatamala (CICIG). Another example is Judge Giovanni Falcone, who in 1989 established the AntiTerrorism Unit in Quantico, Virginia, in collaboration with then Attorney Rudolph Giuliani. It is highly unlikely that these professionals, together with other judges and prosecutors, would allow their investigations be strategically used by politicians.

[26]The only case where a dissolution did not follow the normal legislative process is that of Fondi. The local prefect, together with enforcement agencies, drafted a 500 page proposal for the dissolution of this municipality. The Ministry of Interior then opted for a political solution, asking the municipality to proceed immediately with new elections without sending any commissioners and therefore officially dissolving the government. Fondi does not, therefore, appear as a case of infiltration in our dataset. The case was covered by the Italian press and TV news for weeks. The large amount of attention it drew leads us to two considerations: a) the Government will try to avoid these situations and b) when they happen, they create so much noise, that it is very easy to correct for them in our dataset. Finally, and more technically, given that the press and opposition parties were concerned that new elections would not be sufficient to get rid of the criminal infiltration, we would see an additional downward bias in our setting.

Moreover, as mentioned, Italian local governments can also be dissolved for reasons unrelated to mafia infiltration (e.g. resignation of the mayor, resignation of more than 50% of council members etc.). Hence, for politicians wishing to undermine the stability of a given municipality ruled by an opposing party, such routes would certainly represent cheaper and easier options than trying to establish a false mafia case.

A final potential issue with our empirical setting is that the definition of our treatment and control observations is based on the assumption that the entire period between the election of a local government and its dissolution consists of infiltration years. This implies that the infiltration began at the moment of election of a later-dissolved government. While this hypothesis may be true for many infiltrated municipalities where electoral manipulation brought to power local governments subject to the conditioning of the mafia from the very moment they took office, it may not hold for other dissolved municipalities where the timing of the infiltration was different. It is therefore important to test whether we find any effect on our outcome variables in the years preceding the elections. We deal with this issue in the empirical analysis.

2.4 Data and Estimating Equation

2.4.1 Data

Local public spending. Our primary data source is the Italian Ministry of Interior's Financial Statement Certificates (Certificati Consuntivi) database, which contains yearly statistics on the public finances of Italian municipalities for a number of different spending categories.[27] The full dataset is disaggregated into capital account and current account expenditures. These are further disaggregated into six specific spending categories.[28] These different categories reflect the services

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[27]In Reading Appendix A.2.1, we provide a short overview of the political system of Italian municipalities.

[28]Capital account and current account are further sub-divided into three spending sections: spending decisions, year-over-year spending and residuals. Spending decisions correspond to the amount of financial resources a municipality plans to spend over the course of the following year, determined at the end of the current year. Year-over-year spending refers to that which the municipal government has actually spent, calculated at the end of the year. Residuals consist of the resources that have not been spent. Throughout our analysis, we adopt spending decisions as a spending proxy as data on residuals and year-over year spending is much more fragmented, less reliable and less homogeneous. In addition, in some cases year-over-year spending includes expenditures planned by previous governments, while our intention is to capture the conditioning

and functions to which the resources have been allocated and spent and include: general administrative functions, social sectors, construction and waste management, transportation, public education and municipal police.[29] This dataset is available for the 1998-2013 time period.

Table 2.1 and appendix A2.2 illustrate average per capita spending for the municipalities in our sample over the 1998-2013 period. The resources spent by the municipalities amounts to a yearly average of €543 per inhabitant for the capital account (i.e. investments) and a yearly per capita average of €731 for the current account (i.e. salaries and services). Summing these two figures we obtain the average total spending per municipality, €1,274 per inhabitant. As shown in Table 2.1, the spending function to which the most annual resources are allocated is construction and management, which makes up 34% of the annual capital account budget.[30] As for the current account, spending is highest for administration, followed by construction and waste management. The municipalities are also responsible for tendering and awarding public procurement contracts to the contractor company in charge of carrying out the work.

Infiltrated municipalities. In order to measure the infiltration of organised crime within local governments, we identified all municipalities that experienced government dissolution due to mafia infiltration from 1991 to 2013, exploiting information on the date of the dissolution available from the Ministry of the Interior. The treatment variable was created as a dummy taking value 1 from the year of the last regular election before the dissolution until the moment in which the municipal government was dissolved, and zero otherwise. Data on the date of local elections before dissolutions were obtained from the Historical Archive of Local Elections, publicly available from the Italian Ministry of the Interior.

Mafia homicides and other control variables. Data on mafia-related homicides in each province and year of our sample were provided by the Italian National Institute of Statistics (ISTAT). The data were collected by the Ministry of Interior and classified according to the Italian Penal Code.

A number of municipal level time-varying characteristics were also obtained from the ISTAT Censuses including unemployment rate, percentage of industry

role of mafia infiltrations on policy decisions taken specifically by the infiltrated governments.

[29]Refer to Reading Appendix A.2.2 for additional details.

[30]Average spending for construction and waste management is €382 per year, €217 for the capital account and €147 for the current account. The second largest investment sector is transportation, the third is administration.

employment, percentage of agricultural employment, and percentage of tertiary education degree holders.[31]

2.4.2 Estimating equation

We exploit a difference-in-differences setting to test whether mafia infiltrations have an impact on the public spending allocations of local governments in Campania, Calabria and Sicily. To this end, we compare municipal governments with and without infiltration before and after such infiltration is ended by the national government through the application of law 164/1991.

We estimate various versions of the following model:

$$y_{m,t+1} = \alpha + \beta Inf_{m,t} + \gamma Mafia_{p,t} + \delta X_{m,t} + \varphi_m + \tau_t + \varepsilon_{m,t} \qquad (2.1)$$

Where $y_{m,t+1}$ refers to public spending in municipality m at time $t+1$.[32]

More precisely, $y_{m,t+1}$ is $\frac{PS_{c,m,t+1}}{\sum_c PS_{m,t+1}}$, i.e. the spending allocated to component c as a share of the total spending committed to the next financial year. Total spending is calculated per capita.[33]

The key variable in the model is $Inf_{m,t}$, a dummy taking value one if a municipality is led by a government dissolved for mafia infiltration in year t, and zero otherwise. The coefficient of interest is β which captures the impact of the infiltration at time t on the public spending allocation at time $t+1$.

As our main aim is to identify the effect of a specific activity part of organised crime – the impact of temporary infiltration on governments' spending decisions – we need to control for the underlying strength of the mafia groups across municipalities. This is necessary as, otherwise the observed effect on public spending allocation would not be driven by the mafia-government collusion but by some pre-existing trend. This issue is tackled in two ways. First, we include in the model a control variable $Mafia_{p.t}$, referring to mafia-related homicides and used as a proxy for the underlying strength of the mafia in the province of the municipality at time t. Second, we always test the results by performing a second estimation where we restrict our sample to municipalities that have seen their

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[31]See Appendix A2.3 for the descriptive statistics.

[32]The time lead derives from the fact that our dependent variable is based on spending decisions defined at the end of the financial year,. This reduces issues of reverse causation as our main variable of interest is measured at time t.

[33]$\frac{\sum_c PS_{m,t+1}}{pop_{m,t}}$ is the total per capita spending allocated by a municipal government

government dissolved at least once. This allows us to both reduce unobservable heterogeneity and conduct the analysis on a sample of more similar municipalities.[34] Hence, in the empirical analysis, we always perform two estimations: one with the full sample and one with the restricted sample.

Vector $X_{m,t}$ denotes a set of socio-economic and demographic characteristics of municipalities in the sample regions. The data are drawn from the 1991, 2001 and 2011 ISTAT Censuses interpolated over time.

The model is completed by municipality dummy variables, controlling for time-invariant unobservables correlated with the timing of the infiltration (φ_m), and time fixed effects, controlling for year-specific shocks (τ_t). Finally, $\varepsilon_{m,t}$ is an idiosyncratic error term. Throughout the empirical analysis we cluster standard errors at the municipal level.

2.5   Estimation Results

2.5.1   Does the infiltration of organised crime affect the overall level of public spending?

We begin by presenting the estimates of the effect of mafia infiltration on total municipal spending (Table 2.1). In columns (1) and (2) we focus our attention on total spending commitments per capita. The model is initially estimated for the full sample of 1,350 municipalities from Calabria, Campania and Sicily (column (1)). In column (2) we restrict the sample to a group of more homogeneous municipalities – those 182 having experienced at least one government dissolution for mafia infiltration. In the following columns, we sub-divide total overall spending into total capital account spending per capita (columns (3)-(4)) and total current account spending per capita (columns (5)-(6)). All estimations include municipality fixed effects, year fixed effects and control variables.

Throughout all the different specifications, the coefficients of the infiltration dummies in Table 2.1 are not statistically significant. The highest point estimates (in absolute value) are obtained in column (1), a lower public spending for infiltrated municipalities by 28 euros per capita. Yet, as for all the other coefficients, this is not statistically different from zero. Hence, the results provide evidence

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[34]This estimation does not, however, rule out the possibility that in some municipalities the effect of infiltration is stronger because the presence of organised crime is also stronger in that particular location.

that, other things equal, infiltration periods are not associated with significant variations in the total amount of local government expenditures, either for public investments (capital account) or for services and maintenance (current account).

Our findings differ from those of Olivieri and Sberna (2014), who report a positive relationship between pre-electoral mafia violence and total public investment in local municipalities in Southern Italy. The difference may be due to the fact that we do not focus on violent attacks on the part of organised crime, but on criminal infiltration within politics. Accordingly, one interpretation of our results is that when mafia groups infiltrate local governments, they are not interested in forcing a modification of overall aggregate spending. Indeed, if municipal governments were running constant budget deficits during infiltration periods, they would risk being taken over by the central government for reasons of financial instability, thus leaving the criminal organisation without reliable political connections within the local council.[35] Rather, a way to coercively condition the public financing of infiltrated governments may be to modify their investment policies precisely in those sectors that are strategic to protecting the interests of organised crime. One might thus ask, *when infiltrating local governments, does the mafia engage in patronage behaviours? Or does it bias the allocation of resources toward specific spending components?* In an effort to answer these questions, we break down total spending into different items of expenditure.

2.5.2 Does the infiltration of organised crime affect specific spending components?

We test whether criminal infiltrations significantly affect the allocation of public resources by comparing each of the spending items of infiltrated governments with those of non-infiltrated governments before and after this infiltration is terminated ended.[36]

The estimation results are presented in Tables 2.3 and 2.4. Each spending item is measured as a share of the total annual spending. The main variable of interest is $Inf_{m,t}$which takes value one if the municipality m is infiltrated at time t.

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[35]Article 244 of the Unified Text Governing Local Authorities (*Testo Unico Enti Locali - TUEL*) foresees the possibility of declaring a municipalities as financially instable (dissesto finanziario) when they are unable to provide basic functions, services and public goods.

[36]As mentioned above, the six fundamental areas of municipal public finance are: administration, social sector, construction and waste management, transportation, public education, and local police.

For each spending item, the model is estimated both for the full sample of municipalities and for the restricted sample of municipalities who have had their government dissolved at least once. Note that most of the current account spending components (Table 2.4) display insignificant coefficients. Particularly interesting is the administration spending component. If organized crime had invested in *patronage behaviour*, thus inflating the hiring of public administration personnel, the coefficient would have been positive and significant.[37] We do not observe this effect. The only significant effect is on municipal police.

When we turn our attention to capital spending (Table 2.3), i.e. investments, we find that on average infiltrated municipalities spend more on construction and waste management (columns (5)-(6)) and less on municipal police (columns (11)-(12)). These results are consistent across both specifications, remaining significant and with similar magnitude. A first look at these results indicates that upon infiltration, organized crime's main strategy is to bias the allocation of resources towards specific sectors rather than affect total spending or engage in patronal behaviours. We provide a more comprehensive interpretation of these results below.

Construction and waste management. According to the estimates in Table 2.3, infiltrated governments increase investment spending on construction and waste management. The estimated effect is economically relevant: infiltrated municipalities increase spending on construction and waste management by 0.0448 percentage points, corresponding to about a 14% change compared to average spending on construction and waste management in non-treated municipalities (equal to 0.34).[38] This is a large figure if we consider that functions related to constructions and waste management already account for the largest part of the capital account budget (Table 2.1). Moreover, there is an average annual effect that is distributed over the entire period a government is in control. Municipal administrations can last up to five years, and the average infiltration period in our sample of municipalities is 2.7 years.[39] Therefore, any additional resources these

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[37]One of the strategies commonly employed by organized crime is to offer employment within the public sector in exchange for various forms of support (Gambetta, 1993)

[38]In appendix Table 2A.1we replicate our analysis, gradually increasing the number and type of controls and including linear time trends. We then present the results for both the full and restricted sample over the period 1998-2013.

[39]At the end of each fiscal year, local governments must approve plans for the financing of public works, set to be realised either within the same year or part of a three-year plan. Annual plans include all projects below 100,000 euros, while three-year plans are for projects above

governments allocate to this sector during a period of infiltration can be substantial. In per capita terms, given an average yearly total spending of 1,273 euro per capita, infiltrated municipalities redirect an additional 179 euros to construction and waste management (Table 2.1).

This particular spending item includes all expenses for waste collection and the construction of new buildings, bridges, streets and highways. This represents a strategic sector for the interests of criminal organisations for many important reasons. First, mafia groups need to find an outlet for profits obtained from illegal activities and the construction sector represents an easy and highly profitable option for money laundering. In addition, the technological and financial barriers to entry are relatively low, making this an ideal area for long-term investment. Second, the area of construction and waste management is associated with a set of activities that are deeply embedded within the local territory. Seizing control of these activities is crucial for the mafia, so as to establish and expand a wide network of relationships, allowing the latter not only to survive, but to prosper. The construction of new buildings and the collection of waste involve many agents: political leaders in charge of awarding public work tenders, contractor enterprises responsible for delivering the project, and a labour pool to carry out the work. Members of organised crime groups may be involved at all levels of this chain, and in the fashion of most traditional of interest groups, they exploit the political connections they have in order to rig public work bids to the advantage of the enterprises they control, or intend to favour. Moreover, access to privileged information on future bids and winning contractors allows the mafia to offer employment, therefore directly managing an important portion of the local labour market (Sciarrone, 2011).

This is thus the context in which infiltrations occur, and highlights the importance of being able to reproduce this cycle. Having political referents within local governments translates into the possibility of steering the outcomes of public work tenders and increasing the profits of affiliated firms. The more buildings to be constructed, the more contracts that will be awarded and the higher the potential gains for the criminal organisation. Figure 2.7 shows the number of firms, disaggregated by business sector, confiscated by police due to collusion with or-

this figure. While yearly plans are binding, three-year plans can annually be updated with new projects. Urban planning interventions represent a key prerogative of local administrations, and regional or national level governments have little say over these kinds of policy initiatives.

ganised crime. In line with the above estimates, the majority operate in the construction and waste management sector. The creation of collusive cartels between politicians, *mafiosi*, and entrepreneurs in the construction market not only causes distortion in the competition for public works, but also seriously inflates expenditures in this particular sector.

Municipal police. The second significant variation in the local public finances of infiltrated governments is spending on municipal police. A significant decrease is seen both for the capital account and for the current account spending in this sector. Our estimates in Table 2.3 report an annual reduction in the share of total capital account spending for municipal police.[40] While this might seem like a low figure, it should be compared to the average share of investment in local police forces made by municipal governments in our sample. As shown in Table 2.1, the proportion of capital account resources that local governments allocate to this sector is about 0.3% of the total for the full sample of municipalities, and 0.7% for the municipalities who had their government dissolved at least once. Therefore, an average annual reduction of about 0.2 percentage points, as per our estimates (column 11), represents a considerable change, equal approximately to 29%. In practice, given that police expenditures are typically low, they are thus nearly absent in infiltration years.

According to the estimates in Table 4, infiltrations also lead to a significant reduction in spending on municipal police as part of the current account. This corresponds, however, to a less radical change in budget decisions with respect to that reported for capital account, given the average share of current account expenditures allocated to municipal police (Table 2.1).

And yet, if we add up the current and the capital account effects, a clear pattern emerges indicating that infiltrated governments tend to refrain from making expenditures on local police forces. A reduction of resources directed towards law enforcement bodies such as the municipal police may directly benefit the criminal organisations, facilitating their illegal activities. Indeed, the local police are responsible for maintaining public order and security, a task shared with the national police (*Polizia di Stato*) and low-quality equipment may imply a lesser ability to fight crimes such as drug trafficking, usury and murders. Perhaps most

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[40]In appendix Table 2A.2 we replicate our analysis, gradually increasing the number and type of controls and including linear time trends. We present the results for both the full and restricted sample over the period 1998-2013.

importantly, local police are also responsible for so-called 'administrative police' functions, including surveillance over construction works and abidance with building regulations. Given that a lack of compliance with building regulations is one of the most frequent motivations for government dissolutions, allocating fewer resources to municipal police forces may also be one of the ways in which corrupt local politicians attempt to prevent dissolutions.

2.5.3 Does the infiltration of organised crime affect local revenue collection?

We now turn to whether infiltration also has an impact on the ability of the local governments to collect fiscal revenues. Given the quasi-federal structure of the Italian State, municipalities are expected to maintain a certain level of independence and autonomy in collecting their own financial resources. Hence, local taxes represent an important source of income for municipalities.[41]

In order to assess the performance of municipal governments, we follow Drago et al. (2014), constructing a measure of efficiency in revenue collection calculated as the ratio between collected revenues and the total amount of forecasted revenues that the municipality should collect within the budget year. We focus on the two main local taxes, i.e. *property tax* and *waste tax,* and on *total taxes* and *total collected revenues.*[42] As Figure 2A.8 shows, *property tax* and *waste tax* are the main source of income in the municipal budget.

Exploiting our difference–in–differences setting, we present our analysis in Table 2.5. The estimation includes municipal fixed effects, time fixed effect and a wide range of control variables including a measure of criminal violence. For each outcome variable, we estimate our model with the full and the restricted sample. In both cases, infiltrated local governments exhibit a lesser ability to collect fiscal revenues. Indeed, although (barely) not significant, the coefficients for Total_tax and Total_revenues are both negative.[43] More importantly, the coefficient on

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[41]Local revenues correspond on average to 52% of the entire budget for Italian municipalities (Daniele et al., 2016, IFEL, 2014).

[42]Our data come from Certificates on Financial Statements (*Certificati Consuntivi - quadro 2*). This analysis is based on a panel dataset that began in 1999 and ended in 2012. Total taxes represent the total fiscal inflows for a municipality. Total Revenues also include transfers from the National Government.

[43]Although not significant, the direction of our coefficient is in line with results from Daniele et al. 2016. They focus on the period *post* dissolution and *after* commissioning, uncovering that a newly elected local government has a lesser ability to collect fiscal revenues.

Waste Tax (Column 7) is negative and significant. The effect is economically sizeable: according to our estimates, infiltrated municipalities collect 15% less taxes on waste and garbage compared to the average of non–treated municipalities (baseline average is 0.14), translating into a loss of approximately 130 euros per capita every year. The result is stable to the inclusion of our set of controls and to the restriction of the sample (Column 8). The interpretation of this result is twofold. First, the direct or indirect presence of criminal organisations within the municipal government is a silent metastasis that has a profound impact on the performance of the local government. Indeed, tax evasion generates significant losses and distortions in government revenues; the ability to efficiently enforce tax collection is one of the fundamental components of state capacity (Casaburi & Troiano, 2016). As shown in Figure 2A.8, *Waste Tax* represents 22% of the municipal budget (total revenues are on average 2.8 million euros per year). Second, lower fiscal revenues correspond to a precise strategy on the part of criminal organisations (Barone & Narciso, Daniele & Geys, 2016; Trocchia 2009) who aim to weaken the presence and reputation of the State in order to open up the possibility of substituting it through a system of provision of private favours. Moreover, this result, together with the evidence on spending on construction and waste management uncovered in section 5.2, seems to confirm the well-known presence of criminal organisations within the waste management sector.[44]

Finally, we also exploit another measure of state efficiency. In 2007, the Italian government instituted a nationwide anti-evasion policy, the Ghost Buildings program. The program identified ghost buildings — properties not listed in the land registry and thus hidden from tax authorities — by overlaying aerial photographs and digital land registry maps (Casabury & Troiano, 2016).[45]Municipalities play a

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[44]The connection between the waste hauling industry and organized crime dates back decades. In the U.S., *Cosa Nostra* has been part of New York's commercial sanitation system since at least the 1950s (personal trash is hauled by the city's Department of Sanitation). "Carters", or trash haulers, have always been able to carve out and sell routes to one another, making the system vulnerable to strong-arm tactics. The Camorra is said to have controlled garbage in the city of Naples since the early 1980s. The poorly run system attracted worldwide attention when, back in 2008, uncollected garbage piled up on the city's streets for more than two weeks because the Mafia had closed the dumps.

[45]The Regional Agency (Agenzia del Territorio) coordinated the effort. The Agency first juxtaposed land and building registry maps to obtain an Official Building Map. It subsequently compiled high-resolution (50 cm) aerial photographs of the entire country so as identify the ghost buildings. Appendix Figures A.1A-A.1C summarize the identification steps. First, the aerial photograph of a particular location was created. Then, the pictures were matched with the official building map for the corresponding area. Finally, the ghost buildings were identified

key role in identifying ghost buildings in their respective territories. The intensity of such identification varies significantly, however, across municipalities. Following Casaburi & Troiano (2016), we use a measure of Ghost Building Intensity, or the number of land registry parcels with ghost buildings identified by the program, to measure the tax enforcement attitude of each municipality.[46] More specifically, we use the number of identified *ghost buildings* as a proxy for the civic sense and civic duty of the local municipal government. Using our difference–in–differences setting, we present the results in Table 2.6. The negative coefficient reveals that, on average, infiltrated municipalities register and declare fewer *ghost buildings*. We interpret this result as in line with our previous findings. When local governments are captured by criminal organisations, the efficiency of the administration, its civic sense, and its compliance with rules decrease. This undermines the entire social welfare of the local community.

2.6 Robustness Checks

In this section, we present a selection of important tests used to verify the robustness of our design and our estimates. Additional robustness checks are presented in appendix A.3.[47]

Infiltration period starts with the elections. As discussed in section 2.3.2, the starting assumption of our identification strategy is that the period of infiltration begins at the moment of the election of later-dissolved governments and ends with the dissolution. We test the validity of this assumption in Table 7, where we perform a placebo experiment on our full sample.[48] If significant variation in both public investments and revenue collection starts in the period preceding infiltration, the decision to infiltrate a government might be taken as a result of this variation. This would occur if the criminal organisation were selecting municipalities where to extract rents on the basis of pre-determined variations

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(Casaburi & Troiano, 2016).

[46]Casaburi and Troiano (2016) use a difference-in-differences approach, to test the impact of the antievasion policy on the reelection of local incumbents by exploiting cross-municipality variation in the Ghost Building Intensity

[47]Appendix 2A.1/2/3 presents the following tests for all our results. a) We present the analysis with both the full and the restricted sample; b) for each of these estimations, in columns 1 to 3, we gradually increase our controls and include linear time trends; c) in column 4, we change the specification and let the infiltration dummy enter with a one-year lag. Section 2A.1/2/3 in the appendix provides a full explanation of the estimations.

[48]The same analysis of the restricted sample can also be found in Table 2.7.

in public expenditures or local taxes, made by governments with no links with or-
ganised crime. If this is the case, public spending decisions are the cause, not the
consequence, of organised crime infiltrations. Our placebo test verifies the spend-
ing behaviour and the revenue collection of those governments later dissolved for
mafia infiltration. In Table 2.7, for each of our outcome variables, Column 1 re-
ports the result of our full model as expressed in Tables 2.3 and 2.4. Columns 2
and 3 introduce two new dummy variables taking value 1 respectively 1 year (Col-
umn 2) and 2 years (Column 3) immediately before the election of later-dissolved
government. All years coded as 'infiltration years' – from election to dissolution
– are excluded from the sample. We expect to find no significant correlation be-
tween pre-infiltration governments and any form of public spending or revenue
collection distortion. All the coefficients in Columns 2 and 3 are insignificant,
suggesting that the observed effects on public spending and revenue collection are
significantly affected only during infiltration years.

Although we cannot reject with full certainty the possibility that infiltrations
begin before elections, the results of our placebo test seem to follow the theoretical
framework of Dal Bo (2006), according to which elections constitute a "*recruitment
process*" whereby a new bargaining table between crime and politics is established.
This might particularly be true in the case in Southern Italy where the political
turnover is very high: 71% of local administrators leave local politics within 5 years
and 93% within 10 years (Daniele and Geys, 2015). In this context, elections are
crucial because they can constitute a turning point whereby the "*criminal interest
groups*" select the political counter-parties that best suit their interests. Hence,
the striking difference in all the coefficients from column 1 to column 2 – 3 in Table
2.7 might be explained as a newly renovated agreement between mafia members
and politicians which in turn leads to a distortion in the allocation of public
resources and revenue collection.

Parallel trend - full dynamic specification. When the sample includes
many years, the DiD model lends itself to a test of causality in the spirit of Granger
(Angrist and Pischke, 2009). More specifically, a Granger causality test (or full
dynamic model) allows us to observe whether causes happen before consequences,
or vice versa. It therefore provides an additional control for simultaneous causality
that analyses the dynamic evolution over time of the local spending determined by
the infiltration. In this specific context, Granger causality testing means checking
whether there is any statistically significant difference between infiltrated and

non-infiltrated municipalities before the infiltration takes place. In order to do this, a set of dummy variables is created for each and every year of the treatment period, i.e. the period from the governments' election to their dissolution. Similar dummy variables are also constructed for pre-treatment years, while one additional dummy is created for the whole post-treatment period.

Formally, we estimate the following equation:

$$Y_{m,t+1} = \varphi_m + \tau_t + \sum_{\tau=0}^{\rho} \delta_{-\tau} Inf_{m,t-\tau} + \sum_{\tau=1}^{q} \delta_{+\tau} D_{m,t+\tau} + X_{m,t}\beta + \varepsilon_{m,t} \qquad (2.2)$$

Where ρ represents the post-treatment effect and q represents the anticipatory effect.[49] We have thus re-estimated the model for the main dependent variables (capital account spending for construction and waste management and for municipal police) by including this set of leads and lags, again controlling for fixed-time effects and municipality time trends.Figures 2A.3 and 2A.4 in the Appendix display the result of the analysis for both public spending and for revenue collection.We assess the evolution of municipal spending: up to 2 years before the election of an infiltrated government, during the period in which the infiltrated government was in charge, and in the post-dissolution years. Each point in the Figures refers to the estimated coefficient for a given year. [50]

Importantly, for all our results, the estimates reveal no statistical difference in the pre-treatment trends between control and treatment group. In all the Figures, the 2 pre-treatment years show that, before the infiltrated governments, there is very limited and not significant variations in either the share of public investments (in construction, waste management and police) or in the collection of fiscal resources. Hence, there is no evidence that the significant change in the proportion of investments and revenues precedes the election of an infiltrated government.[51]

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[49]Given that some municipalities experienced more than one government dissolution, the post-treatment period cannot be codified as continuous in these cases. As a result, all municipalities with more than one infiltrated government in the 1998-2013 period have been excluded from the sample for this test. In the case of municipalities that experienced a government dissolution prior to 1998, the post-treatment dummy takes value 1 for the entire period of analysis.

[50]The number of years of legislature - and corresponding number of municipalities - before dissolutions are as follows: 1 year - 117 municipalities; 2 years - 110 municipalities; 3 years -78 municipalities; 4 years - 49 municipalities; 5 years - 23 municipalities.

[51]Figure 2A.3 shows a jump in investments in construction and waste management in the first year after local election. This may be due to the fact that the second budget year is also the last

This is a fundamental test not just because it addresses an important criteria of the Difference – in – Differences estimation, but also because it provides the highest level of transparency of the dynamicity of the effect before and after the beginning of the treatment.

Selection into treatment correlated with outcome variable. Our results indicate that infiltrated local governments spend on average more on construction and waste management and less on municipal police. One concern, however, is that judicial investigators might choose to investigate precisely those municipalities that present anomalies in their balance sheets. If this is the case, selection into treatment would be correlated with the dependent variable, and there would therefore be bias.

In order to tackle this issue, we reproduced our analysis excluding from the sample all those municipalities for which the main reason for dissolution was related to distortion in the allocation of resources.[52] Table 2A.7 provides the results, showing that reductions in police force investments and increases in construction and waste management don't just remain significant but they also increase in magnitude. Columns 1 and 3 provide the point estimates for both capital spending in police and construction. The only coefficient that turns insignificant refers to the current account spending for municipal police.[53] Hence, according to the estimates in Table 2A.7 we can safely dismiss the concern that our results were driven by a bias in the selection into treatment.

Placebo test: organised crime - unrelated dissolutions. One concern related to the changes in the public spending of infiltrated governments is that, rather than being caused by the mafia, they might be driven by some inherent characteristics of dissolved local governments. These may include the degree of political instability, or the quality of politicians governing these local councils. In

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one in which governments can promote three-year investment plans of public works and hope to see the end of construction work while still in office. These medium-term investment initiatives are potentially very appealing to the mafia due to their higher monetary value as compared to single-year plans – as mentioned, three-year plans concern public works over 100,000 Euros.

[52]To perform this test, we exploit official statements on the dissolutions. These documents contain precise descriptions not only of the final reason for the dissolution, but also why the investigation was begun. We exclude from our sample all the municipalities for which a) the investigation started and/or b) the reason for the dissolution was due to spending related distortions. In doing so we excluded 14% of the sample.

[53]This does not come as a surprise because this result was very weak in the main analysis as well. We do not know if the loss of significance is simply due to the lower statistical power or if it is related to a bias in the selection into treatment.

order to test for this, we exploit the fact that in Italy local governments can be dissolved for reasons unrelated to mafia infiltrations, including: failure to approve the financial budget, resignation of the mayor, resignation of more than 50% of the council members, vote of no confidence. These dissolutions are in fact relatively common in our sample and time-span – in the period from 1998 to 2013 there were 463 cases of municipal government dissolutions unrelated to the mafia within the three Regions of analysis. We use these dissolutions as proxies for unstable governments and for low quality of elected politicians, replicating the estimates of model (1) using $DissNomafia_{m,t}$ as the main explanatory variable, a dummy taking value 1 for all years in which governments later - dissolved for mafia-unrelated reasons were leading the municipalities.[54] If the results in section V were driven by local government characteristics unrelated to the mafia - rather than by infiltrations - we would expect to obtain similar effects as those presented above.

The results of this placebo test are presented in Appendix 2A6. We exclude all infiltrated governments and compare dissolved governments for mafia-unrelated reasons with other governments, before and after the dissolution takes place. We do so using the entire sample of municipalities from Calabria, Campania and Sicily from 1998 to 2013, including linear time trends and controlling for time and municipality fixed effects, and all other controls. Table 2A.8 includes our main results as outcome variables. There are no statistically significant coefficients, suggesting that the observed differences between infiltrated and non-infiltrated governments is truly produced by the presence of the mafia.

In this section we tested the robustness of our estimates. In the section that follows, we further investigate the complex relationship between politics and organised crime.

2.7 Organised Crime and Politics

Our results have thus far revealed that collusion between criminal organizations and politicians has a significant impact on both the allocation of public resources and on local taxes. Both public spending and revenue collection can, however, be

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[54]This type of dissolution is indubitably a bad outcome for a newly elected local government. When, in fact, the government is dissolved for non-mafia related reasons, the elected politicians cannot run again in the following election. Thus, they have every incentive to avoid this scenario.

affected by a multiplicity of factors. The most intuitive and important of which is politics. Hence, a legitimate question is whether our results so far are truly driven by criminal infiltration or simply by some unobserved political characteristics of the local elections of infiltrated municipalities?

The objective of this section is to provide an answer to this fundamental question. In doing so, we inevitably investigate a new empirical relationship between organised crime and politics. This section consequently not only provides a crucial test for the validity of our results, but also offers further insight into infiltration phenomenon.

2.8 Robustness check: politics, organised crime and state capacity

Politics and Organised Crime. Theoretically, there are different political characteristics that might be associated with cases of collusion. One of which is certainly electoral competition. Electoral competition may give rise to opposition parties that can inform the electorate about corruption or collusion (Schleiter and Voznaya, 2014) or, alternatively, more competitive elections may make it more difficult for voters to identify who is responsible for government policy and to coordinate in selecting the best politicians, hence increasing collusion (Lewis-Beck, 1988; Anderson, 2000). We assess whether mafia infiltration is related to the degree of electoral competition by exploiting the fact that there have been cases in which local elections in Southern Italy have been non-competitive; that is, only one candidate was potentially eligible for mayor because no other electoral lists were presented.[55] A lack of electoral competition may be associated with infiltration if pre-electoral intimidation on the part of the mafia limits the participation of other candidates, or if the absence of political opposition within local councils facilitates opportunities for the mafia to find valuable political referents.

Another political element, which may be associated with infiltration, is the mandate limit of incumbent mayors. We look at different terms of office first or second term as mayor? to examine when and if incumbents may be more likely to engage in collusion behaviours. The literature suggests that binding term limits tend to affect the behaviour of politicians (Besley and Case, 2003; List and

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[55]In such cases, the only condition necessary to valid the election is a voter turnout above 50%.

Sturm, 2006; Alt et al., 2011; Ferraz and Finan, 2011) and may increase cases of corruption and collusion (Ferraz and Finan, 2011). We exploit the fact that up until 2014 all mayors had a maximum limit of two consecutive terms in office and examine whether infiltration is associated with the fact that mayors have no possibility of being immediately re-elected.[56] A lower degree of accountability towards the citizens may facilitate the propensity to collude with organised crime.

Finally, infiltrations may be systematically correlated with the political colour of governments. We explore this relationship by verifying whether there is a particular political party recurrently chosen by the mafia when political support is offered in exchange for favours. To perform this test, we divide the political spectrum into three categories: left-wing parties, right-wing parties, and centre parties. A separate classification is used for civic lists, i.e. those electoral lists which differ from the traditional political parties and are often created *ad hoc* for the local election. [57]

In order to investigate whether any correlation exists between cases of criminal infiltration and the political characteristics of municipal elections, we regress a set of indicators for our *Political Factors* on a dummy equal to one (*Infiltration*) if the municipal government is infiltrated. [58] Political Factors is sub-divided into a set of variables referring to key political features of the local government, namely: only one candidate running for election (*Single Candidate*), incumbent running for the second and last mayoral mandate (*Last Mandate*) and political

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[56]While mayors can run for a third term after a term break, third-term candidacies are extremely rare.

[57]Recent evidence has shown that the mafia sells votes to the party that has more core supporters and it is therefore expected to win (De Feo and De Luca, 2013). In Sicily, the strongest political relationships developed by the mafia have been with the Christian Democrats (*Democrazia Cristiana*, DC) (De Feo and De Luca, 2013) and then after the DC's demise in 1994, with the conservative party Forza Italia (Buonanno et al., 2016). Daniele and Geys (2016) find that in the elections immediately following mNote: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; all municipalities for which the main reason for dissolvement was related to distortions in the balance sheets are excluded. Commissioning years excluded in all specifications.afia dissolutions, voters are more likely to vote for centre-left parties and less for civic lists.

[58]We exploit the same dataset used in the Section 3, augmented with data on election characteristics for all the municipalities of Calabria, Campania and Sicily from 1998 to 2013. Our primary data source is the Historical Archive of Local Elections of the Italian Ministry of Interior. We focus on the 182 municipalities that experienced at least one dissolution for mafia infiltration between 1998 and 2013. Descriptive statistics for all political variables are displayed in Table 2.A7 in the Appendix. The variables are reported for both the full sample of municipalities having experienced at least one dissolution, and for the infiltration years.

colour of the winning party (*Right Party, Centre Party, Civic List*).[59] Table 2.8 reports linear probability estimates from this regression. Each of the columns refers to different political variables of interest. The coefficient of Single Candidate (Column 1) is positive and strongly significant. One interpretation of this finding is that due to mafia-government agreements, the mafia operates to reduce political competition, up to the point that only their preferred candidate is running for mayor. Alternatively, it may be that infiltrations are more likely to occur if the local council lacks any political group potentially contrasting the decisions of the government.

Moving to Column 2, the coefficient of the Last Mandate dummy variable is positive and highly significant, suggesting that mayors in their last term of office are more likely to collude with organised crime (Besley and Case, 2003; List and Sturm, 2006).

In columns (3) to (6) we look for a "partisanship effect", i.e. a systematic relationship between infiltrations and certain types of parties. The result of a positive and significant coefficient for the Right Party dummy variable suggests that infiltration is significantly correlated with the probability of having a right-wing party winning the local election and controlling the infiltrated government. The coefficients for Left Party, Centre Party and Civic List are not statistically significant.[60]

Taken together, the estimated effects uncover some important empirical regularities of infiltrations and political and electoral factors. Although we cannot establish the direction of causality of the relationships discussed, the results seem

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[59]When estimating the model with Party Colour variables, we excluded the few governments whose administration cannot be classified among these three categories of parties. In addition, commissioning years are excluded from the analysis, where the municipal government was taken over either for reasons due to mafia infiltration or for other motives. Civic List is a dummy variable taking value one if the winner of the election in municipality m and leading the government at time t is a civic list, that is, a different political formation from any existing traditional party. Although civic lists are not incorporated in any party, they very frequently form multi-party coalitions made of groups of traditional parties.

[60]Political conditions may influence the allocation of public expenditures (Johnston, 1977; Besley and Coates, 1998). The expectations and resultsof electoral contests may be drivers of the territorial allocation of public investments if, for example, incumbent governments allocate public resources with the aim of extracting the highest electoral benefits (Cadot et al., 2006; Rodriguez-Pose et al., 2016), or if public investments are seen as a means to reward voters for electoral support (Golden and Picci, 2008). While this is a possibility, there is substantial evidence suggesting that the distribution of public expenditures is not always influenced by pork-barrel politics or strategic electoral considerations (Larcinese et al., 2012; Luca and Rodriguez-Pose, 2015).

to confirm the structural integration of organised crime groups within the political system and suggest that they are either able to influence electoral outcomes (if collusions happen in pre-electoral periods), or that infiltrations are more likely to occur under some specific political circumstances (if collusions happen after elections).

Political factors and public spending in infiltrated municipalities. All the political and electoral elements discussed so far may not only be correlated with infiltrations, but also with the investment decisions of local governments. This is a very serious concern since it would imply that the estimated effect on the composition of the local budget in Section 5 may be the consequence of political elements such as strategic redistributions and pork-barrel politics, rather than the result of an infiltration. Hence, for any uncovered correlation between infiltration cases and political conditions, we need to verify that infiltrations, and not these political factors, are the drivers of the significant changes in public spending discussed in the previous section of the paper.

We do so by estimating the following models:

$$Y_{m,t+1} = \alpha + \beta_1 Inf_{m,t} + \beta_2 PoliticalFactors_{m,t} + \gamma Mafia_{p,t} + \delta NatGov_t + \vartheta X_{m,t} + \varphi_m + \tau_t + \varepsilon_t$$
(2.3)

$$Y_{m,t+1} = \alpha + \beta PoliticalFactors_{m,t} + \gamma Mafia_{p,t} + \delta NatGov_t + \vartheta X_{m,t} + \varphi_m + \tau_t + \varepsilon_t$$
(2.4)

Where $Y_{m,t+1}$ represents the main results of Section 5, i.e. local public expenditures on capital account spending for construction and waste management, for municipal police and local fiscal revenues (waste tax and total tax). As above, $PoliticalFactors_{m,t}$ is sub-divided into a set of variables referring to key political features of the local government, namely $SingleCandidate_{m,t}$, and $PartryColour_{m,t}$.

As in the previous empirical analysis, $Mafia_{p,t}$ represents a control variable for the underlying strength of the mafia. $NatGove_t$ is a dummy variable controlling for the political colour of the national government at time t – left or right-wing governments. $X_{m,t}$ is a vector of socio-demographic municipal control variables at the municipality level. φ_m and τ_t respectively represent municipality and time

fixed effects. $\varepsilon_{m,t}$ is an idiosyncratic error term. Standard errors are clustered at the municipality level.

Exploiting our difference - in - differences setting we present the results of model (3) in Table 2.9 and those of model (4) in table 2.10. In Table 2.9, we run our main estimating equation from Section 5 but control for all the political factors correlated with the infiltrated local government. The infiltration dummy remains significant and confirms all of our results. None of the political factors are significant. The same is true in Table 2.10 where we provide the estimate for equation 4: again, none of the estimated coefficients report significant correlation between key political factors and the spending components on which government spending varies during infiltration periods.[61] These crucially important tests confirm, as hypothesised, that the variations in public spending are not determined by any of the political elements linked with infiltrations.

2.9 Partisanship effect, organised crime infiltration, and public spending

2.9.1 RDD setting

The previous section uncovered a systematic correlation between criminal infiltrations and governments ruled by conservative parties. This may imply that the mafia is more likely to provide electoral support to right-wing candidates, or that candidates belonging to right-wing parties are more likely to collude with criminal organisations. Although interesting, this result cannot be interpreted causally. The electoral victory of a right-wing candidate is plausibly correlated with a wide range of socioeconomic characteristics of the municipality. Thus, a simple comparison of the probability of infiltration in municipalities with and without right-wing incumbent mayors may confound the effect of other municipal characteristics. We consequently cannot be fully certain that our main results on public spending are not driven by conservative parties winning the elections.

In order to address this issue, we implement a regression discontinuity design

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[61]As a further check that the relationship between infiltration and local public finances is not driven by political conditions, we restrict the sample to infiltration years and focus only on the governments that were dissolved for mafia infiltration during the 1998-2013 period. The results, shown in Table 2.A8 in the Appendix, corroborate the hypothesis that political factors are not linked to expenditure shares of infiltrated governments.

(RDD) based on close elections, investigating whether the probability of infiltration is a function of the electoral victory of right-wing parties. We compare municipalities where right-wing candidates won local elections by a narrow margin to municipalities where right-wing candidates lost by a narrow margin. The underlying identification assumption of this empirical exercise is that municipalities where right-wing candidates won or lost by a narrow margin are similar across all characteristics, except for the ideological leaning of the incumbent politician. Table 2.A9 in the Appendix provides evidence that key covariates (socio-economic variables, mafia strength, local election characteristics) are not significantly different in treatment and control groups used for the RDD.

The empirical approach therefore focuses on the sample of electoral races in which the right-wing candidate is either the election winner (*treatment group*) or the runner-up (*control group*).[62]

Let $X_{m,t}$ be the vote share of the right-leaning candidate minus the vote share of the non-right candidate, $R_{m,t}$ be the treatment dummy variable referring to electoral victories of right-wing parties, and $Pr(Inf)_{m,t}$ the probability of infiltration. We then have $R_{m,t} = 1$ if $X_{m,t} > 0$ and $R_{m,t} = 0$ if $X_{m,t} < 0$. We focus on the set of electoral races where $X_{m,t}$ is lower than a bandwidth h, such that the outcome of those races can be considered as good as random. Our treatment effect is the average difference between $Pr(Inf)_{m,t}$ of a municipality where the right narrowly wins and $Pr(Inf)_{m,t}$ of a municipality where the right is narrowly defeated.

Formally:

$$Pr(Inf)_{m,t} = \alpha R_{m,t} + f(X_{m,t}) + \varepsilon_{m,t} \tag{2.5}$$

for all electoral races, such that $-h < X_{m,t} < h$

with $R_{m,t} = 1$ if $X_{m,t} > 0$, and $R_{m,t} = 0$ if $X_{m,t} < 0$

We estimate $\alpha = E[Pr(Inf)_{m,t}|R_{m,t} = 1] - E[Pr(Inf)_{m,t}|R_{m,t} = 0]$. α is

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[62]As a robustness check, we replicate the RDD estimates comparing all the close electoral races where the right barely wins or loses against the left party only. The results are remarkably similar to those obtained when all non-right parties belong to the control group. Estimation results available upon request.

estimated both parametrically and non-parametrically.[63] We report estimates under two choices for the local polynomials: linear and quadratic.

In order to obtain reliable RDD estimates, we need to ensure that there is an absence of non-random sorting around the cutoff.[64] To this end, we perform a McCrary density test, making sure that there is no significant jump in the density of observations at the cutoff point. Figure 2.A.5 in Appendix 2.A9 exhibits a very small discontinuity at the threshold, which is statistically insignificant (Table A9.4).

2.9.2   Results

Table 11 presents our main results, obtained with the full sample of municipalities from Campania, Calabria and Sicily, using both non-parametric and parametric estimation methods. Columns (1) and (2) present the results when using, respectively, a linear and quadratic functional forms. The optimal bandwidth used is 0.075, meaning that the sample is made up of governments whose election was characterised by a difference in votes - between the right-wing party and other parties - below 7.5%. We remove assumptions of linearity in columns (3)-(5). In all cases we find clear evidence of a positive and significant correlation, indicating that the probability of infiltration increases when right-wing parties win local elections by a small margin over other parties.

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[63]In the choice of optimal bandwidth (h), we face a trade-off between efficiency and bias. With very small bandwidths, we are more likely to approximate the quasi-experimental assignment of the treatment variable and to attain balance in the other observable covariates. Very small bandwidths often, however, lead to small sample problems and imprecise estimates. To address this issue, we use the optimal bandwidth proposed by Calonico et al. (2014), which addresses the bias in the confidence interval and the point estimator.

[64]If the density of $X_{m,t}$ for each municipality is continuous, then the marginal density of $X_{m,t}$ over the sub-sample of municipalities used for the RDD study should be continuous as well (McCrary, 2008). If, for example, close races are disproportionally resolved in favour of right wing parties – e.g. via manipulation of electoral outcomes, electoral fraud, etc.– this would challenge the idea that the outcome of these electoral races is as good as random, and indicate some degree of sorting around the threshold. While to a given extent mafia groups are indeed expected to manipulate electoral results by re-directing voting to their preferred candidates, the results of the tests reported in Appendix 2.A9 suggest that this is not the case in our sample of close elections. One possible interpretation may be that if the mafia actively distorts electoral results, this is unlikely to bring victory to the preferred party by a small margin. Electoral manipulations normally come with abnormal numbers of non-valid or white ballots. As a descriptive indication that electoral manipulation is not occurring in the RDD sub-sample, the average proportion of non-valid ballots in infiltrated municipalities won by the left is 4.4% whereas it is 3.8% when the right-wing party wins and the government is infiltrated. The number of white ballots are respectively 1.6% and 1.4%.

Figure 8 illustrates these findings graphically, where observations are fitted with polynomials of order two, using Calonico et al.'s (2014) bandwidths, and adding confidence interval bands. A statistically significant increase in the number of infiltrated municipalities on the right-hand side of the threshold is evident, indicating that the probability of infiltration increases when right-wing parties marginally win the election. These findings nicely complement those of Buonanno et al. (2016) and Alesina et al. (2016) who focus on national elections rather than local elections and report a systematic correlation between mafia-plagued municipalities and the main Italian right-wing party during a similar period of analysis.

Figures 2A.6 and 2A.7 in Appendix A9 confirm the robustness of these results by showing point estimates at different cutoff points and with different bandwidths. As expected, the effect is statistically insignificant at placebo cutoffs. The results remain significant when we increase the bandwidth and when we decrease the bandwidth to elections where the margin of victory was as low as 4%.

2.9.3   Partisanship and public spending

Such a significant relationship between right-wing parties and the probability of infiltration may imply that changes in public spending are not caused by mafia infiltrations but rather by right-wing local governments. To address this concern, we replicate RDD estimates by using capital account spending on construction and waste management and for municipal police as dependent variables. We estimate:

$$Y_{m,t+1} = \alpha R_{m,t} + f(X_{m,t}) + \varepsilon_{m,t} \tag{2.6}$$

Where $Y_{m,t+1}$ represents our main results: a) capital account expenditures on construction and waste management or on municipal police, as a share of total capital account spending and b) our measure of efficiency for Waste Tax.

Table 2.12 reports the results. The insignificant coefficients of right-wing parties reveal that there is no statistically significant variation in construction and waste management and police spending on the part of municipal governments ruled by right-wing parties that barely won the election. The same is valid for the Waste Tax, which reports a non-significant coefficient. Figure 2.9 reproduces the estimation results in graphical forms, providing evidence that no discontinuity around the threshold is present for either of the two key spending components or

for waste tax. Hence, this test supports our hypothesis arguing that the significant variation in construction and waste management and police expenditures and waste tax in infiltrated municipalities are due to the presence of organised crime and not to other unobserved or confounding factors.

2.10   Conclusion

Collusion and corruption distort the correct functioning of democratic systems. Such institutional failures have the potential to influence key aspects of economic activity, undermining the long run development of any society (Shleifer and Vishny, 1993; Mauro, 1995; Glaeser and Saks, 2006). A particularly dangerous form corruption is that perpetrated by organised crime. Differently from the more common white-collar crimes, criminal groups seek profit through illegal business and frequently employ physical intimidation. Illegal and secretive agreements between elected officials and colluding parties may alter the legislative process, compromising the definition of policies aimed at the welfare of citizens. Yet the mechanisms through which this negative impact takes place are still unclear. In this paper, we explored one possible channel: collusion between organised crime and politicians. Our study is among the first in the literature to extensively study the phenomenon of infiltration, analysing both the conditions that make such collusions more likely and their possible consequences.

Using disaggregated municipal data from three regions of Southern Italy, we find that the collusion between organised crime and politicians affects the allocation of public resources and the ability of local governments to collect resources. Our analysis suggests that while the overall amount of financial resources that local governments spend remains unaltered, expenditures for specific components of public finance vary significantly as a result of infiltrations. In particular, difference-in-differences estimates reveal that infiltrated municipalities invest higher shares of resources in construction and waste management and reduce annual investment shares in municipal police forces. Moreover, infiltrated municipalities collect on average fewer revenues, in particular waste taxes. These results are robust to changes in specifications and to a series of robustness checks.

Furthermore, we have identified a set of political characteristics of municipal elections that are correlated with infiltrations. We find that both the absence of competition at local elections, as well as having a mayor running for her second

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and last mandate, are linked with infiltrations. This seems to suggest that there may be some recurrent electoral patterns associated with mafia-government collusions. Importantly, we find no evidence of a correlation between these political conditions and spending decisions. This provides additional evidence in favour of the hypothesis that variations in public spending decisions are determined by infiltrations. In addition, we tested for a systematic correlation between infiltrated governments and political parties of a specific colour, uncovering a positive and significant association between infiltrations and elections won by right-wing parties. This may imply a preference on the part of the mafia for Italian right-wing parties when looking for political referents. We further investigated this relationship by testing the effect of right-wing narrow electoral victories on the probability of infiltration. The evidence suggests that infiltrations are more likely to occur when governments are controlled by right-wing mayors.

In conclusion, this paper provides an assessment of the strategy of organised crime when it endeavours to take control of local politics and consequences for local state capacity. Criminal groups neither seem to impose generalised inflations of public expenditures, nor do they seem to be interested in conditioning the current account budget. Rather, local finances are modified only in the key and strategic sectors where the mafia has interests to protect. In addition, we show that there may be some political parties that are systematically more likely to collude with organised crime.

In sum, our analysis has unveiled the important distortionary effect that mafia infiltrations may have on politics and policy choices. Our study may help to gain a deeper understanding of such phenomena and possibly aid in the prevention of mafia infiltrations.

2.11 Figures and Tables

2.11.1 Figures (in the text)

Figure 2.1: Yearly earning (bn EUR) by mafia organisation
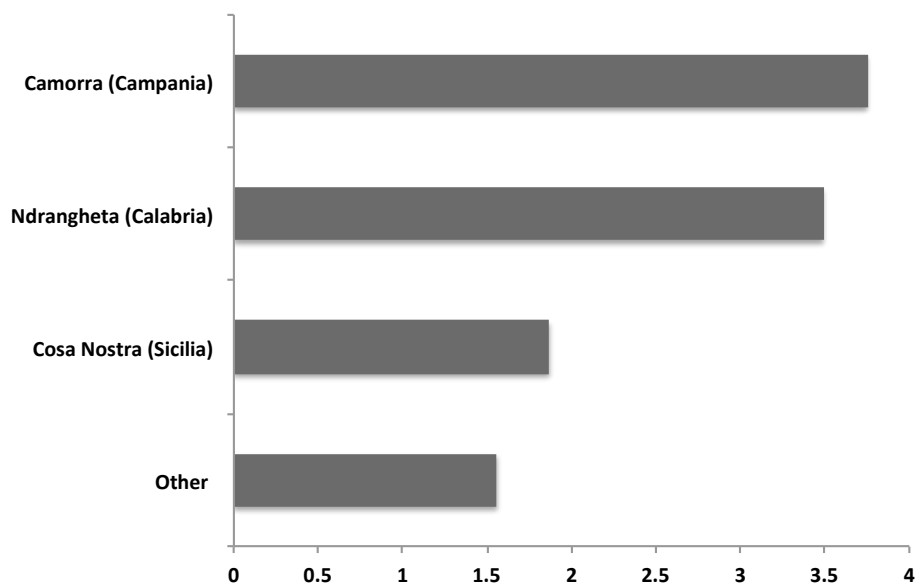
Note: Source: Transcrimine – Gli Investimenti delle Mafie 2013 – authors' own elaboration.

Figure 2.2: Mafia investments by sector
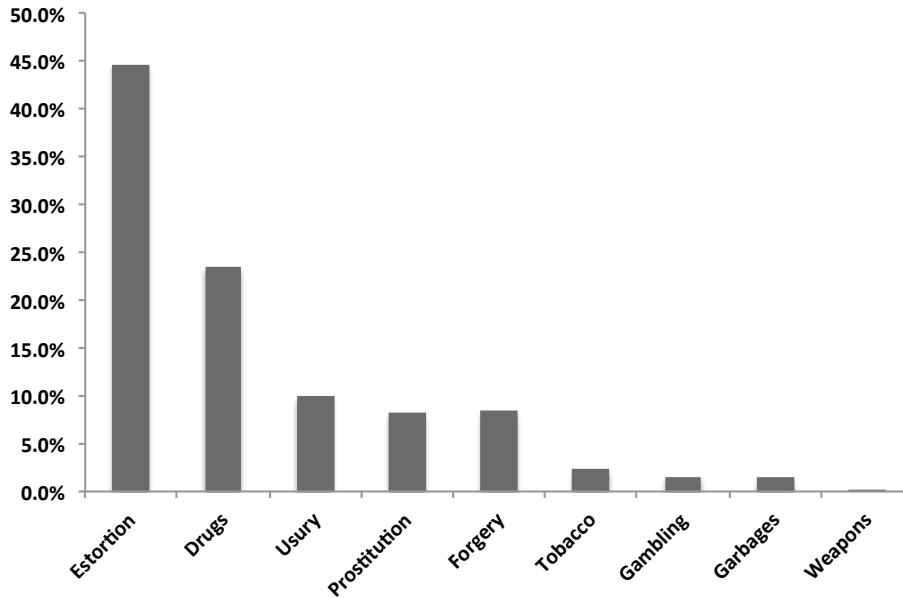
Figure 2.3: % Illegal profits re-invested into the legal economy
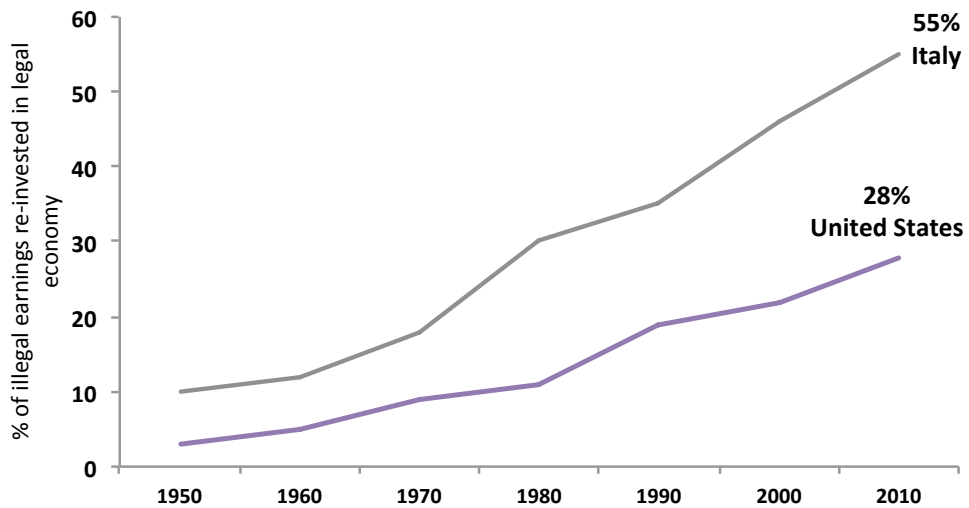
Figure 2.4: Geographical location of the dissolutions
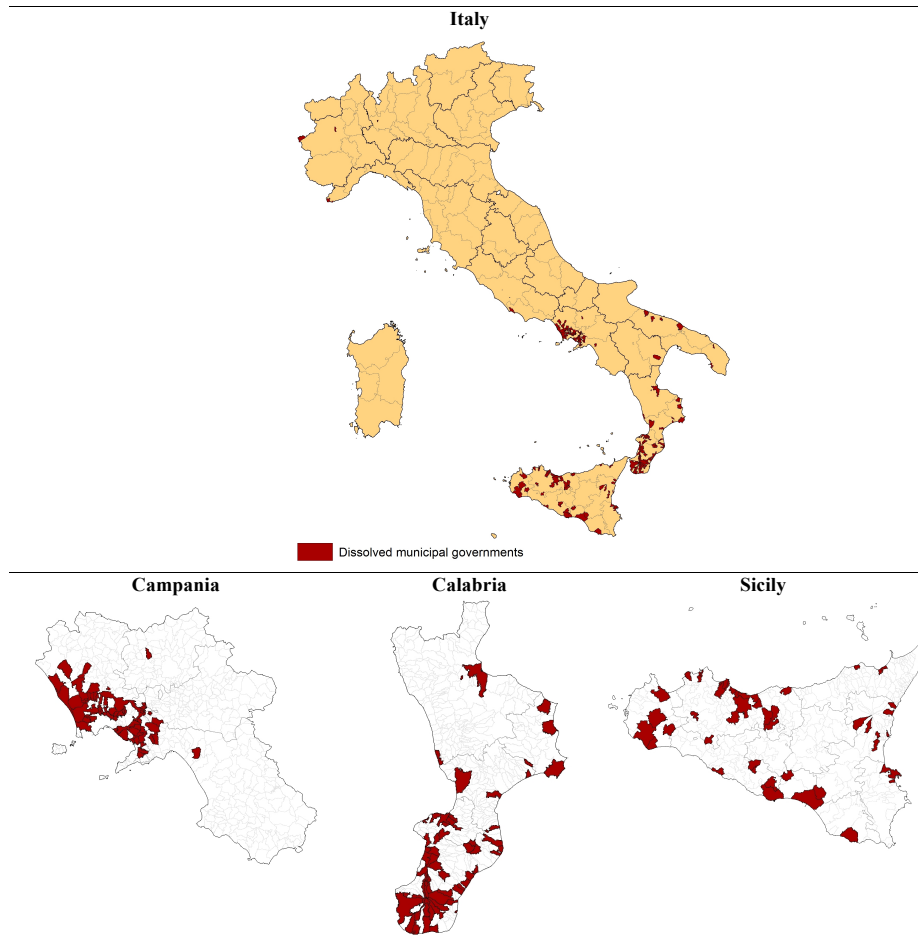
Note: Source: Italian Ministry of Interior – maps are authors' own elaboration.

Figure 2.5: Number of dissolved municipal governments for mafia infiltration
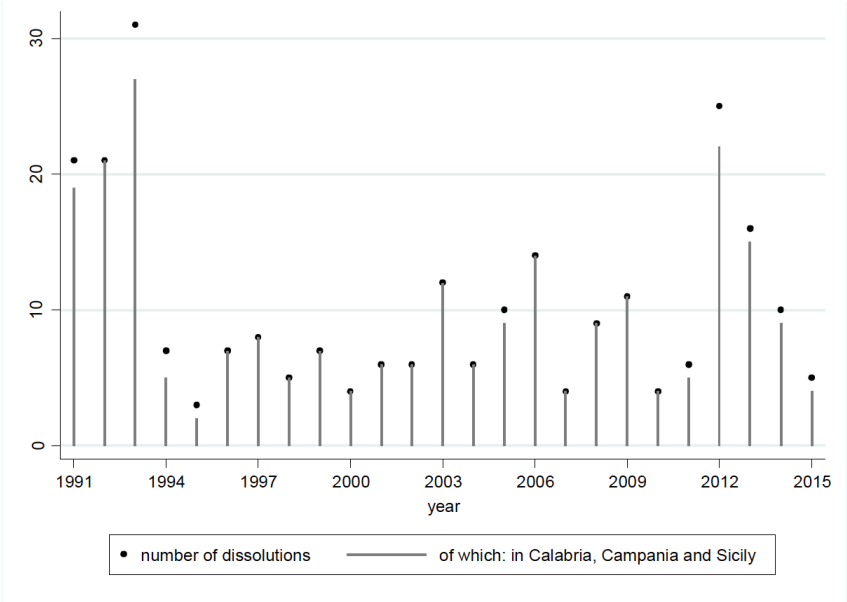
Figure 6

Identification of the treatment period

Electoral history of the municipality of Casoria (Campania)
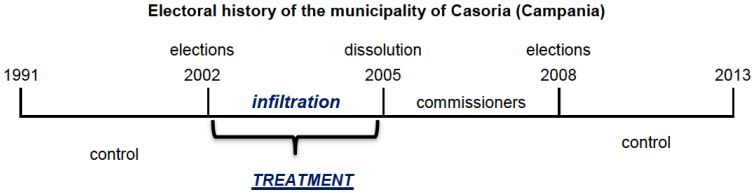
Figure 2.6: Organised crime controlled firms investments by sector
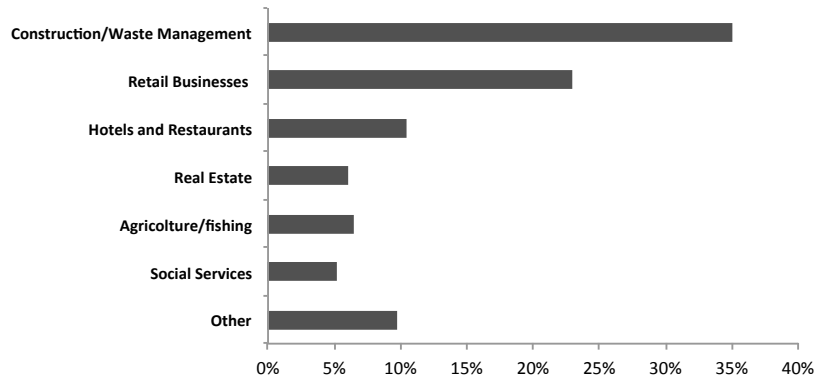
Source: Transcrimine – Gli Investimenti delle Mafie 2013 – authors' own elaboration

Figure 2.7: RDD – right-wing party victory and probability of infiltration
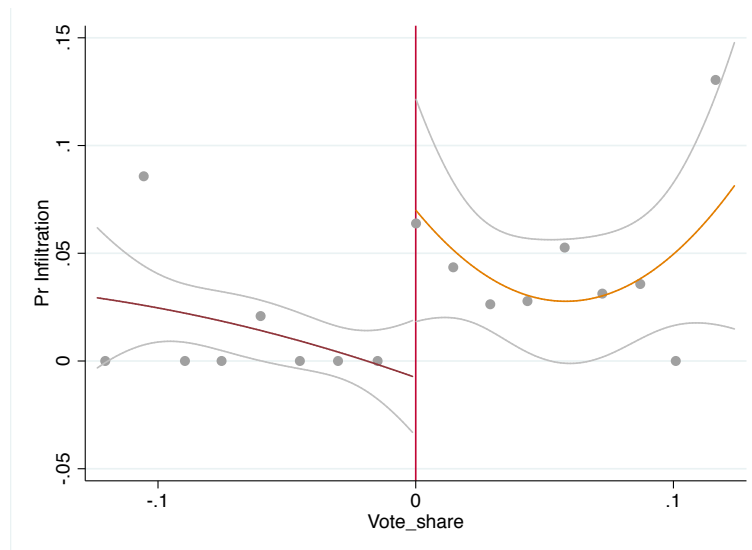
Note: Polynomial fit of order2. vote share>0 refers to elections won by right-wing parties; vote share<0 refers to elections barely lost by right-wing parties.

Figure 2.8: RDD – right-wing party victory and current account spending components and waste tax
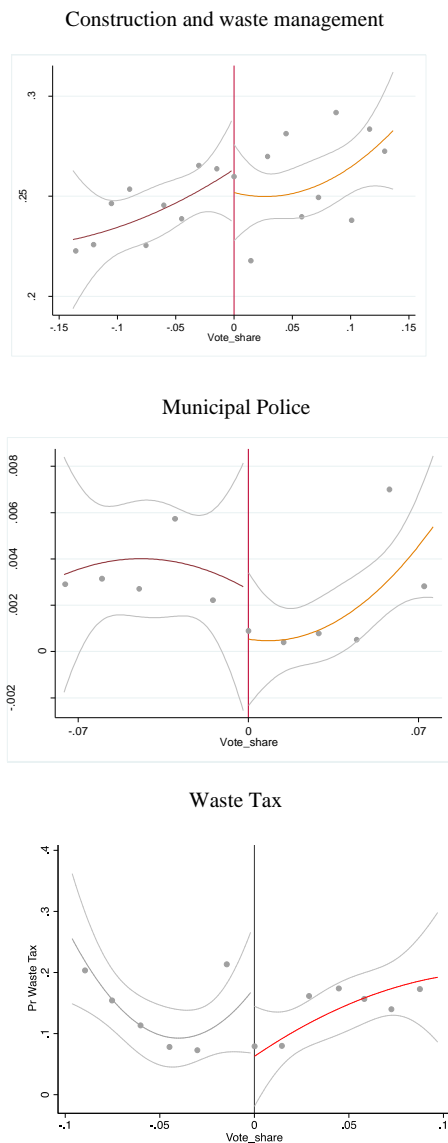
Construction and waste management

Municipal Police

Waste Tax

Note: polynomial fit of order2. vote share>0 refers to elections won by right-wing parties; vote share<0 refers to elections barely lost by right-wing parties.

2.11.2 Tables (in the text)

Table 2.1: Descriptive statistics - public spending

	Full sample			Restricted sample		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Total per capita spending						
Total	21,156	1273.8	1129.9	2,678	1020.3	930.96
Capital Account	21,156	542.82	1002.7	2,678	354.98	821.98
Current Account	21,156	730.97	394.43	2,678	665.3	267.2
Capital Account component (share of total)						
Administration	21,037	0.152	0.217	2,648	0.168	0.214
Social sector	20,901	0.063	0.134	2,625	0.055	0.123
Territory and environment	21,143	0.342	0.292	2,660	0.320	0.277
Transports	21,090	0.232	0.242	2,653	0.228	0.233
Education	20,844	0.084	0.153	2,637	0.104	0.165
Municipal police	20,474	0.003	0.019	2,588	0.007	0.025
Current Account component (share of total)						
Administration	21,240	0.429	0.095	2,675	0.400	0.093
Social sector	21,243	0.073	0.058	2,675	0.086	0.061
Territory and environment	21,239	0.228	0.085	2,675	0.267	0.090
Transports	19,909	0.082	0.040	2,507	0.068	0.037
Education	18,557	0.083	0.041	2,335	0.074	0.038
Municipal police	21,239	0.059	0.027	2,675	0.058	0.024

Note: Full sample refers to all the municipalities of Campania, Calabria and Sicily. Restricted sample refers to the municipalities of these regions that experienced at least one government dissolution for mafia infiltration. The sum of the means of all capital account or current account spending components does not sum up to 1 due to the fact that there are some other minor spending.

Table 2.2: Effect of infiltration on total public spending
Effect of infiltration on total public spending

	Dependent Variable:					
	Total per capita spending		Total p/c spending - Capital Account		Total p/c spending - Current Account	
	(1)	(2)	(4)	(5)	(7)	(8)
Infiltration	-28.55	-15.85	-27.30	-14.59	-1.249	-1.253
	(33.02)	(34.55)	(30.37)	(34.53)	(10.27)	(8.236)
Mafia Homicides		✓		✓		✓
Other controls		✓		✓		✓
Year dummies	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓
Full sample	✓		✓		✓	
Restricted sample		✓		✓		✓
Observations	20,893	2,582	20,893	2,582	20,893	2,582
R-squared	0.356	0.441	0.290	0.305	0.604	0.783
Municipalities	1,350	182	1,350	182	1,350	182

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Inf refers to infiltration dummy; Inf before dissolution takes value one in the year before commissioning and zero otherwise. Other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample: 1350 municipalities of Campania, Calabria and Sicily; restricted sample: municipalities that experienced at least one government dissolution for mafia infiltration.

Table 2.3: Effect of infiltration on capital account spending by component

	Dependent variable: share of spending in the following component											
	Administration		Social sector		Constructions - Waste Management		Transports		Education		Municipal police	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Infiltration	-0.0115	-0.0146	-0.00494	-0.00674	0.0448**	0.0442**	-0.0206	-0.0220	0.00633	0.00949	-0.00262**	-0.00222*
	-0.0143	(0.0139)	(0.00746)	(0.00764)	(0.0175)	(0.0181)	(0.0133)	(0.0133)	(0.0111)	(0.0109)	(0.00126)	(0.00118)
Mafia Homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Full sample	✓		✓		✓		✓		✓		✓	
Restricted sample		✓		✓		✓		✓		✓		✓
Observations	20,682	2,554	20,551	2,535	20,783	2,559	20,735	2,559	20,490	2,541	20,126	2,496
R-squared	0.260	0.219	0.135	0.138	0.205	0.227	0.173	0.152	0.115	0.140	0.169	0.235
Municipalities	1,350	182	1,350	182	1,350	182	1,350	182	1,350	182	1,350	182

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample: 1350 municipalities of Campania, Calabria and Sicily; restricted sample: municipalities having experienced at least one government dissolution for mafia infiltration.

Table 2.4: Effect of infiltration on current account spending by component

	Administration		Social sector		Constructions - Waste Management		Transports		Education		Municipal police	
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Infiltration	-0.00538	-0.00623	-0.00163	-0.000277	0.00545	0.00530	-0.00105	-0.000947	0.000219	0.000599	-0.00256**	-0.00217*
	(0.00497)	(0.00484)	(0.00512)	(0.00429)	(0.00489)	(0.00491)	(0.00193)	(0.00193)	(0.00168)	(0.00174)	(0.00130)	(0.00123)
Mafia Homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Full sample	✓		✓		✓		✓		✓		✓	
Restricted sample		✓		✓		✓		✓		✓		✓
Observations	20,881	2,579	20,884	2,579	20,880	2,579	19,582	2,427	18,235	2,242	20,880	2,579
R-squared	0.736	0.698	0.650	0.612	0.732	0.687	0.752	0.752	0.816	0.787	0.622	0.665
Municipalities	1,350	182	1,350	182	1,350	182	1,350	182	1,350	182	1,350	182

The column header row "Dependent variable: share of spending in the following component" spans all data columns.

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample: 1350 municipalities of Campania, Calabria and Sicily; restricted sample: municipalities that experienced at least one government dissolution for mafia infiltration.

Table 2.5: The effect of the infiltration of local revenue collection, 1998 - 2013

| | Dependent variable: | | | | | | | |
| | Total revenues | | Total taxes | | Property tax | | Waste tax | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Infiltration	-0.0127	-0.0123	-0.001	-0.0069	0.0349	0.0337	-0.0210**	-0.0185**
	(0.0111)	(0.0114)	(-0.011)	(0.0107)	(0.0412)	(0.0421)	(0.00912)	(0.00961)
Mafia homicides	✓	✓	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓
Full sample	✓		✓		✓		✓	
Restricted sample		✓		✓		✓		✓
Observations	18,464	2,299	18,475	2,299	17,383	2,170	17,103	2,122
R-squared	0.314	0.374	0.670	0.655	0.395	0.351	0.502	0.470
Municipalities	1350	182	1350	182	1350	182	1350	182

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample: 1350 municipalities of Campania, Calabria and Sicily; restricted sample: municipalities that experienced at least one government dissolution for mafia infiltration.

Table 2.6: Ghost Buildings

Ghost Buildings	
	(1)
VARIABLES	GhostBuildings
Infiltration	-402.7*
	(243.1)
Municipal Dummies	✓
Time Dummies	✓
Municipal Controls	✓
Observations	2,667
R-squared	0.516

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; Commissioning years are excluded from the estimation. Ghost Buildings data are provided by the Agenzia dell'Entrate.

Table 2.7: Robustness check: Timing of the Infiltration (Full Sample)

Robustness check: Timing of the Infiltration (Full Sample)

VARIABLES	Capital Spending Police			Current Spending Police			Construction and Waste Management			Waste_tax		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Infiltration	-0.00252**			-0.00241*			0.0424**			-0.0199***		
	(0.00126)			(0.0013)			(0.0175)			(0.00602)		
One Year Before Infiltration		0.00189			-0.00185			0.0183			0.00380	
		(0.00185)			(0.00160)			(0.0309)			(0.0204)	
2 Years Before Infiltration			0.00254			-0.00160			0.0192			0.00113
			(0.00267)			(0.00159)			(0.0253)			(0.0161)
Mafia homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	20,120	17,934	17,934	20,874	17,958	17,958	20,777	17,934	17,934	17,103	16,638	16,638
R-squared	0.170	0.172	0.172	0.623	0.646	0.646	0.205	0.227	0.227	0.521	0.521	0.521

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Infiltration refers to infiltration dummy;Column 1 reports our full model as per Table 3 and Table 4. Columns 2 and 3 introduce two new dummy variables taking value 1 respectively 1 year (Column 2) and 2 years (Column 3) immediately before the election of later – dissolved government. All years coded as 'infiltration years' – from the election to the dissolution – are excluded from the sample. The estimation exploits the full sample.

Robustness check: Timing of the Infiltration (Restricted Sample)

VARIABLES	Capital Spending Police			Current Spending Police			Construction and Waste Management			Waste_tax		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Infiltration	-0.00210*			-0.00211*			0.0453**			-0.0172**		
	(0.00115)			(0.00122)			(0.0181)			-0.00805		
One Year Before Infiltration		0.00127			-0.00152			0.0165			0.00765	
		(0.00191)			(0.00128)			(0.0326)			(0.0190)	
2 Years Before Infiltration			0.00133			-0.00239*			0.0128			0.00426
			(0.00257)			(0.00135)			(0.0231)			(0.0154)
Mafia homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,559	2072	2,072	2,579	2146	2,146	2,559	2133	2,133	2122	1,738	1,738
R-squared	0.226	0.256	0.256	0.665	0.664	0.664	0.226	0.255	0.255	0.471	0.474	0.474

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Infiltration refers to infiltration dummy;Column 1 reports our full model as per Table 3 and Table 4. Columns 2 and 3 introduce two new dummy variables taking value 1 respectively 1 year (Column 2) and 2 years (Column 3) immediately before the election of later – dissolved government. All years coded as 'infiltration years' – from the election to the dissolution – are excluded from the sample. The estimation exploits the full sample.

Table 2.8: Infiltrations and political factors, 1998-2013

	Single Candidate	Last Mandate	Right Party	Left Party	Centre Party	Civic List
			Dependent variable:			
	(1)	(2)	(3)	(4)	(5)	(6)
Infiltration	0.0474**	0.189***	0.0942**	-0.0682	0.0351	-0.0414
	-0.0194	-0.0506	-0.0516	-0.0464	-0.0327	-0.0383
Mafia homicides	✓	✓	✓	✓	✓	✓
NatGov (Left)	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	2,869	2,869	2,582	2,582	2,582	2,582
R-squared	0.259	0.22	0.455	0.468	0.417	0.63

Note: Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Sample of all municipalities from Campania, Calabria and Sicily that experienced at least one government dissolution for mafia infiltration.

Table 2.9: The effect of the infiltration on public spending controlling for political factors, 1998 -2013

VARIABLES	Constructions and Waste Management	Municipal Police	Waste Tax
Infiltration	0.0483*	-0.00222**	-0.0163*
	(0.0235)	(0.0010)	(0.0086)
Right Party	-0.00440	0.000213	0.0352
	(0.0139)	(0.0019)	(0.053)
Last mandate	-0.00757	0.000878	-0.00106
	(0.0171)	(0.00091)	(0.0185)
Single Party	-0.0862	0.000218	0.00700
	(0.0515)	(0.00199)	(0.0317)
Mafia homicides	✓	✓	✓
National government (Left)	✓	✓	✓
Municipality control	✓	✓	✓
Municipality dummies	✓	✓	✓
Year dummies	✓	✓	✓
Observations	2,536	2,470	2,087
R-squared	0.231	0.237	0.093

Table 2.10: Political factors and public spending components, 1998-2013

	Dependent variable:								
	Public spending						Revenues collection		
VARIABLES	Construction and waste management			Municipal police			Waste tax		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Single candidate	-0.0647			-0.00044			0.0376		
	(0.0448)			(0.00239)			(0.0567)		
Last mandate		0.0015			0.00045			-0.00334	
		(0.0161)			(0.00136)			(0.0299)	
Right party			0.015			0.00014			-0.00198
			(0.0136)			(0.00203)			(0.0183)
Mafia homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓
National government (Left)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality control	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,778	2,778	2,408	2,717	2,717	2,351	2,302	2,302	2,005
R-squared	0.225	0.224	0.233	0.234	0.234	0.239	0.451	0.451	0.465
Municipalities	182	182	182	182	182	182	182	182	182

Note: Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Sample of municipalities having experienced at least one government dissolution for mafia infiltration.

Table 2.11: Effect of right-wing close electoral victory on the probability of infiltration

	Dep. variable: probability of infiltration				
	Non - parametric		Parametric		
	(1)	(2)	(3)	(4)	(5)
Right-wing winner	0.0751*	0.0846*	0.0722**	0.0722**	0.101*
	(0.0399)	(0.0524)	(0.0366)	(0.0365)	(0.0604)
Bandwidth	0.0751	0.124	0.0751	0.0751	0.0751
Observations	911	911	911	911	911

Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Forcing variable coefficients not displayed. Column 1: rddrobust Linear; column 2: rddrobust Polynomial; column 3: linear regression with kernel weights; column 4: linear regression varying linear slopes; column 5: polynomial regression of order 2 with interaction with the forcing variable. All the estimations use Calonico, Cattaneo and Titiunik (2014) optimal bandwith.

Table 2.12: Effect of right-wing close electoral victory on public spending

	Dep. variable: capital account spending in the following component		
	Construction and waste management	Municipal police	Waste_tax
	(1)	(2)	(3)
Right-wing winner	-0.0194	0.048	-0.0641
	(0.0263)	-0.0551	(0.0564)
Bandwidth	0.0751	0.0751	0.0751
Observations	620	620	580

Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1.

2.12   Appendix

Figure 2A.1: Correlation between dissolved municipal governments and national government

no of dissolutions	Municipal government	National government	
		Right	Left
67	Right[a]	-0.108	0.061
43	Left[b]	0.139	-0.047
6	Centre[c]	-0.068	-0.011

Note: no statistically significant coefficient. Right-wing national governments: Berlusconi 2001-2005 and Berlusconi 2008-2011; Left-wing national governments: Prodi 1998, D'Alema 1999, Amato 2000, Prodi 2006-2007, Letta 2013; Centre national governments: Monti 2012. a / Right-wing municipal governments during infiltration period; b / Left-wing municipal governments during infiltration period; c / Municipal government ruled by a Centre party during infiltration period.

Figure 2A.2: Correlation between dissolved municipal governments and provincial governments, 1998-2013

Municipal government	Province and provincial government									
	Caserta		Napoli		Reggio Calabria		Vibo Valentia		Palermo	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Right[a]	-0.143	/	0.277	/	0.233	/	N/A	/	-0.154	/
Left[b]	/	-0.149	/	0.194	/	0.14	/	0.239	/	N/A

Note: no statistically significant coefficient. None of these provinces had governments from the 'Centre' over the 1998-2013 period. Vibo Valentia only had left-wing governments while Palermo only had right-wing governments. a / Right-wing municipal governments during infiltration period in given province. b / Left-wing municipal governments during infiltration period in given province.

A2. Municipal institutional setting and public spending.

A2.1 Italian municipalities institutional setting. As of 2016, there were 8,010 municipalities in Italy, 1,350 of which are found in the regions of analysis, varying considerably by area and population. The institutional setting of the municipalities is centred on the figure of the mayor, who heads the local government and leads along with the legislative body, the local council, and the executive body, the local *giunta*. The mayor and members of the council are elected together by resident citizens. The *giunta* is chaired by the mayor, who appoints its members. Elections of local councils are staggered over time and not held at the same time for all municipalities.

A2.2 Public spending components. General functions of administration include all expenses related to the management of offices coordinating the internal activities of the municipality; (2) social sectors include all expenses for the provision of social services and the creation of infrastructure to that aim (kindergartens, retirement homes, rehab centres); (3) construction and waste management refers to all expenses for urban planning – adoption of construction plans and building regulations, maintenance and construction of all new buildings (all part of capital account spending), waste collection and disposal (current account spending); (4) transportation includes expenses to guarantee local public transportation, public lighting, provision of local road infrastructure; (5) public education includes all expenses for all education infrastructure, school maintenance and school transportation; (6) functions of local police include the acquisition and maintenance of goods and equipment, cars and office structures

Capital account - current account over time
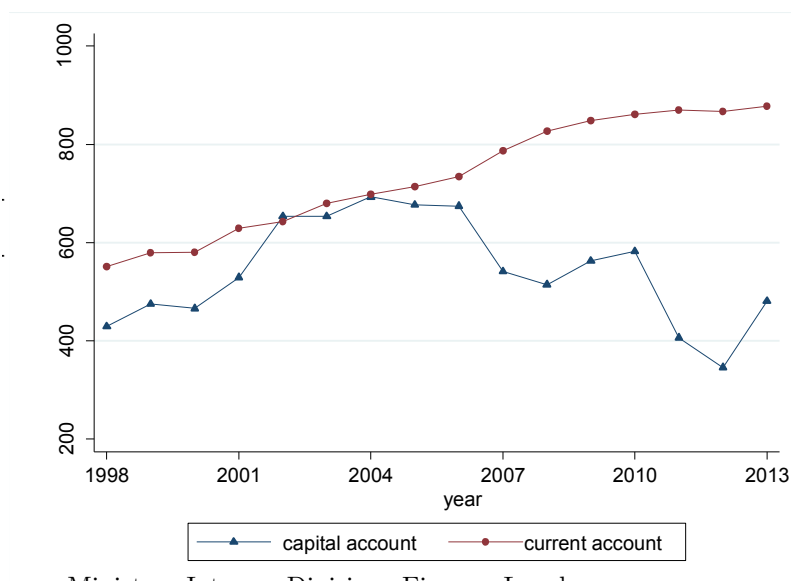
Source: Ministero Interno, Divisione Finanza Locale

<div align="center">Descriptive statistics – control variables</div>

	Full sample			Restricted sample		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Percentage of agricultural employment	21,594	4.592	3.382	2,912	4.303	4.066
Percentage of citizens holding tertiary education degrees	21,594	6.06	2.62	2,912	5.687	2.272
Percentage of industry employment	21,594	6.489	2.128	2,912	5.894	1.693
Unemployment rate	21,594	7.609	2.518	2,912	8.89	2.646
Mafia-related homicides at province level	21,600	0.0058	0.0082	2,912	0.0095	0.0092

Note: Full sample refers to all municipalities of Campania, Calabria and Sicily. Restricted sample refers to municipalities of these regions that experienced at least one government dissolution for mafia infiltration. Source: Istat and Ministry of Interior

A3 Robustness Checks - Effect of Infiltration on Public Spending Results

Gradually increase control variables. From Table A3.1 to Table A3.3 we provide a series of robustness checks for our main results, i.e. capital spending on construction and waste management (A3.1) and on capital (A3.2) and current (A3.3) spending on municipal police. In all estimations, the sample is restricted to the municipalities that experienced at least one dissolution. This is important because we control for unobserved heterogeneous effects that might be present across municipalities. In the first column, a parsimonious specification is presented, including time fixed effects and no other controls. The second column adds mafia-proxies and municipal socio-economic factors as controls. In practice, the results in column (2) of table A3.1 – A3.3 replicate those in columns (6) and (12) of Table 3 and column (22) in Table 4. In the third column of Tables A3.1 – A3.3, we include a full set of linear time trends for each municipality, accounting for any previously omitted factor potentially affecting the temporal development of municipal governments and correlated with infiltrations. This specification represents our preferred one and reports a coefficient for the infiltration dummy of similar magnitude of those in the previous columns. The effects are economically sizeable. Investments in construction and waste management increase by over 4pp of total spending per year, equal to an increase of 12.5% over the average value of non-treated municipalities. The reduction of capital and current spending for police is respectively 0.004pp and 0.0007pp per year, equal to 9.8% (capital spending) and 1.2% (current spending) over non-treated municipalities.

Infiltration with a one year lag. We relax this assumption in column (4) of Tables A3.1 – A3.3 where the infiltration dummy enters with a one year lag. This classifies infiltrations as if they initiated in the year after the elections. This classification introduces one additional lag between the moment of infiltration and the moment in which the financial resources were actually spent by local governments (recall that

the spending variable is measured at period t+1). As shown in Tables A3.1 – A3.3 this alternative definition of infiltration periods is even more robustly correlated with higher proportions of investment in construction and waste management and with a reduction of both current and capital spending in police forces. According to this result, governments infiltrated by the mafia annually invest 19% more in construction and waste management compared to the average spending of non-infiltrated municipalities.

Table 2A.1: Effect of infiltration on capital account spending in Construction and Waste Management, 1998-2013

Full Sample

	Dep. Variable: Capital Account spending for Construction and waste management			
	(1)	(2)	(3)	(4)
Infiltration	0.0448**	0.0424**	0.0414**	
	(0.0175)	(0.0175)	(0.0179)	
Lagged Inf				0.0668***
				(0.0245)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	20,783	20,777	20,777	19,531
R-squared	0.205	0.206	0.296	0.306
Municipalities	1350	1350	1350	1350

Restricted Sample

	Dep. Variable: Capital Account spending for Constructions and Waste Management			
	(1)	(2)	(3)	(4)
Infiltration	0.0469***	0.0442**	0.0466**	
	(0.0177)	(0.0181)	(0.0200)	
Lagged Inf				0.0674***
				(0.0249)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	2,559	2,559	2,559	2,405
R-squared	0.220	0.227	0.333	0.348
Municipalities	182	182	182	182

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; Lagged Inf is the infiltration dummy lagged by one period. Commissioning years excluded in all specifications. Infiltration years excluded in specification (5). In the top table the estimation reports the results using the Full Sample. In the bottom table, the estimation reports the results using the restricted sample (dissolved municipalities).

Table 2A.2: Effect of infiltration on capital account spending in Municipal Police, 1998-2013

Full Sample

	Dep. Variable: Capital Account spending for Municipal Police			
	(1)	(2)	(3)	(4)
Infiltration	-0.00262**	-0.00254**	-0.00473***	
	(0.00126)	(0.00126)	(0.00157)	
Lagged Inf				-0.00341*
				(0.00212)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	20,126	20,120	20,120	19,539
R-squared	0.169	0.171	0.291	0.295
Municipalities	1350	1350	1350	1350

Restricted Sample

	Dep. Variable: capital account spending for Municipal police			
	(1)	(2)	(3)	(4)
Infiltration	-0.00277**	-0.00222*	-0.00467*	
	(0.00125)	(0.00118)	(0.00242)	
Lagged Inf				-0.00335*
				(0.00206)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	2,496	2,496	2,496	2,412
R-squared	0.230	0.235	0.419	0.431
Municipalities	182	182	182	182

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Infiltration refers to infiltration dummy; Lagged Inf is the infiltration dummy lagged by one period. Commissioning years excluded in all specifications. Infiltration years excluded in specification (5). In the top table the estimation reports the results using the Full Sample. In the bottom table, the estimation reports the results using the restricted sample (dissolved municipalities).

Table 2A.3: Effect of infiltration on Waste Tax, 1998-2013

Full Sample

	Dep. Variable:Waste Tax			
	(1)	(2)	(3)	(4)
Infiltration	-0.0219**	-0.0203**	-0.001	
	(0.00898)	(0.00908)	(0.0109)	
Lagged Inf				-0.0202**
				(0.00938)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	17,106	17,103	17,003	15,747
R-squared	0.520	0.521	0.565	0.545
Municipalities	1350	1350	1350	1350

Restricted Sample

	Dep. Variable:Waste Tax			
	(1)	(2)	(3)	(4)
Infiltration	-0.0190**	-0.0176*	-0.0025	
	(0.00896)	(0.00951)	(0.0309)	
Lagged Inf				-0.0192**
				(0.00957)
Mafia homicides		✓	✓	✓
Other controls		✓	✓	✓
Year dummies	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓
Time trends			✓	✓
Observations	2,122	2,122	2002	1,954
R-squared	0.472	0.472	0.388	0.488
Municipalities	182	182	182	182

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Infiltration refers to infiltration dummy; Lagged Inf is the infiltration dummy lagged by one period. Commissioning years excluded in all specifications. Infiltration years excluded in specification (5). In the top table the estimation reports the results using the Full Sample. In the bottom table, the estimation reports the results using the restricted sample (dissolved municipalities).

Figure 2A.3: Parallel Trend - Full Dynamic Model

Effect of Infiltration on Constructions and Waste (Capital Account)
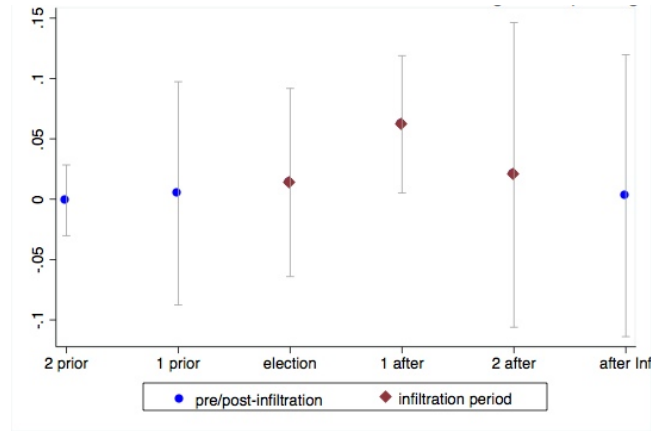
Effect of Infiltration on capital account spending for municipal police
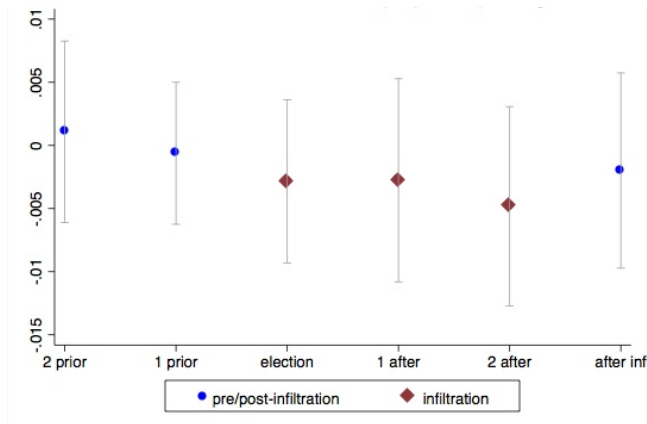
Source: own elaboration with Ministry of Interior data. Granger Causality Test estimated with 2 leads and 2 lags. Municipalities dissolved more than once have been dropped from the sample. The estimation includes time and municipalities dummies, linear time trends, socio-demographic controls and mafia controls. Standard errors clustered at the municipal level.

Figure 2A.4: Parallel Trend - Full Dynamic Model

Effect of Infiltration on Waste Tax
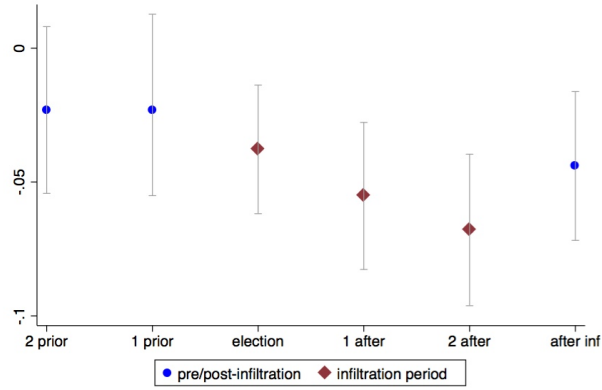
Effect of Infiltration on Total Revenues
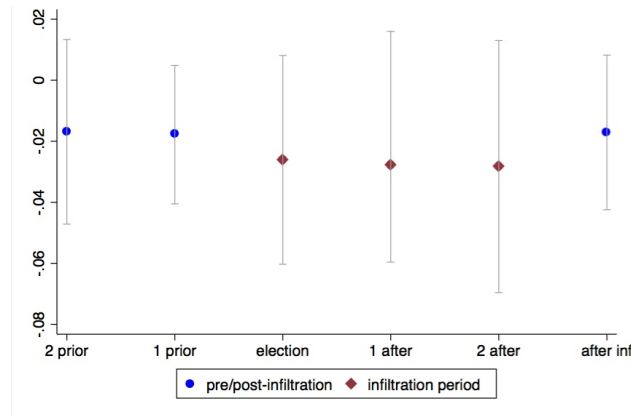
Source: own elaboration with Ministry of Interior data. Granger Causality Test estimated with 2 leads and 2 lags. Municipalities dissolved more than once have been dropped from the sample. The estimation includes time and municipalities dummies, linear time trends, socio-demographic controls and mafia controls. Standard errors clustered at the municipal level.

Effect of Infiltration on Capital Account Spending Components by Municipal Population, 1998-2013

Our analysis has unveiled that mafia infiltrations determine important modifications in the investment policies of local governments in Southern Italy. However, the impact of the mafia on public finance allocations is likely to vary according to some characteristics of the local context, which are more or less suitable to the development of mafia-government collusions. One aspect we investigate in this section is whether the intensity of the effect depends on the size of the municipalities whose governments are infiltrated. We hypothesise that the largest absolute variation in spending allocations are found in smaller municipalities. Small towns are where the power of the mafia can be more pervasive, due to the high control of territory it exercises and to the greater distance from the central State felt by the citizens. In the context of small localities where the presence of the mafia is more diffused, collusion is expected to lead to a stronger predatory behaviour – i.e., more public work tenders awarded to mafia-controlled firms.

We test this by sub-dividing the entire sample into municipalities with less than 2,000 inhabitants, between 2,000 and 5,000 inhabitants, and above 5,000 inhabitants, replicating the main estimates. As shown in Table A5 below, the data confirm our hypothesis. Inflations in capital account spending for construction and waste management are higher, the smaller the population of a municipality. The coefficient of the infiltration dummy is positive and significant for medium and small-size municipalities and the magnitude is larger for towns below 2,000 inhabitants. By using the same sub-division by population size, we replicate the estimates adopting the share of municipal police spending as the dependent variable. In this case, the reduction of the investment share is larger in cities with greater than 5,000 inhabitants (Table 2A.4). This result can be explained by the fact that the investment budget for police forces managed by large cities is significantly larger than those of small towns. The mafia has more interest in limiting expenses for law enforcement where the latter can affect the productivity of police investigations.

Table 2A.4: Effect of infiltration on capital account spending components by municipal population, 1998-2013

Dep. Variable:	CA spending for Construction and waste management			CA spending for Municipal Police		
	population:			population:		
	below 2000	between 2000 and 5000	above 5000	below 2000	between 2000 and 5000	above 5000
	(1)	(2)	(3)	(4)	(5)	(6)
Infiltration	0.0951**	0.0795**	0.0199	0.00283	-0.00183	-0.00338**
	-0.0425	-0.0331	-0.0219	-0.00259	-0.0018	-0.00168
Mafia homicides	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓
Observations	6,817	6,514	7,447	6,564	6,299	7,258
R-squared	0.193	0.222	0.234	0.139	0.157	0.175
Municipalities	473	469	502	473	469	502

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. Infiltration refers to infiltration dummy; Commissioning years excluded in all specifications.

Table 2A.5: Placebo – Dissolutions Unrelated to Organised Crime and Public Spending

A5.1.Organised Crime dissolutions and total public spending

VARIABLES	Total Spending (1)	Total Capital Account (2)	Total Current Account (3)
Dissolution_No_Mafia	-49.44	-41.92	-7.517
	(53.74)	(52.79)	(6.745)
Mafia Controls	1,284	529.9	754.4
	(1,386)	(1,086)	(723.3)
Municipalities dummies	✓	✓	✓
Year Dummies	✓	✓	✓
Other Controls	✓	✓	✓
Time Trends	✓	✓	✓
Observations	18,305	18,305	18,305
R-squared	0.426	0.345	0.794

A5.2. Robustness check: Our Main Results and Organised crime *non - related dissolutions*

Dependent variable	Public spending		Revenues collection
	Constructions and Waste Management	Capital Expenditure Police	Waste Tax
	(1)	(2)	(3)
Mafia-unrelated dissolutions	-0.00353	0.000313	-0.00469
	(0.0143)	(0.000820)	(0.00782)
Mafia homicides	✓	✓	✓
Other controls	✓	✓	✓
Year dummies	✓	✓	✓
Municipalities dummies	✓	✓	✓
Observations	18,218	18,010	18,170
R-squared	0.292	0.227	0.259
Municipalities	1350	1350	1350

Note: Clustered standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. DIss_nomafia refer to mafia-unrelated dissolved governments; other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample of 1350 municipalities from Campania, Calabria and Sicily: infiltration and commissioning years excluded.

Table 2A.6: Placebo – Dissolutions Unrelated to Organised Crime and Public Spending

A6.1: Mafia-unrelated dissolutions and capital account spending by component

VARIABLES	Administration (1)	Social Sector (2)	Constructions (3)	Transports (4)	Education (5)	Municipal Police (6)
Dissolution_No_Mafia	0.00183	-0.00295*	0.000624	-0.000238	0.000673	-0.000486
	(0.00211)	(0.00164)	(0.00197)	(0.000743)	(0.000988)	(0.000657)
Mafia homicides	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓
Observations	18,296	18,299	18,295	17,152	15,987	18,295
R-squared	0.839	0.774	0.821	0.850	0.888	0.761

A6.2: Mafia-unrelated dissolutions and current account spending by component

VARIABLES	Administration (1)	Social Sector (2)	Constructions (3)	Transports (4)	Education (5)	Municipal Police (6)
Dissolution_No_Mafia	0.00606	0.00836	-0.00353	-0.00892	-0.00125	0.000313
	(0.0102)	(0.00749)	(0.0143)	(0.0119)	(0.00767)	(0.000820)
Mafia homicides	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Other controls	✓	✓	✓	✓	✓	✓
Observations	18,122	18,010	18,218	18,170	17,943	17,624
R-squared	0.367	0.227	0.292	0.259	0.188	0.245

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. DIss_nomafia refer to mafia-unrelated dissolved governments; other controls: agricultural employment, industry employment, tertiary education degree holders, unemployment. Full sample of 1350 municipalities from Campania, Calabria and Sicily: infiltration and commissioning years excluded.

Table 2A.7: Descriptive statistics – political variables

	All municipalities			Infiltration years		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Single candidate	2,869	0.023	0.149	437	0.059	0.237
Last mandate	2,869	0.203	0.402	437	0.327	0.470
Left party	2,869	0.320	0.467	437	0.316	0.465
Centre party	2,869	0.082	0.274	437	0.098	0.298
Right party	2,869	0.461	0.499	437	0.563	0.497
Civic list	2,869	0.510	0.500	437	0.584	0.494

Note: All municipalities: municipalities of Campania, Calabria and Sicily that experienced at least one government dissolution for mafia infiltration. Infiltration years: years classified as infiltration for these municipalities

Table 2A.8: Political factors and public spending components during infiltration years, 1998-2013

	Dependent variable:								
	Public spending						Revenues collection		
VARIABLES	Construction and waste management			Municipal police			Waste tax		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Single candidate	-0.0347			-0.00460			-0.620		
	(0.190)			(0.00536)			(0.0722)		
Last mandate		-0.0494			0.00687			0.0553	
		(0.177)			(0.00569)			(0.0541)	
Right party			0.169			0.00146			-0.00198
			(0.128)			(0.00452)			(0.0183)
Mafia homicides	✓	✓	✓	✓	✓	✓	✓	✓	✓
National government (Left)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality control	✓	✓	✓	✓	✓	✓	✓	✓	✓
Municipality dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	432	432	432	425	425	425	382	382	382
R-squared	0.400	0.400	0.404	0.444	0.446	0.444	0.451	0.451	0.465
Municipalities	127	127	127	124	124	124	182	182	182

Note: Clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Sample of infiltrated governments during 1998-2013.

Figure 2A.5: Effect of Electing Right-Wing Governments on the Probability of Infiltration

A5.1 Balance of Covariates

	Dep. Variable:								
	Unemployment	Industry employment	Human capital	Pop	Total spending	Mafia-related homicides	White ballots	Turnout	Non-valid ballots
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment vs.	-0.594	0.48	-0.0919	-0.269	-0.0195	5.45E-06	0.129	-2.397	0.8
	(0.795)	(0.551)	(0.670)	(0.364)	(0.0263)	(0.00233)	(0.306)	(2.428)	(0.520)
Observations	620	620	620	620	614	620	619	621	619

A5.2 McCrary Test
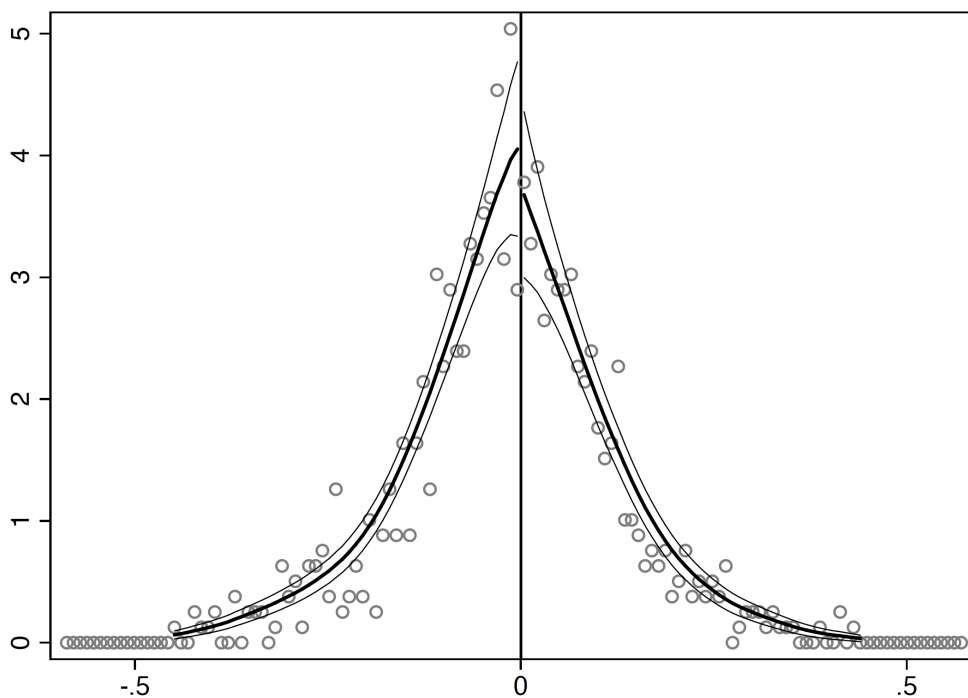
Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. T student at the discontinuity -0.9782 with robust estimation. There is no presence of non - random sorting at the cutoff

Figure 2A.6: Effect of Electing Right-Wing Governments on the Probability of Infiltration

A6.1 Robustness Checks – points estimates at different cutoff points
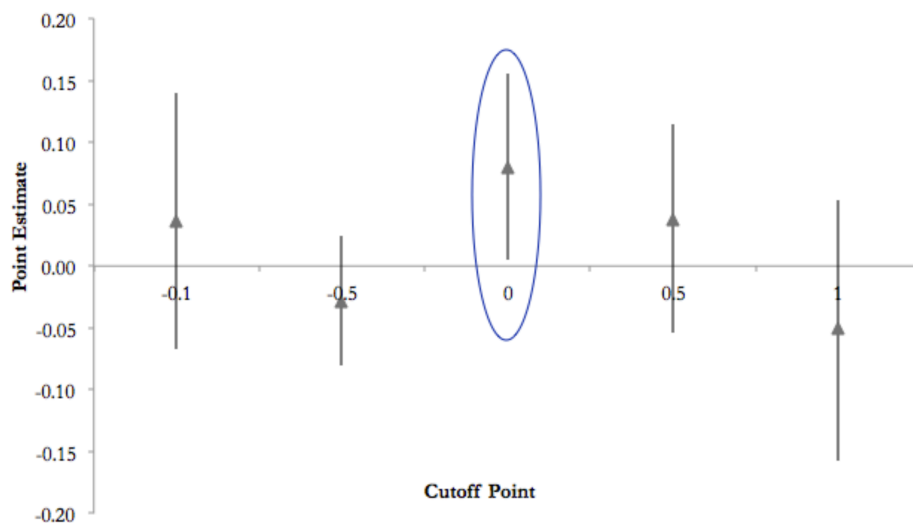
A6.2 Robustness Checks – Moving bandwidths
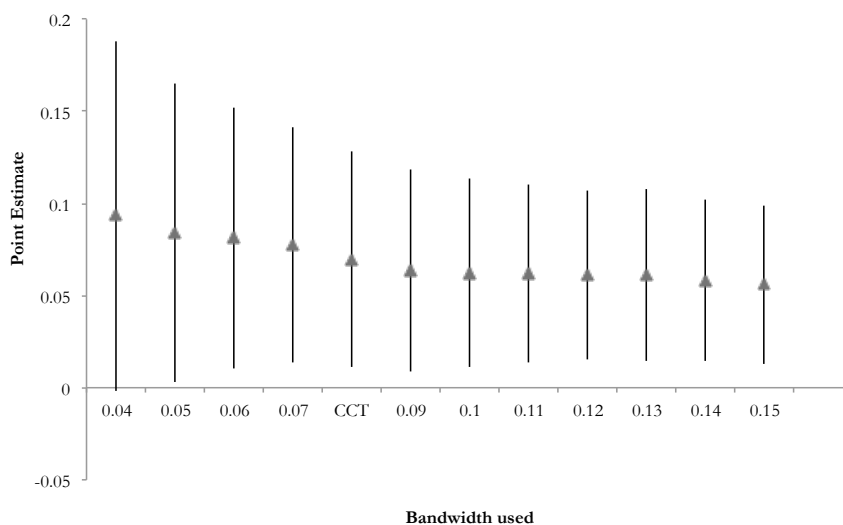
Note: Figure A6.1 Dependent variable is Probability of infiltration. The line extends from the lower bound to the upper bound. 90% confidence interval. Non-parametric estimates with bias correction, robust standard errors, triangular kernels, linear local polynomials and optimal bandwidth (Calonico et al., 2014). Figure A6.2, Dependent variable is Probability of infiltration. The line extends from the lower bound to the upper bound. 90% confidence interval. CCT: optimal bandwidth.

Table 2A.9: Selection into Treatment

VARIABLES	Municipal Police_CA	Municipal Police_CR	Constructions and Waste Management	Waste Tax
	(1)	(2)	(3)	(4)
Infiltration	-0.00474*	-0.000967	0.0609***	-0.0165**
	(0.00269)	(0.00119)	(0.0213)	(0.00921)
Mafia Homicides	✓	✓	✓	✓
Socio_Demographic Controls	✓	✓	✓	✓
Municipal Dummies	✓	✓	✓	✓
Time Dummies	✓	✓	✓	✓
Time Trends	✓	✓	✓	✓
Observations	2,236	2,308	2,298	2002
R-squared	0.423	0.774	0.335	0.401

Note: Clustered standard errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Infiltration refers to infiltration dummy; all municipalities for which the main reason for dissolusion was related to distortions in the balance sheets are excluded. Commissioning years excluded in all specifications.

Figure 2A.7: Local Fiscal Revenues Structure
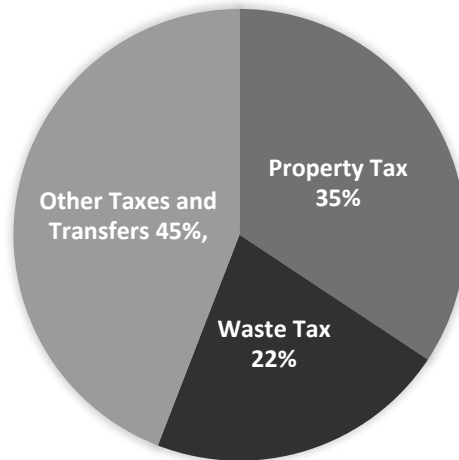
Note: Authors Elaboration - data from the Ministry of Interior.

3 The Effect of News Media on Attitudes: Evidence from Crime Perceptions in Italy

3.1 Introduction

A recent body of empirical literature suggests that media have a significant impact on political and public policy outcomes (see, among others: Della Vigna and Kaplan, 2007; Gerber et al., 2009; Enikolopov et al., 2011; Barone et al., 2015). Yet, little is known about the mechanisms through which media concretely manage to influence collective decisions and policies. In this paper we explore one possible channel: influencing individuals' beliefs and perceptions about topics that are salient in the political debate. Understanding the role of information provided by the media on the formation of beliefs and attitudes is relevant for outcomes that go well beyond voting. As Della Vigna and Gentzkow (2010) argue, the efficiency of democratic and economic systems ultimately depends on the accuracy of individual beliefs. One potential threat to the accuracy of perceptions steams from the fact that, although people base their beliefs partly on direct observation, a large share of information is provided by intermediaries - such as television, newspapers, or Internet - who might themselves have some interest in the behaviour of the receivers. In these cases communication is defined as persuasive (Della Vigna and Gentzkow, 2010) and its effect on the receiver is uncertain. In this paper, we investigate the influence of news media on beliefs and perceptions individuals have about crime.

We do so in the context of Italy, a country where, for over a decade, a relevant share of traditional analogue TV channels has been under the influence of Mr Silvio Berlusconi in his dual role of media tycoon and Prime Minister.[65]We study if and to what extent individuals revise their perceptions once exposure to news provided by this group of channels is reduced. Obviously, estimating the causal effect of the exposure to specific media on individuals' perceptions poses difficult identification issues, as people self-select into news media according to their news content (see

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[65]As we will describe in details later on, of the 6 main TV channels holding about 85% of viewing shares up until year 2007, three channels – Rai1, Rai2 and Rai3 - constituted the bulk of the Italian public broadcasting system, which has a long tradition of alignment with the parties in government (Larcinese, 2008) while other three channels – Rete4, Canale5 and Italia1 – were privately owned by Berlusconi through his media conglomerate Mediaset.

Gentzkow and Shapiro, 2010 and Durante and Knight, 2012). Similarly to Barone et al (2015), we identify causal effects by exploiting the introduction of digital TV signal in Italy. We exploit the staggered introduction of the policy to extend the design to all Italian regions and complement it with detailed channel-specific viewership and news content data.[66]

Between 2008 and 2012, Italy has gradually shifted from analogue to digital TV transmission: on specific dates, which varied by region, the analogue signal was switched off and substituted with the digital one. Around the digital switchover dates the number of nationally available free TV channels increased from about 7 to more than 50 within days. Such a supply shock was accompanied by a drastic drop in the viewing shares of the six main traditional analogue channels (Rai and Mediaset) from 82% in June 2008 to 60% in June 2012, mostly in favour of the newly available digital channels. [67]We exploit the exogenous shift in viewing shares described above to study if and to what extent individuals revise their perceptions about crime when exposure to potentially biased news is reduced. In particular, we rely on a specific feature of digital introduction in Italy: the fact that deadlines at which the signal switched from analogue to digital varied across regions, and did so for plausibly exogenous reasons.

We focus on perceptions about crime for a number of reasons. First, crime perceptions have been proven to be relevant for several economic outcomes such house prices (Buonanno et al., 2013) mental health (Dustmann and Fasani, 2015) and daily routines and behaviours (Braakman, 2012). Secondly, crime is at the top of people's concerns in many countries, and thus often at the centre of the political debate[68]. Thirdly, it exists a puzzling mismatch between individual perceptions and actual data when it comes to crime rates. Figure 3.1 provides evidence of such mismatch for Italy, where despite a decreasing (or if anything stable) trend in actual crime rates over the period considered (left panel), about 80% of respondents believe that crime is on the rise (right panel).[69]These figures seem to

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[66]Barone et al (2015) have been the first to use the introduction of digital TV signal in Italy within the literature. They exploit, in particular, the case of Piedmont region where some provinces introduced the digital TV signal before 2010 regional elections and some after. They thus compare voting outcomes for municipalities on either side of such provincial boundaries in a regression discontinuity design setting.

[67]Source: AUDITEL data. http://www.auditel.it

[68]As Appendix Figure A1 shows, people rank consistently crime among the first five (out of 15) most important perceived problems in a number of European countries. Source: Eurobarometer.

[69]The famous line, 'If it bleeds, it leads,' is a well-known maxim for what determines news-

reveal an information problem potentially deriving from the fact that people, by having little observational experience about crime, might tend to collect a relevant share of information about it through indirect and secondary sources. Thus the providers of such information (i.e. the media) are likely to play an important role in the formation of crime perceptions.

In the first part of the paper we document how a specific group of traditional TV channels seem to systematically over-represent crime news compared to others. We also show how individuals who select into TV channels characterised by high crime news reporting are also more likely to believe crime is major problem. We then test if individuals revise their perceptions about crime when exposure to news programs broadcast by such specific group of channels is reduced, identifying a reduced-form (ITT) effect of the Digital Reform. We find that the increase in the number of available TV channels - and the consequent lower exposure to news broadcast by partisan ones - led individuals to revise downward their perceptions about crime. Estimated negative effects on crime concern are larger for individuals who spend more time watching television while using less frequently other media such as internet, radio and newspapers. Such individuals, by gathering information mainly through TV and placing high weight to information coming from it, were likely to be more exposed to the potential pre-reform bias, thus responded more to changes in TV content. Older individuals spend more time watching TV and have much less frequent access to other media than their younger counterpart. In fact, individuals aged above 65 (and above age 51 in some specifications) drive most of our estimated effect. For example, among those older than 65, the probability of mentioning crime as among the three priority problems in the country drops with the introduction of the digital signal by 5.2 percentage points, i.e. 8.4 percent with respect to the average value.

In the second part of the paper, we attempt to quantify the effect of exposure to crime news on crime perceptions. To do so, we combine unique data on prime-time news programs for each TV channel on: a) the monthly amount of crime-related news reported; and b) the region-specific monthly viewership. We use the

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worthiness of crime. In fact, this gap between actual crime rates and people's perceptions is a feature common to other countries as well. Indeed, while crime levels have been decreasing in many western countries during the last decade (see for example "The curious case of falling crime" in The Economist, July 20th, 2013) a surprisingly large share of the population believes that crime is actually increasing. Dustmann and Fasani (2014) provide similar evidence for the UK. For an interesting review: Emanuelsson and Mele (2010).

switch to digital signals to predict exogenous changes in the exposure to crime news induced by the policy, and estimate the effect on crime perceptions through a two-steps method. We find that the digital reform induced a reduction in exposure to crime news of about 12 percent of the average value and that, under the assumption that the switch-over affected crime perceptions only through such changes in crime news exposure, a 1 standard deviation decrease in exposure to crime news is associated with a 9.2 percent decrease in people's concern about crime, among those aged above 65.

In the last part of the paper we explore whether the change in crime perceptions induced by the digital signal introduction might be relevant for voting behaviour. We first show how, in our context, high concerns about crime are correlated with support to the centre-right coalition. Then, using data from an electoral survey, we run a back of the envelope analysis to show that the reduction in crime concern caused by the digital reform might have induced up to about 2.4-2.8% of those aged above 51 who voted for the centre-right coalition in the 2008 national election to change their vote. Since individuals aged above 51 represent about 1 out of 3 of Italian voters (and usually show higher turnout rate), the effect we detect is likely to be relevant for electoral outcomes.

This paper contributes to the growing literature on persuasive communication in economics. In particular we fit into two main research clusters. First, the group of studies that focuses on the effect of (biased) news media on political outcomes.[70] A number of papers within this literature have provided empirical evidence for the influence of (biased) media on voting outcomes. Among them, Della Vigna and Kaplan (2007) find that the introduction of Fox News has led to a significant increase in the share of votes for the Republican Party in the U.S. 2000 election, while Enikopolov et al. (2011) show that Russian voters with access to an independent TV channel were less likely to vote for Putin during the 1999 national election. Moving to the Italian case, Durante and Knight (2012) provides evidence of the bias in favour of the Berlusconi's coalition (centre-right) while he was Prime Minister on five out of six of the above TV channels. Closest to our paper, Barone et. al (2015) convincingly document the impact of such media

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[70] See Pratt and Stromberg (2011) and Sobbrio (2014) for a review of the literature on media and electoral outcomes. A number of studies have also looked at the effect of persuasive communication in other context such as: advertisement (Simester et al., 2007); non-profits organisations (Landry et al., 2006) and non-informative communication provided by leaders (Bassi and Rasul, 2015).

bias in favour of Berlusconi on his electoral support. They, exploiting for the first time the policy change used in this paper, show how the availability of new digital channels caused a drop in Berlusconi's voting shares in the 2010 regional elections.[71]

Second, there is a broader literature on the relationship between media (mainly television) and beliefs, attitudes and behaviours. Among the earlier attempts, and closely related to our paper, is the work from Gentzkow and Shapiro (2004) who study the effect of exposure to different news outlet on anti-American sentiment in the Muslim world. They find that increased exposure to information from the media is not necessarily correlated with more accurate perceptions of world events. Some of the other relevant papers are Jensen and Oster (2009); Chong et al. (2012); Della Vigna et al. (2014); Rizzica and Tonello (2015); and Lim et al. (2015).[72]

We address these research clusters and we contribute to both of them. Specifically, our study complements the first group of papers by studying another aspect of partisan media, their influence on attitudes and perceptions with respect to politically salient topics. Importantly, by producing causal evidence of the impact of news media on individual perceptions we start shading light over one of the possible mechanisms through which media ultimately affect voting outcomes.[73]In

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[71]Another paper, Durante et al. (2015), investigates the effect of Berlusconi's TV on voting behaviour, yet from a different perspective. They analyse the long-term impact of early exposure to Berlusconi's commercial TV (Mediaset) and find that municipalities with a longer history of exposure to it did show greater electoral support for Berlusconi's party. They argue in favour of this effect being motivated by the decline in social capital and the diffusion of a culture of individualism promoted by Berlusconi's TV, and against the exposure to partisan news bias story from the moment that during the period they focus on, prior to 1985, news programs were not broadcast on Mediaset channels.

[72]Jensen and Oster (2009) study the effect of cable TV and women's status in rural India; Chong et al. (2012) study the role of soap operas in reducing fertility in Brazil while Della Vigna et al. (2014) the effect of propaganda channeled through the radio on violence in Serbia; Rizzica and Tonello (2015) study the relation between exposure to corruption news and corruption perceptions in Italy; Finally, Lim et al. (2015) reveal that active newspapers coverage significantly magnifies the influence of voters' preferences on court decisions when judges are elected.

[73]The research on individual beliefs and perceptions is mostly theoretical with Bayesian beliefs model (Eyester and Rabin, 2009) and Bayesian preference models (Nelson, 1970, Mullainathan et al. 2005). Closer to our empirical approach, Chiang and Knight (2011) study whether newspaper endorsements have an effect on individual voting intention. Schroeder and Stone (2015) explore another possible mechanism, the effect of partisan media on political knowledge. They find that Fox News increased knowledge for issues it covered more often, and negative effects for issues it neglected. In our case, although suggestive of the potential role of crime perceptions on voting in the Italian setting, quantitatively assessing the role of changes in crime perceptions on voting vis-à-vis that of other possible channels is beyond the scope of this paper.

doing so, we also contribute to the second group of papers by providing a new field of evidence about the impact of media: the one on crime perceptions. Exploiting unique viewership and news content data, we are able to move the first step towards a measurement of the elasticity of perceptions to specific news reporting intensity.

The rest of the paper is organized as follows: section 2 presents the institutional background on Italian television market and the intensity in crime news reporting on traditional channels; section 3 discusses our identification strategy and presents the natural experiment; section 4 introduces the data and the estimating equations; section 5, 6 and 7 present different sets of results; section 8 concludes.

3.2 Background

3.2.1 The Italian TV Market

Up until 2007 - the year before the switch from analogue to digital TV signal transmission started - Italy presented a particularly concentrated television market, with only about seven national channels freely available to viewers through the analogue signal and the six main channels holding about 85% of total TV viewing shares. Three channels – Rai1, Rai2 and Rai3 - constituted the bulk of the Italian public broadcasting system (Rai), which has a long tradition of alignment with the parties in government (Larcinese, 2008).[74] Other three channels – Rete4, Canale5 and Italia1 – were privately owned by Mr Berlusconi through his media conglomerate Mediaset. Finally, there was a seventh channel - LA7 - that is private and can be considered independent from political influences.[75] Mr Silvio Berlusconi, in his double role of media tycoon and Prime Minister, was in the position to influence five out of seven national channels while in government - the 3 privately owned (Mediaset) plus Rai1 and Rai2 – during the periods 2001 to 2006 and 2008 to 2011. Indeed, Durante and Knight (2012) provide evidence

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[74]Larcinese (2008) well explains the historical background. Initially there were two main public channels and, only later on, a third one was added. This created the so call "*lottizzazione*" for which the two main channels went to the government coalition (which at the time was a coalition formed by *Democrazia Cristiana* and *Partito Socialista*) and the third one went to the communist opposition.

[75]LA7, previously called TeleMontecarlo, was owned since 1999 by Telecom Italia Media Spa, a telecommunication company specialized in television production and broadcasting, advertising and other multimedia activities.

of the news being biased in favour of Mr. Berlusconi's centre-right coalition while he was Prime Minister on the above five TV channels.[76]

3.2.2 Actual crime, crime news reporting, and perceptions

In this section we study the intensity of crime news reporting in Italian TV and in particular in the six main traditional channels (Rai + Mediaset) in comparison with others. News programs in Italy (called telegiornali) are usually broadcast between 6:00 and 8:30PM, the time slot labelled as prime-time. They last 30 minutes and contain between 10 and 15 news items. We have data on the monthly number of crime news items (stories) broadcast by each TV channel during such 30-mins news programs. In Panel A of Figure 3.2 we compare, for the years from 2007 to 2013, the monthly averages of such crime related news for the six main traditional channels with the same statistic for the only independent TV channel nationally transmitted through the analogue signal (LA7). The figure shows large differences in crime reporting intensity between the two groups, with the Rai and Mediaset channels reporting a number of crime related news which is on average double that reported by the independent channel LA7. One could argue that LA7 might be underreporting crime news rather than Rai and Mediaset channels over reporting them although LA7, having no links with any political parties, should have little incentive to under or over-report crime news. Such concern is partially addressed by comparing monthly averages of crime related news broadcast by the main Italian public channel (Rai1) with that of the main TV channel in a selected number of European countries (TVE for Spain, BBC 1 for the UK, France 2 for France and ARD for Germany). Panel B of Figure 3.2 shows that the main public Italian channel (Rai1) broadcast an average of 73 crime related news per month during the period 2010 to 2013. The number is larger for a factor that ranges between 1.7 (Spain) to 18 (Germany) with respect to the same metric in the other European countries considered. As (Panel B) shows, such difference in the amount of attention dedicated to crime by news programs on specific Italian channels does

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[76]Durante and Knight (2012) find evidence of bias toward the centre-right coalition in Berlusconi privately owned channels. When it comes to the three public channels, Rai 1 and Rai 2 exhibit bias toward the centre-right while that coalition is at the government, whereas Rai 3 is generally closer to the opposition. As Larcinese (2008) points out "....*for having the owner of a vast broadcasting corporation as the leader of one of the electoral coalitions, Italy is probably a unique example in having such extreme selective exposure to television news*" (Larcinese, 2008, p.4).

not seem to be justified by existing differences in crime rates (measured as murder rate) across countries.

One legitimate question is whether the amount of crime related news reported by a TV channel is associated with the perceptions about crime that individuals who watch that specific channel hold. To provide an illustrative answer we make use of the ITANES Survey and regress an indicator equal to one if an individual reports crime as the most important problem in the country on a dummy for the TV channel she declares to watch most regularly. [77] We then plot in Figure 3.3 the estimated coefficients against the level of crime news reporting of each channel (measured as the monthly amount of crime-related news reported during prime-time news programs). First, the figure shows relevant heterogeneity across traditional channels in the amount of crime news broadcast. Interestingly, the ranking of channels from the most to the least crime news intensive closely matches the equivalent provided by Durante et al. (2012) from the most to the least biased in favour of the centre-right coalition. Mediaset channels (directly owned by Mr. Berlusconi) broadcast a higher number of crime news than Rai channels.[78] Further, Figure 3.3 shows that individuals who watch TV channels characterised by higher level of crime news reporting are indeed more likely to consider crime as major problem in the country. Although suggestive, this evidence cannot be interpreted as causal because individuals tend to self-select into news media with an ideological leaning closer to their own, as shown by Gentzkow and Shapiro (2010) for the US and by Durante and Knight (2012) for Italy.[79]We exploit the drastic supply shock and the consequent shift in viewing shares induced by the introduction of the digital TV precisely to tackle such identification issue and to

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[77]ITANES is a survey similar in content to the American National Election Study Survey in the US and representative of the entire Italian population, see section 4 for further details. We use the wave collected before the 2008 national elections. In the regression, the reference category is LA7, the main channel not referring to either Rai or Mediaset. Estimates of the coefficients are stable to the inclusion of individual characteristics and region fixed effects.

[78]Also in line with results in Table 3.2 of Durante and Knight (2012) is the fact that Rai3 - the channel usually granted to the opposition when the centre-right coalition is in government - presents the lowest value of crime news intensity and is the only one with a lower crime news intensity than LA7. Similarly, they find Rai 3 being the only channel with a negative bias toward the centre-right coalition.

[79]Gentzkow and Shapiro (2010) investigate whether ideological bias is driven by audience or owner preferences and find that readers have a significant preference for like-minded news. Durante and Knight (2012) show, in the Italian context, that viewers respond by switching to a channels with an ideological leaning closer to their own in response to changes in content of such channels.

study the effect of an exogenous reduction in the exposure to crime news on crime perceptions.

3.3 Identification: The Digital Reform as a Natural Experiment

3.3.1 The Digital Reform

Italy started introducing terrestrial digital TV in 2008. On specific deadline dates, which varied by region, the analogue signal was switched-off and substituted by the digital one. Terrestrial digital TV technology enhances transmission efficiency and allowed Italian households to freely receive more than 50 new channels previously not available through the analogue signal. [80] Terrestrial digital TV has a low set-up cost (lower than cable or satellite TV) as it uses existing analogue infrastructures. In order to receive the newly available digital channels people needed a specific *decoder* (similar to a modem). The price of such decoders was 50 euros, and its cost was 100% subsidized by the government through vouchers. The switch over was initiated in 2006 by the centre-left government as per a compulsory European Union Directive (2007/65/EC). Indeed many other European countries have gone through the same technological change, and switch over from analogue to digital TV signal during the last decade. Importantly, in Italy the deadlines to switch-off analogue signal differed across regions, allowing us to analyse the effect of the policy using a difference-in-difference type of strategy. Identification relies on the exogeneity of such switch-off deadlines, after conditioning on region fixed effects, time fixed effects and time varying region characteristics.

Specific deadlines were based on similarity of 1950s infrastructures and could not be manipulated by local politicians or interest groups once set. [81] Italy was divided into sixteen areas, to each of which a precise date for the analogue switch-off was assigned. The digital switchover for the entire country was completed over 4 years, from November 2008 to June 2012 (Appendix Figure 3A.2). [82] To test

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[80]The cost of the Decoder was entirely subsidized by the Government. For more information see E-Media Institute, DGTVi.

[81]For more information please refer here for the EU directive legislation summary and here for the official Italian Law on the introduction of digital TV signal.

[82]The switch over has been implemented gradually with patchwork pattern, alternating one region from the South and one from the North. The first region was Sardinia in the South, the

the orthogonality of switch-off deadlines to regional characteristics we perform a balancing test and compare two groups of regions: *early* switchers (those switching to digital before or at December 2009) and *late* switchers (those switching to digital from January 2010 onwards). Table 3.1 shows that *late* and *early* switcher regions are similar in dimensions such as unemployment and employment rates, GDP per capita, share of tertiary educated, of immigrant residents and of internet users, persons cited for crimes and murder rates per 100,000 people, suggesting that area-specific deadlines seem to be largely idiosyncratic to the purpose of our analysis.

3.3.2 The induced change in TV viewing shares and exposure to biased news

Treatment induced by the digital reform. The switch from analogue to digital TV signal caused an unprecedented increase in the supply of channels. Such increase was accompanied by a drastic drop in the viewing shares of the six traditional channels (Rai + Mediaset) mainly in favor of the newly available digital ones. The viewing shares during prime-time (the period between 6:00 and 8:30 pm when most news programs are aired) of the six main traditional channels went down from about 82% in June 2008 to 60% in June 2012.[83] At the same time, viewing shares of the new digital channels jumped from 2% to 17% (see Figure 3.4). Since the two platforms are characterized by different crime news reporting intensities, such shift generates arguably exogenous variation in exposure to crime news. As shown above, the six main traditional channels broadcast higher number of crime related news than that broadcast by independent Italian TV channel and by most important channels in main European countries.

Ultimately, for those who reacted to the introduction of digital signal by "changing" channel from traditional analogue to the new digital channels, we can think of two alternative possibilities. The first is to switch from news programs on traditional channels to news programs on digital ones. In this case individuals would now be exposed to a different (it could be lower or higher) amount of crime news. The second possibility is to switch from news programs on traditional chan-

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second one was Trentino in the North.

[83]We focus on prime-time, as we are interested in capturing the time of the day when most news programs are aired but, as we will show later, the drop in the viewing shares of traditional channels shares is relatively homogeneous across all time slots during the day.

nels to full-entertainment programs on digital ones. In this case, people would not receive any information about crime through that specific channel anymore and the exposure to potentially biased news is reduced. Data about the content of new digital channels indicate that the latter case is indeed most common. Appendix Figure 3.A3 plots the increase in the viewing share of new digital channels, split into those that broadcast some news programs (News Channels) and those that are full-entertainment (Other Channels). About 95% of the viewing shares of new digital channels are of channels that do not broadcast news at all. As Appendix Figure 3.A4 shows the most common programs broadcast by digital channels are TV-shows, movies and programs for kids, and to a lower extent sport programs, educational/history programs and life-style programs.

The Digital Reform could also induce individuals to increase/decrease the total amount of time devoted to watch TV, and, consequently, to vary the time devoted to other activities, a substitution mechanism that might potentially contaminate our results. Appendix Table 3.A1 investigates whether the digital switchover induced any change in the propensity to watch TV (columns 1-2) or in the average viewing time per day, conditional on watching some TV (columns 3-4). Results suggest that the Digital Reform might have slightly reduced the probability of watching TV, although the estimates are significant only for the youngest group of individuals (when not controlling for region time-varying controls). Further, coefficients for the effect on the average daily TV watching time (in 10 minutes) are positive for individuals aged below 41 and negative above, yet are significant only for the group aged 41-51. Thus, although with some exceptions, the majority of individuals seem not to have respond to the Digital Reform by watching more or less TV.

In the next paragraphs we will show how the shift in viewing shares is clearly triggered by the new technology introduction and takes place precisely in correspondence of the region-specific switch-off deadlines, thus providing evidence of its exogeneity.

Descriptive evidence. In order to further support the effectiveness of our identification strategy, we would like to observe jumps in the region-specific shares of the six main traditional and new digital channels in correspondence with the region-specific switch-off deadlines. Figure 3.5 plots the evolution of prime-time viewing shares, for respectively the six main traditional and new digital channels,

in an exemplificative group of four regions around switch-off dates (the same plot for all regions is provided in Appendix Figure 3.A8).[84] For all of them it is possible to observe a large and sudden increase (decrease) in the viewing shares of new digital channels (traditional analogue channels) in correspondence with the analogue switch-off deadlines (indicated by the vertical dashed lines). To better show the variation we exploit in our empirical analysis, Figure 3.6 plots the evolution of the prime-time viewing shares of new digital channels in two pairs of neighboring regions that switched-off the analogue signal at different times. In Panel A we compare Campania with Calabria (in the south) while in panel B Emilia Romagna with Tuscany (in the center-north). Focusing on Panel A, the trend in digital channels viewing shares is quite similar before November 2009, when none of the two regions had switched off yet, and after May 2012, when both regions have already switched to the digital signal. In between switch-off deadlines (indicated by the dashed vertical lines) individuals who happened to live in either of the two neighbouring regions have been exposed to a different mix of TV channels. We exploit precisely such differential exposure, which we argue is as good as random.

Evidence from regression analysis. In order to provide a more systematic evidence of the effect of the digital switchover on TV watching behaviour we make use of unique data on TV viewing shares collected for each channel at the month by region level and estimate the TV viewing share during prime-time for various groups of channels (labelled as c) in region r and month t as a function of the digital switchover as follows:

$$Share_{rt}^c = \gamma_0 + \gamma_1 DigitalSwitch_{rt} + \gamma_r + \lambda_t + u_{rt} \qquad (3.1)$$

We split channels into four groups: Main Traditional Channels (RAI + Mediaset), New Digital Channels, Satellite Channels and Residual Channels.[85] In equation (1) above $DigitalSwitch_{rt}$ is an indicator for the region having switched over to digital signal in month t or before, while γ_r and γ_t are region and time fixed

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[84]The plotted regions are Campania (switch-off deadline December 2009), Lombardy (switch-off deadline October 2010), Umbria (switch-off deadline November 2011) and Sicily (switch-off deadline June 2012).

[85]Satellite Channels are pay-per-view ones to which terrestrial digital TV does not automatically provide access. The forth group, Residual Channels, include other digital and satellite channels whose viewing shares are not recorded individually, as well as some minor local channels.

effects respectively.[86] Panel A of Table 3.2 reports estimates from equation (1) for the group of Main Traditional Channels. The switch-over induces a decrease in the viewing shares of these channels between 8.1 and 8.7 percentage points, depending on the specification. This corresponds to more than a 10% decrease on the baseline value. In Panel B, C and D we look at viewing shares of New Digital, Satellite, and Residual Channels respectively. The switch-over is associated with an increase in the viewing shares of New Digital Channels that ranges between 6.2 and 7.2 percentage points depending on the specification, while, as expected, has only a tiny positive effect on the viewing shares of Satellite and Residual Channels. In the table we deal in different ways with the potential confounding effect due to time trends by including linear time trends (column 1), year fixed effects (column 2), month*year fixed effects (column 3) and month*year plus region-specific linear trends (column 4). The digital switchover is very powerful in predicting values of TV viewing shares with an F-stat equal to 89.9 and 110.8 in our most restrictive specification (column 4) for respectively viewing shares of main traditional and new digital channels.[87]

3.4   Data and Estimating Equation

3.4.1   Data

Individual perceptions of crime. Our primary data source is the Multipurpose Household Survey, by the Italian National Statistical Agency (ISTAT). One of its several modules gathers information about individual and household daily life. The survey is carried out yearly (around March) and is a repeated-cross section representative at the regional level of the entire Italian population. In addition to the usual demographic, labour market, and education information, the survey

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[86]We here exclude, as in the following of the paper the region of Piedmont from the analysis, from the moment that some provinces switched over before others.

[87]Although most of the news programs are aired during prime-time (between 6:00 and 8:30pm), some news are also broadcast during other time of the day, for example at lunch-time: between 12:00 and 15:00. One concern is that people might watch fewer news programs on traditional analogue channels during prime-time, but more of them during other times of the day. Such substitution across time-slots could potentially offset the decrease in crime news exposure measured during prime-time In Appendix Table 3.A2 we test whether viewing shares responses were homogeneous across different times of the day. Reassuringly, the switchover effect on the viewing shares of traditional analogue channels (negative) and on new digital ones (positive) goes in the same direction in all and every time slot and estimates are very similar across the board.

asks a set of questions about the use of TV, Internet and radio, as well as about beliefs and perceptions regarding a number of issues. From this survey, we employ two measures of perceptions about crime. The first is the answer to the question that asks "*What do you think are the priority problems of the country?*".[88]

We construct an indicator variable for the individuals reporting crime as one of the three priority problems in Italy and we call it *Crime_Concern.* This variable captures individuals' concern about crime, or, in other words, the level of salience of crime as a priority problem to be tackled at the national level. In our estimating sample 57% of individuals report crime as being among the three priority problems in Italy, making crime the second most reported problem after unemployment (mentioned by 72% of individuals) throughout the entire period. The average of *Crime_Concern* by sub-group of population, alongside other descriptive statistics for our main estimating sample, is reported in Appendix Table 3.A3. The share of people particularly concerned about crime is higher among those aged above 65 than among those aged 65 or less, and is equal to 62 and 55 percent respectively. The survey contains a second measure of crime perception, which derives from the question "*What level of crime risk does your area of residence present?*". Respondents can choose from four categories that range from "absent" to "very high". This variable, named *Crime_Risk_Local,* is less suited to our purpose as a) it refers only to the local area while we are interested in attitudes toward crime at the national level, and b) it is reported only at the household level. However, the question, unlike the previous one, has also been asked in year 2011 and 2012.

TV viewing shares. To measure the shift in audience shares induced by the Digital Reform we gathered unique data about monthly, region-specific, viewing shares for each TV channel available from year 2007 until 2013. The data have been extracted from the official Auditel dataset.[89] We have information about

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[88]Respondents can choose three topics from the following list of ten: unemployment, crime, tax evasion, environment/pollution, public debt, inefficiency of health sector, inefficiency of school sector, inefficiency of judicial sector, immigration, poverty, others. Individuals are free to mention fewer than, but no more than three topics.

[89]Auditel is an independent third party agency responsible for television audience measurement in Italy. Viewing shares data are based on a sample of about 5200 households and 14000 individuals that is representative at the regional level of the entire Italian population. Auditel has selected a sample of 20000 households. Every year they conduct a face to face interview with each of them to check the type of technology they use (Satellite, DG, DVD, etc) and they install the so-called people meter. The meter is based on the advanced technology Unitam

viewing shares for five different time slots during the day including prime-time going from 18:00 to 21:30. Such data are used in the analysis carried out in section 6.[90]

Individual level self-reported voting and TV watching behavior. We further use data from the 2008 ITANES Survey , a survey similar in content to the American National Election Study Survey in the US and representative of the entire Italian population. It includes individual level information about the most watched news-program, perceptions about crime, and voting behaviour.[91] Such data are used in the analysis in section 7.

3.4.2 Estimating Equation

In this section, we present our empirical strategy to estimate the reduced-form effect of the increase in the number of available TV channels on individual perceptions about crime. In order to identify the intention to treatment effect (ITT), i.e. the effect of the switch-over from analogue to digital TV signal and the subsequent increase in number of available channels, we exploit region specific idiosyncratic deadlines to switch and implement a difference-in-difference design that compares crime perceptions of individuals within the same region, before and after the analogue switch-off occurred. More formally, we estimate various versions of the following linear probability model:

$$CrimeConcern_{irt} = \alpha_0 + \alpha_1 DigitalSwitch_{rt} + X'_{irt}\delta + Z'_{rt} + \gamma_r + \lambda_t + \varepsilon_{irt} \quad (3.2)$$

where i indexes individuals, r regions and t time periods. The variable $CrimeConcern_{irt}$ is an indicator for the individual mentioning crime among the three priority problems in the country. $DigitalSwitch_{rt}$ is a dummy that equals 1 if region r experienced the switch-off to digital signal at time (year) t or before. The switch-off might occur at any point in time during the year previous to the annual household survey collected in March. Indeed, switching to digital

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/ CTS (content tracking system) and collects data everyday on the number of TV minutes watching per all the existing channels. More information on Auditel procedure is available at http://www.auditel.it/come-lavora/.

[90]Slot1, from 07:00 to 11:59; slot2, from 12:00 to 14:59; slot3, from 15:00 to 17:59; slot4 (prime-time) from 18:00 to 21:30 and slot5, from 20:31 to 23:59.

[91]The 2008 ITANES Survey was collected right after the 2008 national election.

TV just one month before the survey is likely to induce different treatment than switching 11 months before it, as the share of time between two surveys during which individuals have access to more TV channels differs. In order to take such heterogeneity in (intention to) treatment intensity into account we also consider an alternative measure for *Digital_Switch*, which is the fraction of months (over the 8 previous to each annual survey) after the switch-off occurred. The coefficient of interest is α_1, which captures the impact of the increase in available TV channels on individual crime perceptions. Vector X'_{irt} denotes a set of individual and household level characteristics including gender, age, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Vector Z'_{rt} includes a series of region time-varying covariates that might affect crime perception directly or indirectly, such crime rates and unemployment rate. For our purpose it is crucial to control for region-specific crime rates that are likely to be an important determinant of crime perceptions. We measure it as the (log) crime rate, defined as number of crimes over 10'000 population, in region r during the calendar year previous to the collection of year t survey. The coefficient on crime rates is of interest on its own as it will tell us whether, and to what extent, crime perceptions respond to actual crime rates. The γ_r are region fixed effects meant to capture any unobserved time-invariant characteristics that affect crime perceptions and may also be correlated with the timing of the switch-over to digital TV. The λ_t are year fixed effects meant to allow for very flexible trend in crime perception common to all regions. Finally, ε_{irt} is an idiosyncratic error term. Our identifying assumption is that, conditional on region and year fixed effects and on the time-varying controls, the timing of the digital switchover is orthogonal to the error term. We will attempt to test the plausibility of this assumption in the reminder of the paper. Finally, throughout the empirical analysis, we cluster standard errors at the region level to allow for an arbitrary correlation of residuals within regions.

3.5 The Effect of the Digital Reform on Crime Perceptions

3.5.1 Estimates

Overall Effect. Here we discuss results from the estimation of the reduced form effect of the digital switchover on individual crime perceptions. Table 3.3 summarizes the results from our estimation of equation (2): a linear probability

model of *Crime_Concern* on a post switch-over indicator *Digital_Switch* and controls. *Crime_Concern* is an indicator for the individual reporting crime as being among the three priority problems in the country at the moment of the survey. The coefficient on *Digital_Switch*, an indicator taking value 1 if the region has switched-off in period t or before, captures the effect of the increase in the number of available TV channels on crime perceptions. When we look at the effect on the overall population (column 1) we find a negative coefficient, suggesting that the Digital Reform induced a lower concern about crime. The coefficient is not statistically significant though. However, we do not expect all groups of the population to a) be exposed in the same way to the pre-existing bias, and b) to respond in the same way to the partial removal of it. Indeed, individuals of different cohorts are likely to gather information from different combinations of media; for example, older individuals are likely to rely more on television and less on new technologies such as internet, as we will show in more detail later.

Heterogeneity of the effect across age groups. We therefore turn and study the heterogeneous effect of the Digital Reform for five different age groups of the population (results reported in column 2). We do so by interacting *Digital_Switch* with a set of five age group indicators. While estimates for individuals below age 41 are close to zero, they are negative for older individuals. Estimates get larger as we move from younger to older groups and are significantly different from zero at conventional levels for the group of individuals above age 65. These results suggest that elderly individuals' crime perceptions respond more to the decreased exposure to potentially biased news programs broadcast by the six main traditional TV channels. The stronger response for the group of elderly individuals is consistent with findings from Barone et al., 2015 that detected a stronger effect of media on voting in municipalities with higher share of elderly individuals. One potential reason for such regularity might be higher amount of time elderly individuals are likely to spend watching TV and the relatively lower use they make of alternative sources of information. We will directly investigate these potential explanations in the next section.

New specification: accounting for the length of treatment. From column 3 onward we employ a more precise version of Digital_Switch: the share of months the region has spent under the new digital regime during the 8 months period previous to the survey. Such specification takes into account the length of the (intention to) treatment we are interested in. Estimates (all negative)

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get larger, and are now significant also for the second oldest group of individuals, those aged 52-65. The fact that when we account for the intensity of the treatment estimates effects get larger suggests that in our empirical analysis we are not likely to be picking up just some spurious correlation between year of switch-off and changes in crime perceptions. We consider this specification more appropriate to the purpose of our analysis and will use it from this point forward.

Robustness of estimates and magnitude of the effect. The coefficients are very stable across specifications, suggesting that the introduction of digital TV is not correlated with any individual characteristic (included from column 4) or region time-varying characteristics (included from column 5). In particular, in column 5 and 6, we add region-specific crime rates that do not affect the estimates on the *Digital_Switch*. Crime perceptions respond to actual crime rates, but only to specific crime categories: column 6 shows that individuals become more concerned about crime only when violent and drug related crimes increase, while property crimes and other crimes do not seem to affect individual concerns in any significant way. In our most complete specification the increase in TV channels, or better, having access for the entire pre-survey period to an increased number of TV channels, is associated with a statistically significant decrease in crime concern for individuals aged above 51 (the t-statistic for the next younger groups is 1.636). The effect estimated is economically relevant: if we focus on the older group of individuals, those aged above 65, the digital reform is associated with a decrease in the probability of reporting crime as one of three priority problems of 5.2 percentage points, corresponding to about 8.4 percent change with respect to the average probability for that specific age group (equal to 0.62). These results are consistent with the increase in the number of channels available - and the induced lower exposure to partisan ones over-reporting crime news - leading individuals to revise their crime perceptions downward.

Estimates of the group-specific Digital_Switch coefficients from the most complete specification (column 6) together with 90% confidence intervals are also plotted in Figure 3.7. This shows clearly how the effect of the reform gets larger as we move from left to right of the age distribution. In Appendix Figure 3.A5 we also report estimates from regressions of the type in column 6 but estimated separately for males and females. Among females the effect is negative and statistically significant for those aged above 40 and gets more precisely estimated as age increases. The effect is negative and significant for males above age 65. As

for interpreting the coefficients, for females aged above 65 the switch-off is associated with a decrease in the probability of reporting crime as priority problem of 3 percentage points, which represents a decrease of about 5 percent with respect to the average probability for that specific group of individuals. Similarly the effect of the switch-off on males above age 65 corresponds to a decrease of about 6.5 percent on their average probability.[92]

3.5.2 Interpreting results: TV watching time and other media usage

TV watching time. Why are elderly individuals more responsive to the increase in TV channels availability? One potential reason might be related to different amount of time spent watching TV. Indeed, it is reasonable to expect that the effect of a reduced exposure to partisan TV channels is larger the for those individuals who, on the one side, watch more television, and on the other one have smaller access to other sources of information such as the internet, the radio and newspapers. Our survey provides information about the daily amount of time spent watching television, as well as how frequently other information sources are used. In our setting, it is possible that TV watching time might be affected by the Digital Reform itself, introducing a bias in the estimates of an interaction term between Digital Reform and actual watching time. [93] To overcome this problem, we predict the amount of time an individual spends watching TV by using a number of characteristics – age, gender, marital status and household size – which we believe are unaffected by the digital reform.[94] Table 3.4 reports estimates from regressing our usual outcome on *Digital_Switch*, *TV_time* (which is measured in 10 minutes and de-meaned) the interaction between them, and the usual set of controls. The effect of the digital reform on the likelihood to report crime as a problem for the individual watching an average amount of TV is negative and significant at the 10% level. The interaction term is negative and highly statistically significant, suggesting that the negative effect of the digital reform is stronger for

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[92]Average probability of reporting crime as a major problem is 0.62 and 0.61 for female and males respectively above age 65.

[93]Indeed, in section 3 (see Appendix Table 3.A1) we show that we cannot rule out that some groups of individuals have responded to the Digital Reform by modifying the total amount of time spent watching TV.

[94]We calculate, using pre-reform data, averages TV watching time for each cell formed by the interaction of the following variables: age, gender, marital status and household size. We then predict TV watching time for individuals in our estimating sample based on such cell-specific averages.

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individuals watching relatively more TV. Precisely, the probability of reporting crime as a problem decreases by an extra 1.5 p.p. for every extra half hour spent watching TV. Individuals who watch a lot of television were more likely to be exposed to news programs in partisan channels before the introduction of the digital signal and this is likely to be a reason why they revise perceptions to a larger extent. In column 2 we test the linearity of the interaction effect and although the coefficient on the interaction with *TV_time* squared is positive we fail to reject linearity.

Differential access to other sources of information. Television is not the only source of information individuals use. Access to other media is equally important. Individuals form their beliefs about the actual levels of crime through two main different sources: direct observation of the reality and indirect channels, such as television, the internet, newspapers and the radio. Hence, according to simple Bayes Rule, an individual would update his perceptions every time a new piece of information is received, and do so according to the weight attributed to the specific information source. If many sources of information are available each one will have little weight and contribute only marginally to the update of perceptions. Hence, we would expect the weight attached to information coming from television to be higher for individuals who have only limited access to other sources. To explore this hypothesis we run regressions where we interact *Digital_Switch* with an indicator variable equal 1 for individuals not using, respectively, the internet, the radio, and newspapers.[95]Results (reported in columns 3-5 of Table 3.4) indicate that the effect of the Digital Reform is stronger - more negative - for individuals who do not use the internet (54% of the sample) or do not listen to the radio (37% of the sample). In both cases the coefficients are negative, sizable, and highly significant. The interaction with the dummy as for not reading newspapers (40% of the sample) turns out negative but is not statistically different from zero. Thus, the effect of the change in the information content provided through television appear to be larger for individuals with a less diversified set of sources from which gathering information, consistently with the simple updating mechanism suggested above. To reconcile these estimates with our main results from Table 3.3 we compare average TV watching time and the share of individuals not using internet, the radio and newspapers among individuals below and above age 51,

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[95]Also in the case of internet, radio and newspapers, because of the reasons above we predict values using characteristics not affected by the reform in the same way we did for TV_time.

the age cut-off above which we find statistically significant effect of the Digital Reform. Table 3.5 shows that individuals aged above 51 are used to watch TV for almost one extra hour per day with respect to those aged 15-51 (193 vs 142 minutes per day). Individuals aged above 51 also show to have much less frequent access to other media: 86% of them never use internet, 50% never listen to the radio and 41% never read newspapers, while such percentages equal, respectively, 41%, 21% and 33% for their younger counterpart. The results above suggest that older individuals, especially those aged above 65, by relying mainly on television probably place high weight to information coming from it. As a consequence that group of the population, more likely to be exposed to the potential pre-reform bias, responded more to changes in TV content.

3.5.3 Further results and robustness checks

Effect on concerns about other topics. If individuals are less concerned about crime after the introduction of digital TV, we might be interested in knowing what problems have substituted crime as priorities in their opinion.[96] We therefore look at the effect of the digital introduction on the likelihood of mentioning any of the other problems suggested by the question "*What do you think are the 3 priority problems of the country?*", and there are nine of them apart from crime. The Appendix Table 3.A4 reports estimates for individuals aged above 51 – those for whom we found significant impact on crime perceptions - of the effect of the digital switchover for each of the other topics plus crime. In the table problems are ranked from left to right from the most (unemployment) to the least mentioned (inefficiency of education system). The lower concerns about crime seem to be compensated for by higher concerns about most of the other problems, such as poverty, inefficiency of health sector, tax evasion, environmental issues, inefficiency of judicial system, public debt and inefficiency of the educational system. However, estimates are statistically significant at conventional level only for inefficiency of health sector. The introduction of digital TV is also associated with lower concern about immigration and unemployment, but in the first case estimates are very small and in the second standard errors

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[96]Our outcome variable is a relative measure of concern as people are asked to report the three priority problems. Given such relative nature we are not able to test whether the increase in TV channels, and the consequent lower exposure to Berlusconi-influenced news programs, induced a lower general concern about every problem.

are quite large.

Effect of switch-over on unemployment and crime. The first robustness check we perform is to test if, in correspondence with the switch-off deadlines, regions have experienced changes in economic outcomes that are themselves relevant for crime perceptions. We test such hypothesis by estimating, in a similar fashion as above, the effect of the Digital Reform on unemployment and crime rates where the unit of observation is the region*year. Estimates suggest (Appendix Table 3.A5) that the Digital Reform is not statistically significantly associated with any change in unemployment or crime rates at the regional level, regardless of whether we use a specification with an indicator for *Digital_Switch* (columns 1 and 3) or the share of months (columns 2 and 4). In the case of unemployment share estimates even change signs when adopting the share of months as explanatory variable.

Effect of switch-over on individuals not watching TV. A portion of individuals in our sample (about 5% of the total) do not watch TV at all, and we should expect not to find any effect of the digital switchover on them. As a robustness check we thus estimate the same reduced-form regressions presented in Table 3.3 on the sample of those individuals who report not to watch TV at all. This exercise is only valid under the assumption that individuals did not pass from not watching to watching TV (or vice versa) in response to the Digital Reform. The Appendix Table 3.A6 reports results from such exercise, estimates on *Digital_Switch* are significant at the 10% level in only one case out of twenty.

Timing of the switch-over effect: perceptions about local level crime. We run a placebo test to check if we can detect any effect of the switch to digital signal before it actually occurred. To do so we employ the second measure of crime perceptions included in our dataset that refers to the level of crime risk in the area of residence. The questionnaire asks to rate the risk of crime in the local area of residence on a scale from 1 to 4 (highest level of crime) and we use answers to such question to construct a measure of perception of the level of crime in the local area called *Crime_Risk_Local*. Such variable is only reported at the household level but is available until year 2012 enabling us to look at the effect of the increase in the number of TV channels available also 1, 2 and 3 years after the switch-off. The estimated leads and lags effects running from two years prior to two years after the switch-off are plotted in Appendix Figure 3.A6. Estimates show

no effect of the switch-off before it actually occurred and such result is reassuring. They start to become negative right after the switch-off, and keep decreasing with time (becoming statistically significant two years after it). This might be an indication of individuals adjusting their viewing behavior gradually. Furthermore, it could be that perceptions about the level of local crime might take longer to adjust. Perhaps because individuals put larger weight on direct information when forming such perceptions while relying more on secondary sources of information, such as television, when forming perceptions at the national level.

Strategic editorial response to the change in market shares. The interpretation of our results would be hindered if the amount of crime news items broadcast by different channels responded to the digital switchover. This would be the case if the editors of news programs responded to the change in the television market's structure by strategically increasing or decreasing the amount of crime stories reported. To explore such possibility, we plot (Appendix Figure 3.A7) the average number of crime news reported on channels directly owned by Berlusconi (Mediaset) against the viewing shares of new digital channels, from 2007 until the end of 2012. Despite the significant increase in digital channels viewing shares (dashed blue line), the amount of crime news reported in Berlusconi's channels (red line) fluctuates around an average of about 100, and does not show any clear trend during the period. In particular, the number of crime news reported does not seem to change in any systematic way in correspondence with the various waves when the digital signal is introduced (indicated in the figure by the grey shaded areas).

3.6 Assessing the Effect of Crime News Exposure on Perceptions

Our reduced-form estimates indicate that individuals tend to revise their concern about crime downward once less exposed partisan TV channels. In this section we try to measure to what extend such reduced-form effect can be linked to the change in crime news exposure induced by the reform. In other words, we now attempt to answer the question about what happens to individuals' concern about crime when their exposure to crime news varies. As discussed earlier, in our setting the decrease (increase) in exposure to crime news might come together with the decrease (increase) in exposure to other types of news, and with an increase

(decrease) in exposure to full-entertainment contents. Therefore our measure of exposure to crime news will naturally capture those additional elements as well.

3.6.1 Measuring crime news exposure

To construct a measure of *exposure to crime news* we combine unique data on: a) region-specific monthly viewing shares of each TV channel during prime-time news programs; and b) the monthly amount of crime-related news items reported by each TV channel during prime-time news programs. With these two pieces of information we construct the following region*time specific measure of *exposure to crime news*:

$$CrimeNewsExposure_{rt} = \sum_{c=1}^{c} CrimeNews_t^c * Share_{rt}^c$$

where $CrimeNews_t^c$ represents the number of crime news items reported during prime-time news programs on channel c during period t; while $Share_{rt}^c$ is the prime-time viewing share of channel c in region r during period t. The measure is the summation, over all TV channels, of the number of crime news items broadcast during the period t weighted by the region-specific viewing share in the region r during the period t. This weighted average delivers us the actual number of crime news items the average individual who lives in region r is exposed to at each point in time (during each month or year). Between two months, the exposure to crime news of individuals living in a specific region can vary either because the average amount of crime news broadcast changes or because of some viewing shares reallocation across TV channels characterised by different crime news reporting intensity.

3.6.2 Estimating changes in crime news exposure induced by the Digital Reform

In order to measure the effect of the Digital Reform on individuals' exposure to crime news we estimate the following first-stage equation:

$$\left(\sum_{c=1}^{c} CrimeNews_t^c * Share_{rt}^c\right) = \gamma_0 + \gamma_1 DigitalSwitch_{rt} + Z'_{rt} + \gamma_r + \lambda_t + \varepsilon_{irt} \quad (3.3)$$

Where t can be either month or year and Digital_Switch is an indicator for the regions having switched to digital at time t or before.[97] Estimates are reported in Table 3.6. While we always include region fixed effects, from columns 1 to 4 we account for possible confounding factors due to the time dimension in different ways. More precisely, in column 1 we only include a linear time trend; in columns 2 year fixed effects; in column 3 year*month fixed effects to allow for maximum flexibility in the (common) time trend; finally, in column 4, we estimate our tighter specification by including both year*month fixed effects and region-specific linear time trends. In our context TV news programs are broadcast nationally, so any change over time in the amount of crime news reported is absorbed by time fixed effects. Instead, the variation in *Crime_News_Exposure* that is generated by the digital switch has to do with the reallocation of viewing shares away from traditional analogue channels and in favour of those with fewer or no crime news. Furthermore, if we look within the six main traditional channels (see Appendix Figure 3.A9) those characterized by higher crime news reporting intensity lost relatively more viewing shares during the period of digital TV introduction. Thus, because of this differential effect of the Digital Reform on viewing shares of different traditional channels, even the group of individuals who keep watching those traditional channels is, after the reform, on average exposed to lower crime news intensity.

Estimates (reported in Table 3.6) suggest that the digital switchover induced a decrease in the exposure of individuals to crime news. The coefficients on the *Digital_Switch* indicator are always negative, remarkably stable across specifications, and very powerful in predicting changes in *Crime_News_Exposure*. They are all

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[97]In this part of the analysis, because we often work with monthly level observations, we use the dummy measure of the digital switch rather than the fraction of months after the switch-off occurred.

significant at the 1% level and the F-statistic associated with *Digital_Switch* always scores above 35 in our most complete specifications, from column 4 onward. In column 5 we exclude from the analysis the residual TV channels, which we cannot label as either digital, or satellite; while in column 6 we estimate the equation collapsing the data into a yearly dataset. Estimates are in both cases very similar to those in the main specification. According to these results (see column 3) the digital switchover caused a reduction in the exposure to crime news equal to 8.4 crime news items per month. This number corresponds to about 12% of the average amount of crime news individuals are exposed to during a month, thus a sizable reduction.

3.6.3   The effect of crime news exposure on crime perceptions

We then move on and use the predicted values of *Crime_News_Exposure* to measure the effect of the digital reform on crime perceptions. We do so by estimating the following second-stage equation:

$$CrimeConcern_{irt} = \beta_0 + \beta_1 Crime_{rt} + \beta_2 \left(\sum_{c=1}^{c} CrimeNews_t^c * Share_{rt}^c \right) + X'_{irt}\beta_3 + Z'_{rt}\beta_4 + \eta_r + k_t + u_{irt}$$

(3.4)

where the variable $CrimeConcern_{irt}$ is the same as the one used in equation (2) and described above. $\sum_{c=1}^{c} CrimeNews_t^c * Share_{rt}^c$ is our predicted measure of *Crime_News_Exposure*. Vectors X'_{irt} and Z'_{rt} are the same as in equation (2). As usual robust standard errors are clustered at the regional level. In our first stage the change in *Crime_News_Exposure* is driven by shifts in TV viewing shares across channels, thus by individuals deciding to change channel in response to the digital reform. These compliers allow us to identify a local average treatment effect (LATE) for that part of the population whose viewing habits have changed because of the digital switchover. In particular, because we observe *Crime_News_Exposure* at the regional rather than at the individual level, the estimates delivered by our model are a mixture of a zero effect for individuals in treated regions who did not change channel and a possibly non-zero effect for those who did change channel. In order to interpret as causal the scaling of our reduced-from estimates by the first stage ones the exclusion restriction must hold, i.e. that the only way the digital switchover affects crime perceptions is through

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the change in crime news exposure. However, crime coverage is only one of the dimensions in which content of the traditional Berlusconi-influenced and new digital channels differ. Non-news related programs, such as movies, soap-operas, sport programs etc. will, of course, also differ. Nevertheless it is fair to believe that such entertainment programs are likely to have a minor direct influence on crime perceptions. [98]

OLS estimates of equation (4) as well as IV ones are reported in Table 3.7. These are year level regressions where the exposure variable is calculated as the average monthly number of crime news broadcast during the year before each survey. Both OLS and IV estimates on *Exposure* are positive suggesting that higher exposure to crime news is associated with higher crime concerns. OLS are just slightly larger than IV ones. This is due a first stage almost perfectly predicting *Crime_News_Exposure.* In fact, once we account for region and time fixed effects, almost the entire variation in the exposure to crime news is explained by the shift in viewing shares across TV channels induced by the digital TV introduction. In other words, because during the Digital Reform period the largest portion of viewing shares reallocation was triggered by the digital switchover, the variation in viewing shares used by OLS estimator has already very little endogeneity. When we allow the effect to vary across age groups our IV estimates (column 6) indicate that, similarly to the reduced-form case, the effect gets stronger (more negative) with age, and estimates are significant for individuals aged above 65. According to these estimates a one standard deviation decrease in the exposure to crime news (equivalent to 13 fewer news items per month) is associated with a 5.7 percentage point decrease in the probability of reporting crime as priority problem for individuals aged above 65. That is about a 9.2 percent drop with respect to their average likelihood of being concerned about crime of 0.62. These results suggest that, over and above actual crime levels (crime rates is included as control in all specifications), people do seem to respond to changes in the number of crime news they are exposed to in the intuitive way. That is, they are more concerned

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[98]It might be the case, for example, that Berlusconi-influenced channels broadcast more violent movie. Yet, Dahl and Della Vigna (2009) have shown no effect of violent movie on crime-related outcomes. More generally non-news programs in Berlusconi-influenced channels might have a direct effect on crime perceptions. Durante et al. (2015) find indeed that commercial-content in those channels affected voting (although in a period anterior to our study) yet, they argue the effect being due to the decline in social capital and the diffusion of a culture of individualism, not mentioning possible change in perceptions with respect to politically salient topics.

about crime when TV broadcasts higher number of crime news, regardless of the actual amount of crime. The estimated elasticity of crime perceptions to crime news is economically relevant and thus might have political economy implications. We discuss this issue in the next section.

3.7 Priming, Crime Perceptions and Voting Behaviour

In this section, we want to first discuss to what extent the high level of crime news reporting in Berlusconi-influenced channels can have a supply-side rather than a demand-side explanation, and then analyse the potential implications that the induced change in crime perceptions might have for voting behaviour.

A **supply-side explanation: issue ownership.** Reporting a high number of crime news might be a rational strategy for TV channels under the influence of Mr Berlusconi with the objective to increase people's concern about crime and eventually gain electoral advantage. Such strategy, called issue selection or agenda setting (see Larcinese, Puglisi and Snyder, 2011), is realised when media choose which type of information to report (for example crime events) in order to influence the perception of citizens about which issues are relevant and to what extent. Thus, a coalition that can influence or partially control the media might be incentivised to make a particular topic a salient one in the electorate's mind if the topic is perceived by the electorate as an area in which the coalition has a competitive advantage.[99] To gather evidence on whether crime is an issue "owned" by the centre-right coalition in Italy we use data from the Italian National Election Study Survey (ITANES). To the question "*What coalition would be better able to face the problem: crime?*", 51% of the respondents report the centre-right coalition, only 20% the centre-left and the remaining 29% say that is indifferent. Thus, making the topic of crime a salient one in voters' mind might thus be a rational strategy for the Italian centre-right coalition (CR coalition from now on), which indeed has often based its past electoral campaigns around issues such as crime and security.

Another piece of evidence in favour of the supply-side story is provided in Appendix Figure 3.A10. The figure shows the number of crime news over time

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[99]For example Larcinese et al (2011) shows that, in the US, the majority of people believe the Republican Party being better suited at dealing with national security issues while the Democratic Party with health care and social ones.

broken down by the two main TV groups: Rai, i.e. the public channels and Mediaset that is owned by Mr Berlusconi. Interestingly, the coverage of crime stories drops on Rai channels but not on Mediaset ones following Berlusconi's resignation in November 2011 - at which point he still controls Mediaset but not Rai – indirectly suggesting that supply of crime news might indeed partially driven by political purposes.

Crime news exposure, crime perceptions and voting. Barone et al. (2015) have provided convincing evidence that the Digital Reform had a negative impact on voting for the centre-right coalition. Here our goal is not to quantitatively assess the relative relevance of the induced change in crime perceptions vis-à-vis other potential channels. Such analysis is indeed not feasible with the data in hand and is left for future research[100]. Yet, by uncovering a relationship between crime perceptions and centre-right voting behaviour we intend to provide suggestive evidence that the manipulation of attitudes and perceptions with respect to relevant topics such as crime might have been one of the channels through which the effect of biased media on voting worked. Thus, we employ data from the post-2008 election wave of the ITANES Survey, and regress an indicator for the individual reporting having voted for the CR coalition (*CR_Vote)* on a dummy equal one if the person reports crime as the most important problem in the country (*Crime_Concern*). Table 3.8 shows that individuals who consider crime as the most important problem are almost 25 percentage point more likely to vote for the CR coalition that those who do not think so. These results are coherent with the evidence provided above about the majority of Italian citizens believing the CR coalition being better at tackling the crime issue. Estimates of the coefficient are stable to the inclusion of individual characteristics and region fixed effects. Although we cannot give causal interpretation to these results, they do point in the direction of a relationship in the Italian context between being concerned about crime and security and the likelihood of voting for the CR coalition.

In the same fashion, we then estimate the probability of *CR_Vote* on a dummy indicating the most watched TV channel reported by the individual and plot (see Appendix Figure 3.A11) estimated coefficients against channel-specific crime re-

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[100]Unfortunately, the absence of national elections during the Digital Reform does not allow us to directly test to what extent the change in perceptions induced by the introduction of digital TV affected voting behaviour.

porting intensity.[101] The figure shows a strong and positive correlation: individuals who watch channels characterised by higher intensity of crime news reporting are more likely to vote for the CR coalition.

Table 3.8 provides evidence that crime perceptions are relevant for voting decisions and that the probability *CR_Vote* is correlated with individual crime news exposure. Given the shock in the exposure to partisan channels induced by the digital reform, it is natural to ask what could have been the impact of the digital switchover on voting behaviour through the change in crime perceptions. To provide a numerical illustrative answer, we focus on individuals aged above 51 and 65, the population groups for which we found significant effect of the Digital Reform. For individuals aged above 65 the estimated coefficient of the digital switchover effect on crime concern was -0.052 (Table 3.3, column 6). Assuming a decrease of the same magnitude for the variable *Crime_Concern* and plugging it into the regression presented in Table 3.8, we obtain that the induced change in the latter likelihood would be equal to 1.3 percentage points, or 2.8 percent with respect to the average probability of *CR vote* (0.47). [102] According to these numbers almost 3% of 2008 national election CR voters aged above 65, and 2.4% of those aged 52-65, could have been induced to change their vote by the decrease in crime concern caused by digital TV introduction. Individuals aged above 51 represent almost one out of three of the Italian population entitled to vote and they have on average higher turnout rates than younger individuals. Although illustrative in its nature, this exercise seems to suggest that the change in crime perceptions induced by the decreased exposure to partisan channels might have relevant effects on voting outcomes.

3.8 Concluding Remarks

In modern democracies voters rely on media outlets to learn about politically salient issues. This raises an important question: how strongly can media affect public opinion? In this paper, we address this question by investigating the in-

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[101]The reference category is La7 (as in Figure 4) the main independent channel before the reform. Crime reporting intensity is measured as the monthly average of crime-related news reported during prime-time news programs. Estimates of the coefficients are stable to the inclusion of individual characteristics and region fixed effects.

[102]Similarly, for individuals aged 52-65, the induced change in the likelihood of CR vote would be equal to 1 percentage points, or 2.4 percent with respect to baseline (0.42).

fluence on news media on beliefs and perceptions individuals hold, with a focus on crime perceptions. We do so by focusing on the case of Italy, a country where the majority of TV channels have been under the influence of the former Prime Minister Silvio Berlusconi for more than a decade. In the first part of the paper we document the existence of a potential bias in the number of crime news reported by the Berlusconi-influenced TV channels. We then test if individuals revise their perceptions about crime once exposure to these channels is reduced. In order to identify the causal effect, we exploit a natural experiment in the Italian television: the introduction of the digital TV signal, which led to a drastic and sudden drop in the viewing shares of partisan channels. Exploiting the staggered timing of such introduction, and combining unique data on each channel's crime news coverage and prime-time viewing shares, we find that reduced exposure to crime-related news broadcast by partisan channels decreased concerns about crime. The effect is mainly driven by older individuals because, by watching more television and using alternative sources of information (such as internet, radio and newspapers) less frequently, represent the group more affected by the change in television news content. Such a change in perceptions is likely to be relevant for voting behavior. We predict that the reduction in crime concern caused by the digital introduction might induce up to about 2.4-2.8% of those aged above 51 who voted for the centre-right coalition to change their vote.

This paper contributes to the literature on persuasive communication by producing causal evidence of the impact of information provided by motivated agents (partisan media) on the beliefs and perceptions individuals hold. Although difficult to generalize to other settings, our results seem to suggest media outlet do have the capacity to influence voters' beliefs. Our findings also indicate that manipulating people's perceptions is more difficult when individuals acquire information from a variety of sources.

Further, this paper adds to the growing literature that looks specifically at the effects of media on voting. First it starts shading light over one of the possible mechanisms through which media ultimately affect voting outcomes: influencing their beliefs and perceptions about topics that are relevant in the political debate. Second, the use of unique data on viewing shares and news content of the different TV channels allows us to measuring the effect of exposure to specific media content. Individuals for whom we find a significant effect, those aged above age 51, make up about 30 percent of Italian voting population. Hence, for an office-

seeking politician, being able to influence their beliefs about politically salient issues might have relevant implications in terms of voting outcomes. Media are nowadays a pervasive presence in people's lives and the increasing availability of data about them provides unique opportunity to further explore the mechanisms through which they impact on economic decisions and outcomes.

3.9 Figures

Figure 3.1: Actual crime vs crime perceptions in Italy: 2004-2012
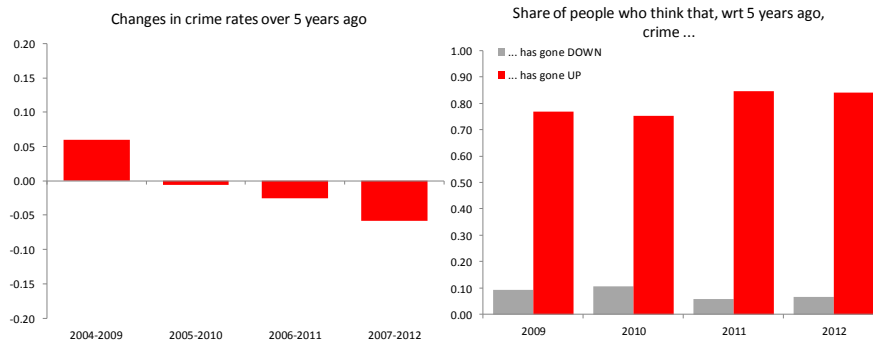
Note. The left panel of the figure reports changes in crime rates between 2004 and 2012. Source: Authors' elaboration on Italian Home Office Data. The right panel reports the share of people by answer to the question "Do you think that, with respect to five years ago, crime has gone up/gone down/ stayed the same/ do not know" from 2009 to 2012. The shares referring to the answers "stayed the same" and "do not know" are not reported.
Source: Eurostat (left panel) and UNIPOLIS Foundation (right panel).

Figure 3.2: Intensity of Crime News Reporting

Panel (A): Intensity of crime news reporting: Main Traditional Channels (Rai + Mediaset) vs New Independent Channel (La7)
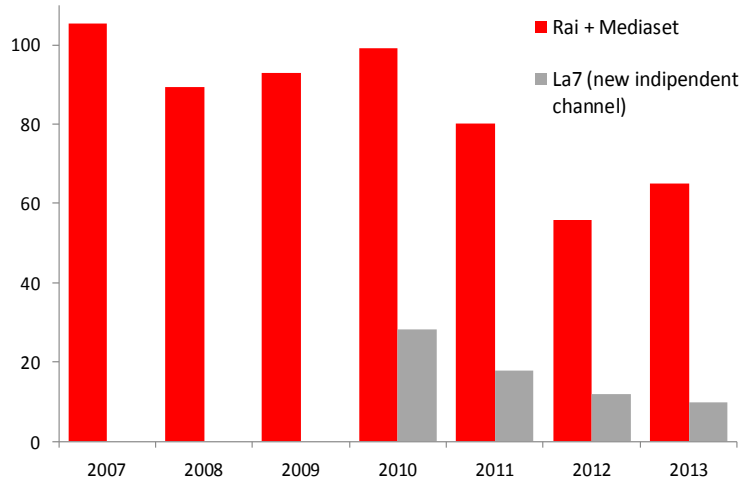
Panel (B): Intensity of crime news reporting and murder rates: selected countries
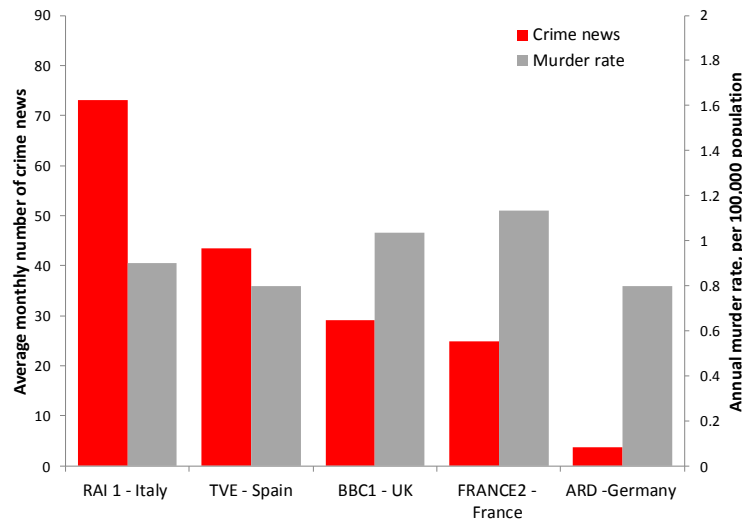
Note. **Panel A.** The graph shows the average monthly number of crime news broadcast during prime-time news programs respectively by main traditional channels (Rai + Mediaset) and the new independent channel (La7). Data for LA7 channel are available only from year 2010 onwards. a.

Panel B. The graph compares the average monthly number of crime news broadcast during prime-time news programs by the main public TV channel with the annual murder rate in a selected number of European countries. Sources: Pavia Observatory (crime news data) and Eurostat (murder rates). Years: 2010-2012.

Source: Authors' elaboration from Pavia Observatory data

Figure 3.3: Crime news exposure and concerns about crime
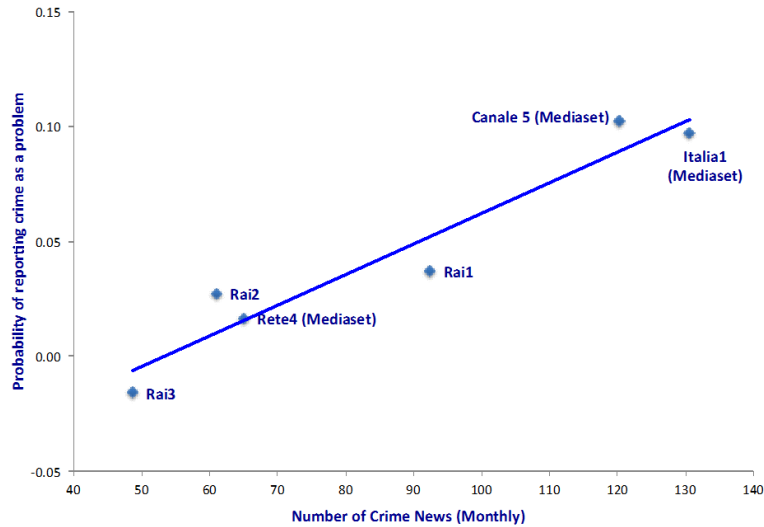
Note. The figure reports estimates from a LPM where we regress an indicator equal to one if an individual reports crime as the most important problem in the country on set of dummies for which of the 7 main analog TV channel the individual declares to watch most regularly. We then plot the estimated coefficients together with the monthly amount of crime-related news items reported by each TV channel during prime-time news programs. Estimated coefficients are interpreted with respected to the TV channel LA7, which is excluded from the regression. The regression includes age, male dummy, level of education, dummy for married, a set of dummies of occupational status and region fixed effects. Sources: Pavia Observatory (crime news data) and ITANES (Crime Perception Data) Year: 2008. Crime Perception measure with a pre-electoral survey using the question "Which is the most important problem in Italy at the moment?"

Figure 3.4: Prime time viewing shares: main traditional analogue channels (Rai + Mediaset) vs new digital channels
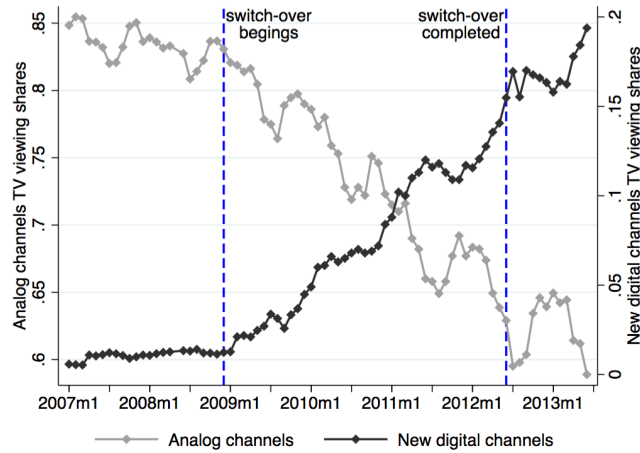
Note. The figure plots monthly TV viewing shares during prime-time (18:00-20:30) for main traditional analogue channels (Rai and Mediaset) and new digital channels between 2007 and 2013. Source: authors' elaboration on AUDITEL data.

Figure 3.5: Prime time viewing shares around switch-off deadlines (selected regions)
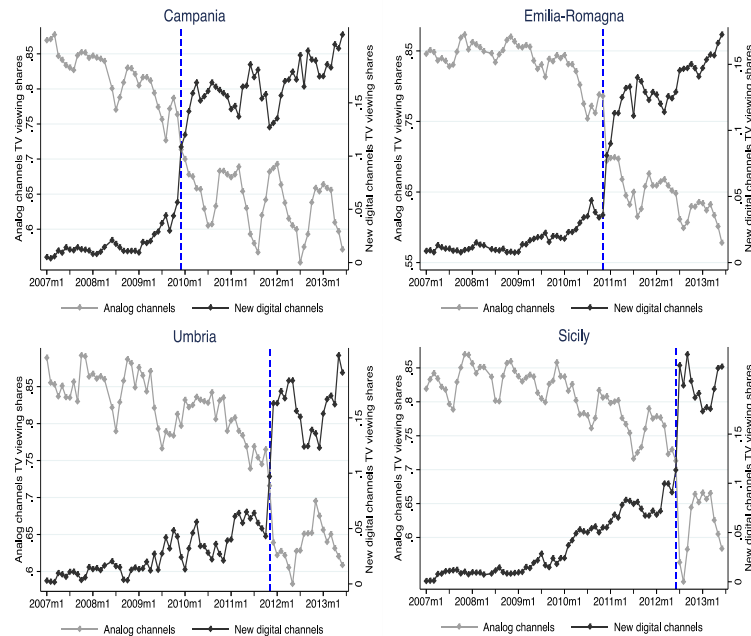
Note. The figure reports the evolution of monthly viewing shares (prime-time) before and after the switch-over to digital TV signal in 4 selected regions. The light grey lines indicate viewing shares of main traditional analogue channels while the dark grey ones indicate those of new digital channels. The dashed vertical lines indicate switch-off dates for each specific region. Source: authors' elaboration on AUDITEL data.

Figure 3.6: Discontinuity in digital channels viewing shares (prime-time) around switch-off deadlines (selected pairs of neighboring regions)

Panel A

Panel B
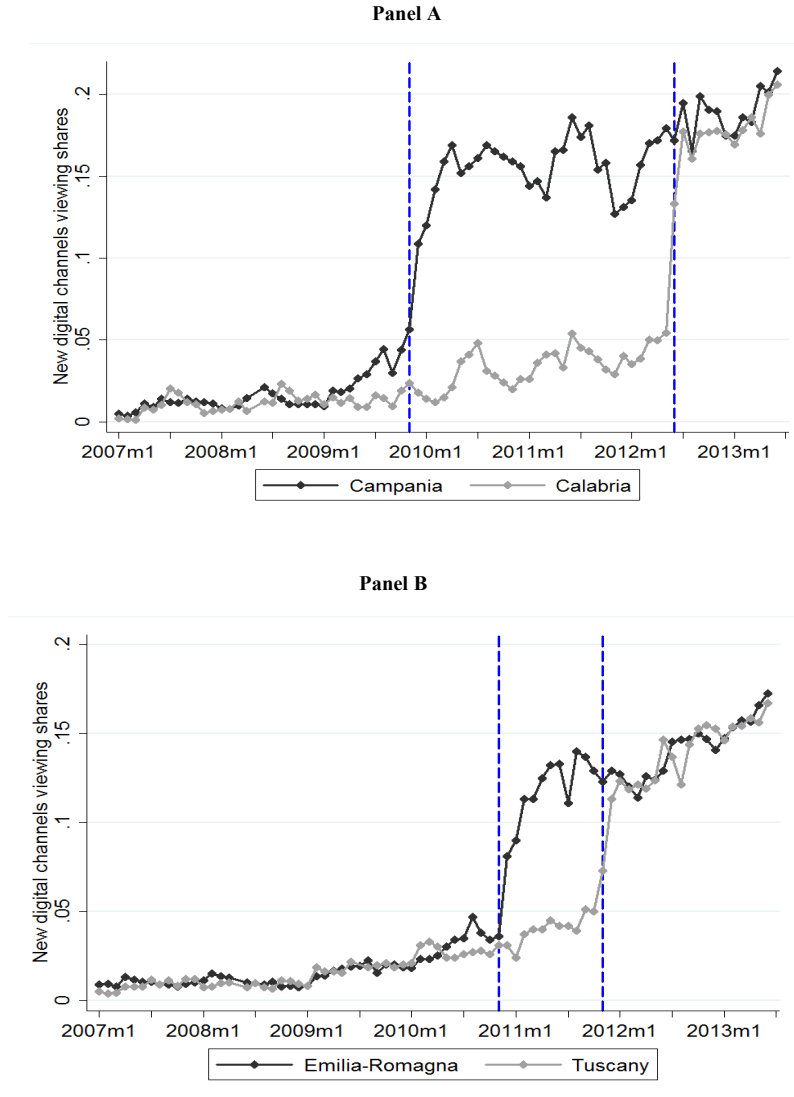
Note. The figures show the evolution of monthly TV viewing shares (prime-time) of new digital channels in 2 pairs of neighboring regions, before, during, and after the switch to digital signal. The dashed vertical lines indicate switch-off dates. In particular in Panel A the first line corresponds to the deadline in region Campania (12/2009) while the second to the deadline in region Calabria (06/2012). In Panel B the first line corresponds to the deadline in region Emilia-Romagna (11/2010) while the second to the deadline in region Tuscany (11/2011). Source: authors' elaboration on AUDITEL data.

Figure 3.7: Effect of Digital Reform on crime perceptions: heterogeneity across age groups
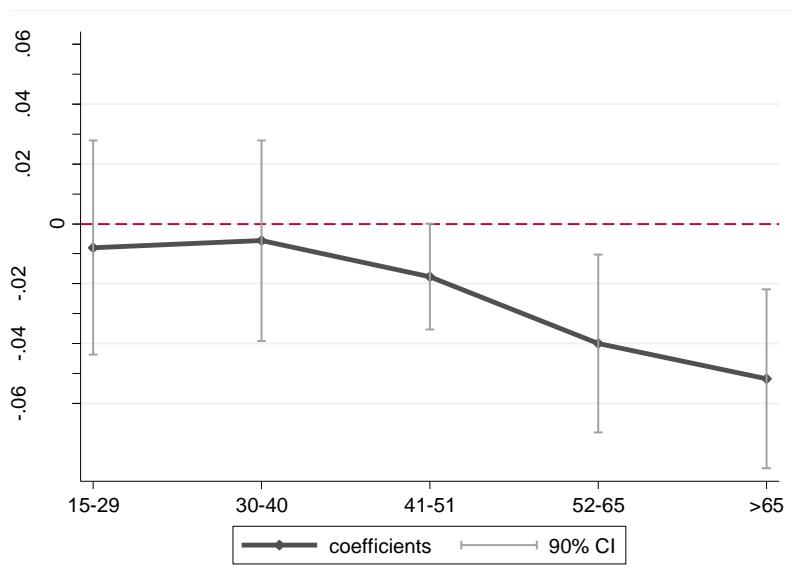
Note. The figure plots estimates and 90% confidence intervals by age groups from a LPM regression of Crime_Concern on a post digital switch variable (Digital_Switch) and controls. Crime_Concern is an indicator for the individual reporting crime as one of the 3 priority problems in Italy. Digital_Switch equals the number of months (as fraction of the 12 before each survey) elapsed since region r experienced the switch to digital signal. The specification is the same used in column 6 of Table 3. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. 90% confidence intervals based on robust standard errors clustered by region are reported.

3.10   Tables

Table 3.1: Balancing test: early vs late switcher regions

	Early Switchers	Late Switchers	Difference	p-value
Unemployment rate	0.063	0.064	-0.002	0.923
Employment rate	0.636	0.629	0.008	0.866
Share of tertiary educated	0.084	0.085	-0.001	0.121
Share of immigrant residents	0.039	0.042	-0.004	0.756
Share of internet users	0.388	0.355	0.033	0.213
GDP per capita (euros)	25,900	23,976	1924	0.550
Population density (people by square km)	186.3	182.9	-3.4	0.950
Persons cited for crimes (per 100,000 people)	1,149	1,137	-13	0.933
Murder rate (per 100,000 people)	1.010	0.881	0.129	0.546

Note. The table reports means of various characteristics for two groups of regions: those that switched to digital before or at December 2009 (early switchers) and those that switched to digital from January 2010 onwards (late switchers). Column 4 reports the p-values for tests of the difference between means in the two groups.

Table 3.2: Effect of the Digital Reform on TV viewing shares

	(1)	(2)	(3)	(4)
Panel A: Traditional Channels				
Digital Switch	-0.087***	-0.086***	-0.085***	-0.081***
	(0.010)	(0.010)	(0.010)	(0.008)
F-stat: Digital Switch	79.25	74.09	73.42	89.93
Panel B: New Digital Channels				
Digital Switch	0.072***	0.067***	0.064***	0.065***
	(0.007)	(0.006)	(0.007)	(0.006)
F-stat: Digital Switch	103.4	116.5	94.45	110.8
Panel C: Satellite Channels				
Digital Switch	0.007	0.009**	0.009*	0.007
	(0.004)	(0.004)	(0.005)	(0.005)
F-stat: Digital Switch	2.732	4.559	3.473	2.370
Panel D: Other Channels				
Digital Switch	0.012***	0.012***	0.014***	0.012**
	(0.004)	(0.004)	(0.004)	(0.004)
F-stat: Digital Switch	8.728	9.352	11.83	7.513
Region fixed effects	X	X	X	X
Linear time trend	X			
Year fixed effects		X		
Month*Year fixed effects			X	X
Region-specific linear trends				X
Observations	1,519	1,519	1,519	1,519

Note. The table reports estimates from regressions of TV viewing shares (during prime-time) on Digital_Switch The level of observation is the viewing share by channel*month*region. Digital_Switch equals one if the region r experienced the switch-over to digital signal at time (month) t or before. Each panel reports estimates of the TV viewing shares (prime-time) of a different group of channels. Rai and Mediaset channels are indicated as Traditional Channels. Robust standard errors clustered at the region level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3.3: Effect of the Digital Reform on crime perceptions

	Digital: Indicator of switch-off occurred		Digital: Share of months after switch-off			
	(1)	(2)	(3)	(4)	(5)	(6)
DigitalSwitch	-0.014					
	(0.010)					
DigitalSwitch * Aged 15-29		-0.000	-0.006	-0.008	-0.008	-0.008
		(0.015)	(0.020)	(0.020)	(0.018)	(0.022)
DigitalSwitch * Aged 30-40		0.001	-0.006	-0.005	-0.005	-0.006
		(0.015)	(0.021)	(0.020)	(0.022)	(0.020)
DigitalSwitch * Aged 41-51		-0.009	-0.015	-0.016	-0.016	-0.018
		(0.009)	(0.014)	(0.013)	(0.011)	(0.011)
DigitalSwitch * Aged 52-65		-0.025	-0.040*	-0.039*	-0.039*	-0.040**
		(0.017)	(0.022)	(0.022)	(0.020)	(0.018)
DigitalSwitch * Aged >65		-0.035***	-0.050***	-0.051***	-0.050***	-0.052**
		(0.012)	(0.012)	(0.011)	(0.011)	(0.018)
Crime rate: all					0.097	
					(0.091)	
Crime rate: violent & drug						0.205**
						(0.075)
Crime rate: property						0.035
						(0.081)
Crime rate: other						-0.025
						(0.057)
Individual & family controls				X	X	X
Region time-varying controls					X	X
Region fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Observations	139,165	139,165	139,165	139,165	139,165	139,165

Note. The table reports estimates of the reduced-form effect of the digital switchover on perceptions about crime. Estimates are from a linear probability model of Crime_Concern on a post switch-over variable (Digital_Switch). Crime_Concern is an indicator for the individual reporting crime as one of the 3 priority problems in Italy. In order to take into account the effective time passed since the region has switched to the digital signal we employ two alternative versions of the variable Digital_Switch. The first, which we employ in column 1 and 2, is a dummy that equals one if the region r experienced the switch-over to digital signal at time t or before. The second, which we employ from column 3 onwards, is the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. Crime rates are calculated as logs of crimes per 10'000 individuals. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3.4: The role of TV watching time and other media access

	Television		Internet	Radio	Newspapers
	(1)	(2)	(3)	(4)	(5)
DigitalSwitch	-0.026*	-0.032**	0.016	0.007	-0.019
	(0.014)	(0.015)	(0.018)	(0.015)	(0.017)
DigitalSwitch * TV watching time	-0.005***	-0.006***			
	(0.001)	(0.002)			
DigitalSwitch * TV watching time2		0.0005			
		(0.0004)			
DigitalSwitch * No Internet			-0.018***		
			(0.004)		
DigitalSwitch * No Radio				-0.093***	
				(0.025)	
DigitalSwitch * No Newspapers					-0.017
					(0.036)
TV watching time	0.002***	0.003***	0.002***	0.002***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
TV watching time2		-0.0001			
		(0.0001)			
No Internet			-0.003		
			(0.004)		
No Radio				-0.003	
				(0.022)	
No Newspapers					0.031*
					(0.016)
Individual & family controls	X	X	X	X	X
Regional time-varying controls	X	X	X	X	X
Time & region fixed effects	X	X	X	X	X
Observations	139,088	139,088	139,086	139,088	139,088

Note. The table investigates whether the effect of the digital switchover on the probability to report crime as one of the main problems depends on the time spent watching TV (columns 1-2), as well as on the use of other media (columns 3-5). DigitalSwitch is the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. TV watching time is the de-meaned daily amount of time spent watching TV. No_Internet, No_Radio and No_Newspapers are indicator variables for the individuals not using, respectively, Internet, the radio, and newspapers. We predict values for our estimating sample using cell-specific pre-reform averages of the variables above, where the cells are formed by all interactions of the following variables: age, gender, marital status and household size. Individual and family controls include: gender, age, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3.5: Descriptives about TV watching time and other media access by age

	Aged 15-51	Aged >51
TV watching time (daily)	142	193
Share of never users for:		
Internet	0.41	0.86
Radio	0.21	0.50
Newspapers	0.33	0.41
Observations	23,007	17,062

Note. Statistics are calculated on pre-Digital Reform sample (year 2007). TV watching time is calculated in minutes. The other variables are indicators for individuals not using, respectively, internet, the radio and newspapers.

Table 3.6: First–stage estimates: effect of Digital Reform on crime news exposure

	(1)	(2)	(3)	(4)	No residual channels (5)	Yearly data (6)
Digital Switch	-15.895***	-8.306***	-8.436***	-8.130***	-7.783***	-8.154***
	(4.515)	(1.632)	(1.388)	(1.172)	(1.083)	(1.319)
F-stat: Digital Switch	12.39	25.92	36.92	48.16	51.64	38.23
Region fixed effects	X	X	X	X	X	X
Linear time trend	X					
Year fixed effects		X				X
Month*Year fixed effects			X	X	X	
Region-specific lin. trends				X	X	X
Observations	1,406	1,406	1,406	1,406	1,406	133

Note. The table reports estimates of the effect of the switch to digital signal on the exposure to crime news. Estimates are from regressions of Crime_News_Exposure on a post switch-over indicator Digital_Switch. The unit of observation is the TV viewing share by TV channel, month (year in column 6) and region. Crime_News_Exposure is the summation, over all TV channels, of the number of crime news items broadcast during period t weighted by the region-specific viewing share in the region r during period t. Digital_Switch is a dummy that equals one if the region r experienced the switch-over to digital signal at month (or year) t or before. F-stats of the excluded instrument are reported. Robust standard errors are clustered by region and reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 3.7: OLS and IV estimates: effect of crime news exposure on crime perceptions

	OLS (1)	OLS (2)	OLS (3)	IV (4)	IV (5)	IV (6)
Exposure	0.0028**	0.0028*		0.0025	0.0022	
	(0.0013)	(0.0015)		(0.0019)	(0.0017)	
Exposure * Aged 15-29			0.0014			0.0013
			(0.0015)			(0.0024)
Exposure * Aged 30-40			0.0018			0.0011
			(0.0013)			(0.0020)
Exposure * Aged 41-51			0.0024*			0.0021
			(0.0014)			(0.0019)
Exposure * Aged 52-65			0.0033**			0.0035
			(0.0015)			(0.0026)
Exposure * Aged >65			0.0041**			0.0044**
			(0.0015)			(0.0019)
F-stat (excluded instr.)				29.80	29.29	18.76
Individual & family controls		X	X		X	X
Region time-varying controls		X	X		X	X
Region fixed-effects	X	X	X	X	X	X
Year fixed-effects	X	X	X	X	X	X
Observations	139,165	139,165	139,165	139,165	139,165	139,165

Note. The table reports OLS and IV estimates of regressions of Crime_Concern on Crime_News_Exposure (simply Exposure in the table). Crime_Concern is an indicator for the individual reporting crime as one of the 3 priority problems in Italy. Crime_News_Exposure is the summation, over all TV channels, of the number of crime news items broadcast during period t weighted by the region-specific viewing share in the region r during period t. Regressions are estimated on yearly data. In column 4, 5 and 6 we employ the switch to digital signal as an instrument for Crime_News_Exposure. In column 6 the digital switch is interacted with each of the age group dummies. F-stats of the excluded instrument are reported in columns 4, 5 and 6. Crime rates are calculated as logs of crimes per 10'000 individuals. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.8: Crime concerns and voting for the centre-right coalition

	Voted for the centre-right coalition		
	(1)	(2)	(3)
Crime Concern	0.249***	0.248***	0.246***
	(0.028)	(0.030)	(0.029)
Individual controls		X	X
Region fixed effects			X
Observations	1,652	1,637	1,637
R-squared	0.030	0.071	0.098

Note. The table reports estimates from a linear probability model of an indicator for the individual having voted for the centre-right coalition in 2008 election on a dummy for reporting crime as most important problem in the country at the moment of the elections. Individual controls include: age, male dummy, level of education, dummy for married and a set of dummies of occupational status. Sample: ITANES Survey (2008) Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

3.11 Appendix - Figures

Figure 3A.1: Crime concerns in selected European countries (2008-2010)
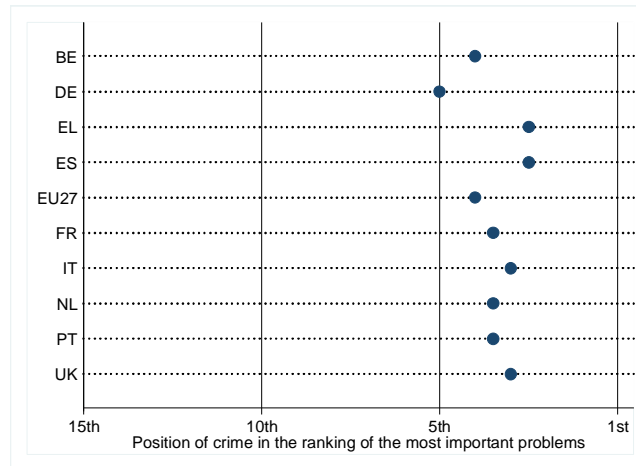
Note. This figure presents how crime is ranked, from 1st to 15th, among a list of major problems in selected European countries. The ranking goes from 15th, indicating the least mentioned topic, to 1st, indicating the most mentioned topic. Source: Authors elaboration from the 2008 and 2010 waves (pooled) of the Eurobarometer Survey.

Figure 3A.2: Timing switch-off across Italian regions

Source: Italian Ministry of Communication.

Figure 3A.3: Viewing shares: new digital channels also broadcasting news programs vs full-entertainment digital channels
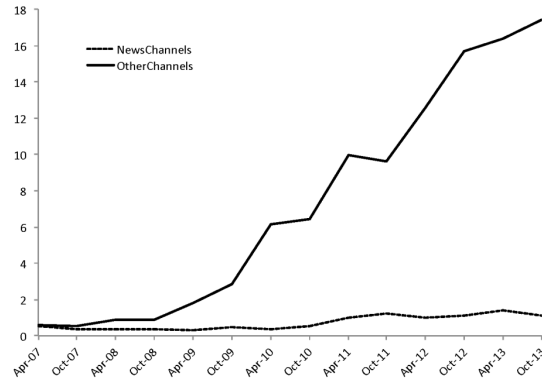
Note. The figure shows the evolution of viewing shares (prime-time) for new digital channels split into channels also broadcasting news programs (news digital) and full-entertainment (other digital channels). Source: authors' elaboration on AUDITEL data.

Figure 3A.4: Content of new digital channels: composition of total viewing shares
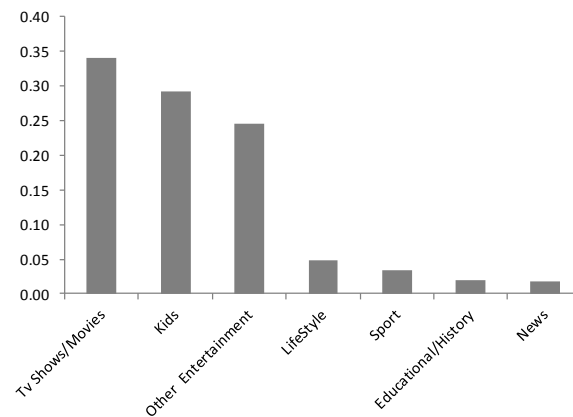
Note. The figure reports the total viewing of new digital channels divided by type of channel, for year 2010. The interpretation of the y axis scale is that, for example, almost 35% of the entire digital viewing share during year 2010 refers to digital channels broadcasting TV shows or movies.

Figure 3A.5: Timing of change in perceptions of local area crime after digital switch-over

Panel A: Females

Panel B: Males
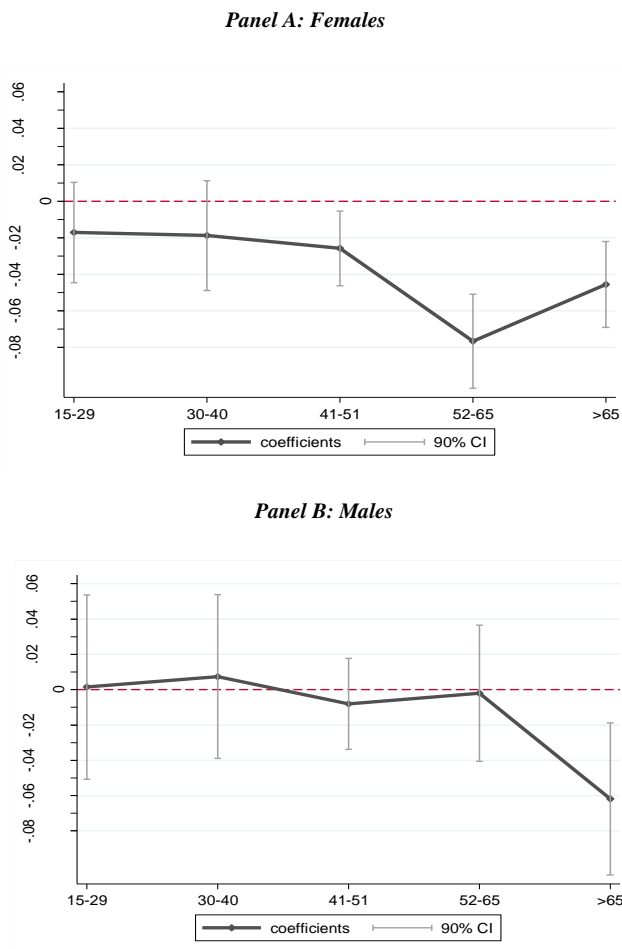
Note. The figure plots estimates and 90% confidence intervals by gender and age groups from a LPM regression of Crime_Concern on a post switch-over variable (Digital_Switch) and controls. Crime_Concern is an indicator for the individual reporting crime as one of the 3 priority problems in Italy. Digital_Switch equals the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. The controls included are the same as those in column 6 of Table 3. In particular. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. 90% confidence intervals based on robust standard errors clustered by region are reported.

Figure 3A.6: Timing of change in perceptions of local area crime after digital switch-over
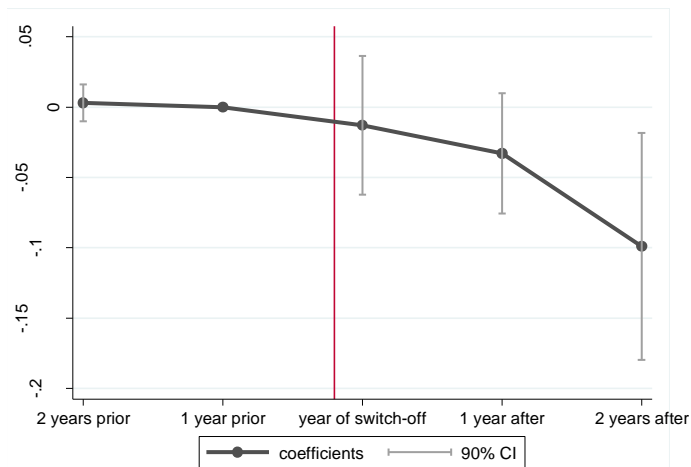
Note. The figure plots estimated coefficients and 90% confidence intervals from regression of the perception of crime level in the local area (Crime_Risk_Local) on a set of dummies from t-2 to t+2, where t=0 is the year when the switch-over to digital signal has occurred. The outcome variable ranges from 1 (crime absent) to 4 (crime level very high) and is collected at the household level. . Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regression include year and region fixed effects. 90% confidence intervals based on robust standard errors clustered by region are reported.

Figure 3A.7: Crime news reporting in Berlusconi-owned channels and viewing shares of new digital channels
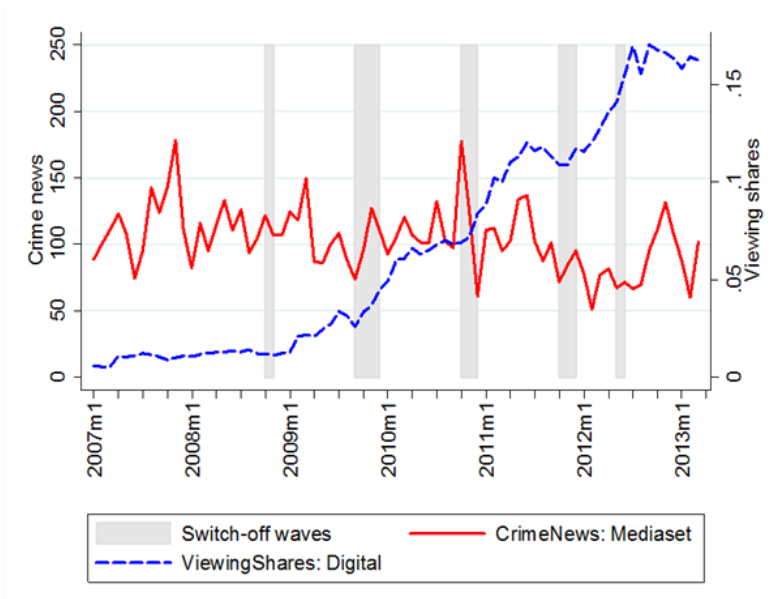
Note. The figure plots the average number of crime news (per month) on TV channels owned by Berlusconi (Mediaset) against the viewing shares (prime-time) of new digital channels, from 2007 to 2013. The grey shaded areas indicate different waves of switch from analogue to digital signal. Source: authors' elaboration on AUDITEL data and Pavia Observatory data.

Figure 3A.8: Prime time viewing shares around switch-off deadlines: all regions
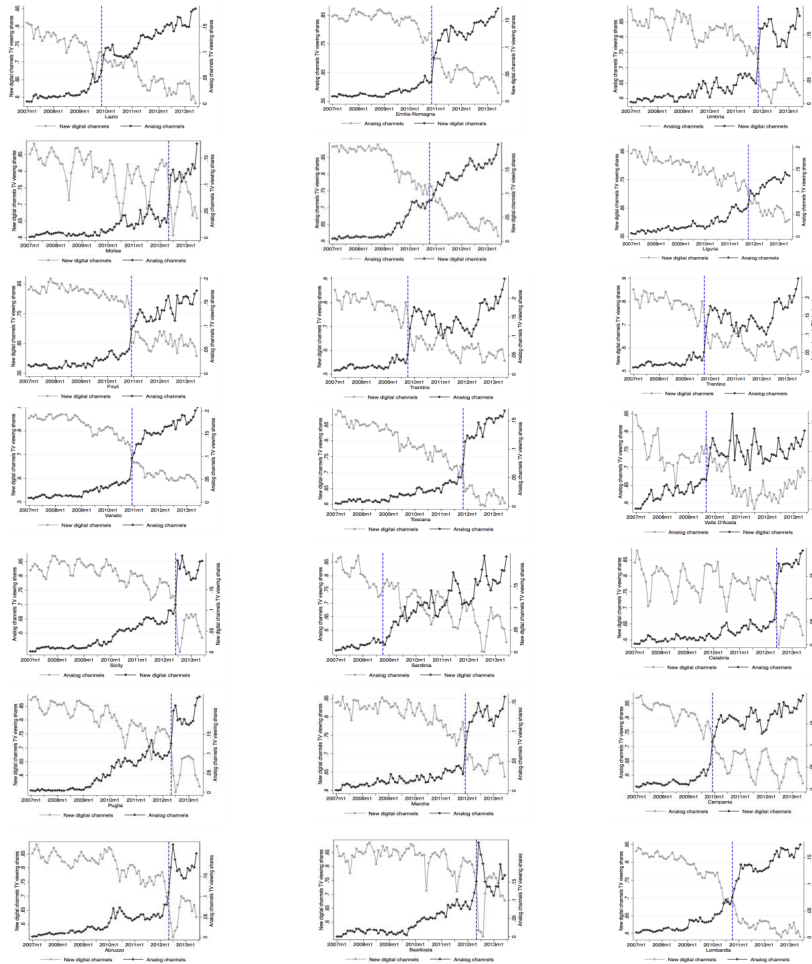
Note. The figure reports the evolution of monthly viewing shares (prime-time) before and after the switch-over to digital TV signal in Italian regions. The light grey lines indicate viewing shares of main traditional analogue channels while the dark grey ones indicate those of new digital channels. The dashed vertical lines indicate switch-off dates for each specific region. Source: authors' elaboration on AUDITEL data.

Figure 3A.9: Crime news reporting intensity and viewing share drop during Digital Reform
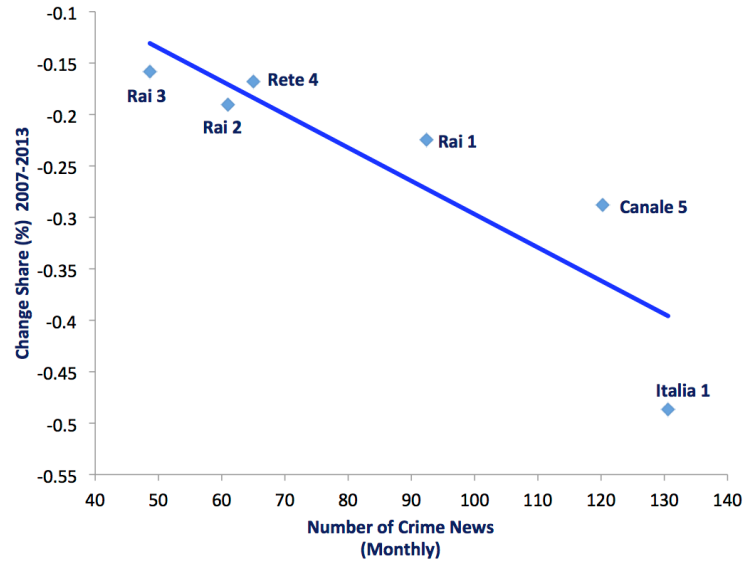
Note. The figure plots monthly average number of crime news against the change in TV viewing shares (both between 2007-2013) for each of the six main traditional channels. Source: authors' elaboration on AUDITEL data.

Figure 3A.10: Crime news reporting on Rai/Mediaset during and after Berlusconi's government
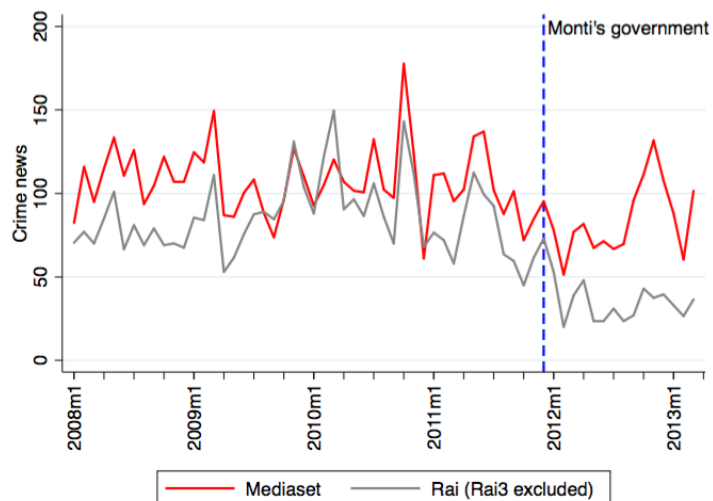
Note. The figure shows time series of average number of crime news (per month) on Berlusconi-owned Mediaset channels and on Rai channels under his control while in power (Rai1 and Rai2). The dashed blue line indicates the date when Berlusconi steps down from government. Source: authors' elaboration on AUDITEL data and Pavia Observatory data.

Figure 3A.11: Crime News Exposure and Voting
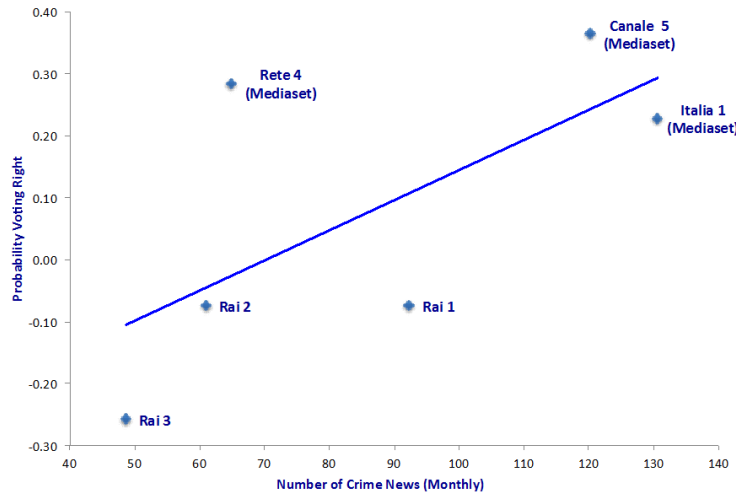
The figure reports estimates from a LPM where we regress an indicator equal to one if an individual has voted Centre right in the last national elections on set of dummies for which of the 7 main analog TV channel the individual declares to watch most regularly. We then plot the estimated coefficients together with the monthly amount of crime-related news items reported by each TV channel during prime-time news programs. Estimated coefficients are interpreted with respected to the TV channel LA7, which is excluded from the regression. The regression includes age, male dummy, level of education, dummy for married, a set of dummies of occupational status and region fixed effects. Sources: Pavia Observatory (crime news data) and ITANES (Voting Data) Year: 2008. Voting measure with a post-electoral survey using the question "Which party/coalition did you vote in the last general elections?"

3.12   Appendix - Tables

Table 3A.1: Effect of Digital Reform on total TV watching time

	Indicator for watching TV		Average TV viewing time per day	
	(1)	(2)	(3)	(4)
DigitalSwitch * Aged 15-29	-0.014**	-0.013	0.242	0.292
	(0.005)	(0.007)	(0.346)	(0.378)
DigitalSwitch * Aged 30-40	-0.016	-0.014	0.232	0.282
	(0.016)	(0.015)	(0.366)	(0.382)
DigitalSwitch * Aged 41-51	-0.007	-0.005	-0.565*	-0.515*
	(0.009)	(0.012)	(0.274)	(0.280)
DigitalSwitch * Aged 52-65	-0.005	-0.004	-0.154	-0.102
	(0.004)	(0.005)	(0.495)	(0.483)
DigitalSwitch * Aged >65	0.002	0.004	-0.305	-0.254
	(0.005)	(0.006)	(0.556)	(0.559)
Individual and family controls	X	X	X	X
Region time-varying controls		X		X
Region & year fixed effects	X	X	X	X
Observations	139,165	139,165	107,392	107,392

Note. The table investigates whether the switch to digital signal induced any change in the total amount of time people spend watching TV by regressing two measures of TV watching behavior on a post switch-over variable. DigitalSwitch is the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. Column 1 and 2 report estimates from regressions where the outcome is an indicator for the individual watching at least some TV (columns 1 and 2), while columns 3 and 4 report estimates where the outcome is the average daily TV viewing time for those who watch at least some TV. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3A.2: Effect of Digital Reform on TV viewing shares: all time-slots

Time slot:	18:00-20:30 Prime-time news	All day	12:00-14:59 Lunch-time news	7:00-11:59	15:00-17:59	20:31-23:59
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Traditional Channels						
Digital_Switch	-0.085***	-0.085***	-0.064***	-0.120***	-0.103***	-0.078***
	(0.010)	(0.010)	(0.010)	(0.019)	(0.014)	(0.010)
F-stat: Digital Switch	73.42	68.97	43.92	41.06	52.13	62.04
Panel B: New Digital Channels						
Digital_Switch	0.064***	0.068***	0.057***	0.094***	0.086***	0.062***
	(0.007)	(0.005)	(0.005)	(0.010)	(0.006)	(0.006)
F-stat: Digital Switch	94.45	154.1	140.5	90.33	179.1	110.3
Panel C: Satellite Channels						
Digital_Switch	0.009*	0.010*	0.010*	0.009	0.009	0.009
	(0.005)	(0.006)	(0.005)	(0.008)	(0.008)	(0.008)
F-stat: Digital Switch	3.473	3.177	3.613	1.406	1.401	1.222
Panel D: Other Channels						
Digital_Switch	0.014***	0.013***	0.006	0.025**	0.020***	0.011**
	(0.004)	(0.004)	(0.004)	(0.010)	(0.006)	(0.004)
F-stat: Digital Switch	11.83	9.460	1.677	6.504	10.77	7.251
Month*year fixed effects	X	X	X	X	X	X
Region fixed effects	X	X	X	X	X	X
Observations	1,519	1,519	1,519	1,519	1,519	1,519

Note. The table reports estimates from regressions of TV viewing shares on Digital_Switch for different time slots during the day. The level of observation is the viewing share by channel*month*region. Digital_Switch equals one if the region r experienced the switch-over to digital signal at time (month) t or before. In each panel the TV viewing shares of a different group of channel is adopted as outcome variable. Month-by-year and region fixed effects are included in all regressions, as in column 3 of Table 2. Rai and Mediaset channels are indicated as Traditional channels. Robust standard errors clustered at the region level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3A.3: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Obs
	Individuals				
Male	0.48	0.50	0	1	139,165
Age	49	19	15	87	139,165
Married	0.60	0.49	0	1	139,165
Tertiary education or more	0.10	0.30	0	1	139,165
Employed dummy	0.43	0.49	0	1	139,165
Retired dummy	0.22	0.41	0	1	139,165
Dummy for not watching TV at all	0.05	0.21	0	1	139,165
Average daily TV watching time (minutes)	165	114	0	930	136,382
Family size	2.98	1.30	1	12	139,165
Crime_Concern: **dummy for reporting crime as one of 3 main problems in the country**	0.57	0.49	0	1	139,165
Individuals aged <= 65	0.55				
Individuals aged > 65	0.62				
Females	0.57				
Males	0.56				
Crime_Risk_Local: **perception of crime level in the local area**	2.01	0.90	1	4	201,923

Note. Descriptive statistics of the main estimating sample from the Multipurpose Household Survey (ISTAT) for the years 2007 to 2010. The variable Crime_Risk_Local is available also for the years 2011 and 2012.

Table 3A.4: Effect of Digital Reform on concern about other topics

	Unemployment	Crime	Poverty	Immigration	Inefficiency of health sector	Tax evasion	Environment/ Pollution	Inefficiency of judicial system	Public debt	Inefficiency of education sector	Others
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Effect of DR on aged >51	-0.090	-0.045***	0.024	-0.003	0.062***	0.004	0.005	0.021	0.003	0.004	-0.005
	-0.072	(0.012)	(0.018)	(0.016)	(0.020)	(0.010)	(0.027)	(0.014)	(0.017)	(0.004)	(0.005)
Individual and family controls	X	X	X	X	X	X	X	X	X	X	X
Region time-varying controls	X	X	X	X	X	X	X	X	X	X	X
Region & year fixed effects	X	X	X	X	X	X	X	X	X	X	X
Mean of outcome	0.73	0.57	0.30	0.27	0.22	0.22	0.16	0.15	0.14	0.07	0.02
Observations	139,165	139,165	139,165	139,165	139,165	139,165	139,165	139,165	139,165	139,165	139,165

Note. The table investigates the effect of the switch to digital signal on the likelihood for individuals aged above 51 of mentioning each of the other problem suggested by the question "What do you think are the 3 priority problems of the country?". Suggested problems are ordered from left to right from the most to the least mentioned. The independent variable is the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3A.5: Effect of Digital Reform on crime and unemployment

	Unemployment share (*100)		log (Crime rate)	
	(1)	(2)	(3)	(4)
Digital Switch (indicator)	-0.245		-0.019	
	(0.340)		(0.016)	
Digital Switch (fraction)		0.118		-0.022
		(0.302)		(0.018)
Region fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Observations	114	114	114	114

We regress the unemployment rate (multiplied by 100) and the crime rate in a specific region and year on Digital_Switch. Crime rates are calculate as logs of crimes per 10'000 individuals. We use two versions of the variable Digital_Switch: a dummy that equals one if the region r experienced the switch-over to digital signal at year t or before (columns 1 and 3); the number of months (as fraction) in the calendar year to which the outcomes refers, elapsed since region r experienced the switch to digital signal. Observations are at the region by (calendar) year level. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3A.6: Effect of Digital Reform on individuals who do not watch TV

	Indicator		Fraction of months	
	(1)	(2)	(3)	(4)
DigitalSwitch * Aged 15-29	-0.011	0.006	-0.076	-0.053
	(0.082)	(0.073)	(0.085)	(0.079)
DigitalSwitch * Aged 30-40	-0.011	-0.004	-0.041	-0.031
	(0.039)	(0.031)	(0.044)	(0.041)
DigitalSwitch * Aged 41-51	-0.052	-0.036	-0.100	-0.079*
	(0.056)	(0.041)	(0.061)	(0.045)
DigitalSwitch * Aged 52-65	-0.018	-0.003	-0.047	-0.024
	(0.042)	(0.034)	(0.051)	(0.045)
DigitalSwitch * Aged >65	-0.061	-0.060	-0.122	-0.121
	(0.088)	(0.082)	(0.096)	(0.091)
Individual and family controls		X		X
Region time-varying controls		X		X
Region & year fixed effects	X	X	X	X
Observations	5,822	5,822	5,822	5,822

Note. The table investigates the effect of the Digital Reform on those individuals who do not watch TV. It reports estimates from a linear probability model of an indicator for the individual reporting crime as one of the 3 main problems in Italy (Crime_Concern) on the number of months (as fraction of the 8 before each survey) elapsed since region r experienced the switch to digital signal. The sample includes individuals who report to never watch television. Individual and family controls include: gender, age group dummies, marital status, education, set of dummies for occupational status, family size, family structure, and major source of household income. Region time-varying controls include unemployment rate and crime rate. The regressions include year and region fixed effects. Robust standard errors are clustered by region and reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

4 The Power of News: Coordination and Crisis

4.1 Introduction

For crisis to occur, there is a need for coordination. This is well known: what is less known is what triggers coordination among actors? This question proved to be particularly relevant in the context of the European Sovereign Crisis. Why did the Greek spread escalate from 140 basis points in early November 2009 to nearly 600 basis points in late March 2010?[103] And, more generally, why did the crisis happen when it did?

In this paper, I tackle this question by arguing that, in order to understand the outbreak of the debt crisis, there is a need to go beyond a mere analysis of economic fundamentals. First, I present evidence that a significant part of the surge on the government bond spreads in the Eurozone was disconnected from underlying changes in a number of standard economic indicators.[104] I then study whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of coordination among investors.[105] Precisely, I focus on political information which, by their nature, are not immediately quantifiable, more subjective and difficult to interpret. I define political information as all the news about political stories related to the country sovereign debt.[106] This includes, but it is not limited to, news reports on economic policy uncertainty, stability of the government, policy making and legislative behaviours. In this paper, I document a change in the frequency of news media related to sovereign debt in the months and weeks preceding the

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[103]For the Greek 10-year sovereign bonds, the spread to the benchmark German bund had been on average just about 30 bps.

[104]The analyis will cover the standard measure of economic fundamentals (De Grauwe 2012). Precisely: Budget Deficit (as % of GDP); Debt (as % GDP); current account; inflation; unemployment. Also I look at measure of international risks such as VIX Index, CDS derivatives market.

[105]The interactions between politics and financial markets have been so far studied assuming full rationality and perfect information (Fama, 1970; Fama, 1991). However empirical evidence clearly reveals that many investors do react to irrelevant information in forming their demand for investments; as Fisher (1986) put it, "they trade on noise rather than on information".

[106]The Data Section will outline more precisely the type of search. However examples of search outcomes are: "*Raising concern over the coalition government in Italy. Doubts on the reforms to cut public spending*", "*La Spagna ad un passo dalla crisi istituzionale. Riforme economiche un fallimento dichiara Zapatero*", "*La situation polique Grecque est pire que la situation economique, "La deuda italiana y su sostenibilidad depende de la fortaleza del Gobierno, "La deuda italiana y su sostenibilidad depende de la fortaleza del Gobierno*"

crisis (when markets were not in turmoil) and I empirically investigate whether the noise, the signal and the uncertainty generated by these information flows might have boosted cordination among investors and anticipated the outbreak of the debt crisis.

In order to test these hypotheses empirically, I collect a unique and new dataset on news from the main media outlets in a set of European Countries from September 2007 to September 2014. I restrict my search to news related to sovereign debt and, in particular, to media stories related to political aspects of the debt. Furthermore, I also gathered data on "opinion pieces" written by prominent opinion makers.[107] In order to select which authors to follow, I have run qualitative interviews among a sample of traders and asked them to provide a list of opinion makers which are most commonly read by investors. I then manually coded the tone of each news and opinion in my dataset. [108]

Time series and dynamic panel estimations reveal that, conditional on a full set of controls and falsification tests, the frequency of news is correlated to an increase in bond prices. Specifically, dynamic panel regressions show a positive and significant variation of the bond yield in countries whereby there was a change in the number of sovereign related news per day compared to countries whereby there was no change. The estimates reveal a significant correlation between both news at time t and t-n on variation of spreads at time t. Interestingly, I find a similar effect when I analyse the correlation between articles written by a set of opinion makers (which are followed daily by traders) and the movements in spreads. The results are robust to the introduction of a full set of controls, past values of the dependent variable and of the explanatory variables, country fixed effects, time fixed effect and linear time trends. Both time series and panel analysis reveal a certain extent of country heterogeneity in the effect. More precisely, both an increase in the total number of news and an increase in the country related news do have a differential effect with peripheral countries exhibiting more severe consequences on the spread.

It is not just the amount of news that matters, but also their tone. Basman

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[107]An opinion piece is an article, published in a newspaper or magazine, that mainly reflects the author's opinion about the subject. Opinion pieces are featured in many periodicals. Examples are the A list and the Exchange of the Financial Times or Project Syndicate or Paul Krugman's blog on the NYT.

[108]Figure 10 provides the answer to the question "*Which are the opinion makers that you read the most*?" Respondents can list 3 posssible names.

et al. (2015) investigates the effect of the tone of news on investors' expectations and beliefs. I adopt a similar approach by studying whether positive news have different impact on bond yield than negative news. More precisely, I coded every daily news and opinion pieces into 3 main categories: *positive, negative and uncertain.* I find that the tone of the news does indeed have a significant effect on bond yields. More precisely, negative news in country i at time $t-1$ increases significantly the sovereign spread of country i at time t. On the opposite positive news leads to a decrease in sovereign spread. The results are remarkably stable across specifications and to the introduction of a full set of controls, municipal fixed effects, time fixed effect and linear time trends.

This paper fits into the literature looking at the determinants of bond yields. Arghyrou and Kontonikas (2014) provides a good overview and argue that most studies (Manganelli and Wolwswijz, 2009; Alesina et al., 1992, Bayouni et at., 1995) have focused on two main factors. First, measures of international risk such as the Vix index or the derivatives market, arguing that high value of international risk leads to an increase in yields spread (Geyer et al., 2004, Longstaff et al. 2007, Favero et al., 2010, Sgherri and Zoli, 2009). Second, the fiscal position of a country (in particular measures of debt and deficit) and its impact on the credit risk of the sovereign debt. As the government debt as a % of GDP (debt/GDP ratio henceforth) increases, investors realize that the probability of a default is higher and their elasticities to changes in debt/GDP ratio increases (Giavazzi and Pagano, 1996). Bernoth et al. (2004) and Faini (2006) finds a significant effect for fiscal deficit on the sovereign bond spreads. Similar results are obtained by Hallerberg and Wolff (2006) using fixed effects panel estimations. In the US, Goldsetin and Woglom (1992) finds evidence that the level of public debt in America has a positive impact on their bond yields relative to that of other states.

These studies share two common characteristics. First, in both these clusters politics is not considered as an important factor. Second, they rely on the assumption that markets have perfect information about the status of fundamentals. The global financial crisis, and the European Debt Crisis, have challenged the heart of these assumptions: developed economies are not immune from the financial markets contagion and volatility triggered by political uncertainty (Leblang and Satyanath, 2013 and Phillips, 2014). There is a limited set of studies on the impact of politics on sovereign spread. However, they mostly operate at high level of institutional aggregation, employing indicators for electoral system, partisanship

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or policy institutions (Bachman, 1992, Bernhard and Leblang, 2002, Eichengeen, Rose and Wyplosz, 1995, Freeman, Hays and Stix, 2000, Leblang and Bernhard, 2000, 2001, Leblang and Mukherjee, 2004, Lobo and Tufte, 1998, Alesina and Drazen, 1991, Leblang and Satyanath, 2013, Phillips, 2014). In this paper, I argue that, while concepts of institutions and partisanship provide a fundamental context of analysis for market actors, they do not capture the day-to-day processes of policy making which are indeed responsible for most of the uncertainty investors' mind.[109] Goidel and Langley (1995) suggest that investors know very little about real economic conditions and heavily rely on news from mass media. Markets learn about politics and they do it dynamically, not statically.

As a consequence, this paper differs from these studies in several dimensions. First, it provides evidence that, although important in the unfolding of the crisis, neither proxies of economic fundamentals nor measures of international risk can be used to explain the outbreak of the European sovereign crisis. Second, it incorporates the important role of politics in the analysis of the onset of the European crisis. It does so not by looking at standard institutional proxies but rather at the day to day policy making processes express by news media. Third, it provides a new dataset to measure the political uncertainty generated by variation in the frequency, types and availability of information flows.

I'm not the first in studying and measuring uncertainty nor in focusing on news media when it comes to the debt crisis. Bloom et al. (2013) recently developed a new index of economic policy uncertainty (EPU) that draws on the frequency of newspaper references to policy uncertainty and other indicators. They then investigate the effects of EPU on investment and hiring, finding negative effects for firms heavily exposed to government contracts. As far as the studies on political news and financial volatility is concerned. Tetlock (2007) has used a dictionary approach to consider the ability of verbal text to predict stock prices. Gade et al. (2014) investigates to what extent and why political communication has had an impact on the sovereign bond spreads of selected euro area countries over the German Bund.[110] Interestingly, they find that, on the short term, certain type of

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[109]Calvo and Mendoza 2000a argues "trading market securities requires collecting detailed information about the countries involved. This information is costly and 'depreciates' quickly. Moreover, fixed information costs are large because assessing country risk requires gathering and processing information about all key macroeconomic and political variables on a recurrent basis, independently of investment size"

[110]Gholampour and Wincoop (2017) use 633 days of tweets about the Euro/dollar exchange

political communication does have an effect on bond spreads. In this paper, my analysis differs from this paper to the extent that the focus here is not on political communication from political leaders but on political information flows which are measured daily (and not monthly as in Bloom et al., 2013). The rest of the paper is organised as follows: section 2 provides background on the European Debt Crisis and the main motivation of this paper; section 3 presents the theoretical framework of the analysis by presenting the Morris and Shin model of currency crisis and explaining its relevance for the European Sovereign Crisis; section 4 discussed the data and section 5 present the main results; section 6 concludes.

rate to determine their information content and the profitability of trading based on Twitter Sentiment.

4.2   Background and Motivation

The efficiency market theory [Fama, 1970; Fama, 1991] predicts that people make rational decisions about the future performance of stocks based on concrete data, and prices adjust accordingly. When information arises, they are incorporated into the prices of stocks and securities without delay. However, the idea that stock prices represent and incorporate rational responses to information seems unlikely. John Mayard Keynes notoriously referred to the "*animal spirits*" to describe the instincts, the beliefs and the emotions that constantly guide human behaviours.[111] Empirical evidence indeed suggest that the receipt and interpretation of news is linked to investors psychology, sociology, and personal characteristics. However, it is still unclear whether the news media induces, amplifies or simply reflects investors' expectations and beliefs.

This paper contributes to this debate by studying the case of the European Sovereign Crisis. The sudden outbreak of the government debt crisis in the Eurozone area in 2009 posed serious problems for the survival of the entire European project (De Grauwe, 2012). In explaining the unfolding of the crisis, conventional accounts resort to the relationship between default risk and a number of economic fundamentals. More precisely, according to standard economic theory (Alesina et al., 1992; Manganelli and Wolsijk, 2009; Arghyrou and Kontonikas, 2010) sovereign yields/spread are conditioned on two main variables. Firstly, credit risk and the quality of the national accounts. This is typically measured with indicators such as debt/gdp ratio, budget deficit, current account, unemployment and consumers' confidence indexes (Barrios et al., 2009). Second, an international risk factor which is used to capture the market sentiment at the global level. Although important in the unfolding of the crisis, I present evidence that both these variables cannot explain its outbreak.

Figure 4.1 shows the overtime trend in Debt/GDP ratio 2007-2015 for a group of 6 European Countries. As largely documented, the Debt/GDP ratio has constantly increased for all the countries considered. The so called peripheral countries are the ones that have experienced the most drastic increase in debt, with Greece that reached 180% of its Gross Domestic Product. The economic theory tells us that when the government Debt/GDP Ratio increases, the burden of ser-

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[111]Animal spirits is the term John Maynard Keynes used in his 1936 book *The General Theory of Employment, Interest and Money* to describe the instincts, proclivities and emotions that ostensibly influence and guide human behavior.

vicing the debt increases leading to an increasing probability of default (Giavazzi and Pagano, 1996). This subsequently translates into an increase in the spread, which is the risk premium investors will charge to compensate them for the increase probability of default (De Grauwe, 2012). Indeed, several studies have shown how, during the unfolding of the crisis, markets have been particularly severe toward those countries characterised by poor quality of their underlying economic fundamentals. However, what is also quite evident is that the levels of debt/GDP ratio were significantly different among these countries well before than the crisis.

Hence, why did the attack happen when it did? As already shown by De Grauwe (2012), the drastic increase in sovereign spread seems to be dissociated from any drastic shock in proxies of fiscal position such as the Debt/GDP ratio. In order, to provide more formal evidence of this phenomenon, Table 4.1 presents ARMA time series regressions which aims to more formally correlate the spreads with a number of fundamental variables. Specifically, I have selected standard proxies of fiscal and macroeconomic imbalances such as debt (as% of GDP) ratio, current account, GDP growth rate and budget deficit (as % of GDP). The analysis is for 6 European Countries and it goes from September 2007 to June 2014 on a monthly dataset.[112] The dependent variables are the 10 years government bond yields and, in the analysis, I control for their lag values.[113] Since the purpose of this analysis is to test whether changes in fundamentals are correlated to the triggering of the crisis, I express all the independent variables in first difference values. As a consequence, each observation represents the difference from the previous month. The estimates reveal no significant coefficients between monthly changes in economic fundamentals and related change in sovereign bond yields. The results seem to support De Grauwe's (2012) conclusion on financial bubbles, where they argue that markets may have mispriced the sovereign risk and, as a consequence, spreads moved independently from fundamentals. However, this analysis might suffer from different types of bias. In particular, timeseries cross sectional datasets present an omitted variables bias. These estimates do not take into account time varying specific factors, country level fixed characteristics and

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[112]Importantly the same results hold if we restrict the analysis to the onset years of the crisis, 2008 - 2012

[113]To chose how many past variables to include, I run a correlogram analyisis exploiting the time series feature of the dataset. Results are reported in the regression table.

any shocks that vary across countries. To correct for this, Table 4.2 presents similar estimates in a panel dataset where the units of observation are country_day over time. The dependent variable is, as before, the 10 years government bond yield and the independent variables are debt/gdp ratio, current account and budget deficit with their respective lagged values. I employ a fixed effects dynamic model which controls with a full set of year dummies. Estimates reveal that none of the economic fundamentals variables, nor their lagged values, exhibit any statistically significant relationship with movements in prices.

The second variable that is commonly used in the literature points to the importance of international risk factors. These are typically measured using indexes of stock volatility such as the VIX Index. The VIX Index is a popular measure of the implied volatility of S&P 500 index options and it used as proxy for global financial instability. Another measure which is commonly used to capture the international risk appetite is the Credit Default Swap contracts (CDS). The CDS are credit derivatives that provide an insurance against the risk of default. According to standard theories (Cacere, Guzzo and Segoviano, 2010), the derivative market, and CDS in particular, anticipates fluctuation on the spreads. More precisely, the purchase of CDS contracts raises the cost of insurance against sovereign default leading to a rise in the underlying government bond yield. In Figure 4.2 and 4.3 we plot respectively the correlation between spread and the VIX index and between the spreads and their respective CDS.

Figure 4.2 plots the 10 years sovereign bond yield of Italy, Spain, Greece and Portugal against the VIX index which is colloquially referred to as the fear index or the fear gauge.[114] At the onset of the crisis, *"fear"* was not really a factor: the VIX index was in its sharp decreasing, signalling a more positive judgment of market makers on the status of international markets. This trend appears significantly disconnected with the European spread which starting increasesing in November 2009.

I then turn my attention to the derivatives market and, in particular, the CDS contracts. Figure 4.3 shows a set of 4 panels whereby the CDS are plotted together with the respective underlying security. I focus on Italy, Spain, Greece and Portugal over the period 2009-2014. The derivative markets did not anticipate the crisis. The CDS contracts follows very closely the trend of the underlying

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[114]In this analysis, I focus on peripheral countries because these countries experienced the hardest market turmoil

sovereign bond. Although, this seems to reinforce the hypothesis that the CDS might be blamed for the deterioration of the sovereign spreads once the divergence from the German Bund had started, they cannot explain the outbreak of the crisis.

In short, it seems that the usual suspects, proxies of international risk factors and standard economic fundamentals, cannot explain the onset of the European Debt Crisis. This puzzle raises the question of what triggered such a wake up call among international investors. Why did the crisis start when it did, without warming and any apparent change in the underlying economic fundamentals? In this paper, I investigate whether a change in the amount and type of news media might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. Figure 4.4 is crucial in explaining the motivating force behind this project. It shows the overtime variation of the 10 years governmental bonds yields of 5 Eurozone Member States in both the beginning and the years preceding the crisis. Together with the spreads, I plot the daily count of the political news stories related to sovereign debt. The picture shows a striking spike in the number of news that has anticipated the divergence of the spreads. Most of the news are clustered around June, July, August and September 2009 when there were no signs of turmoil on the yields and well before the revelation of Greek public finance problems which took place in December 2009. In the next two sections, I'm going to analyse more formally whether this sudden increase in the amount of information might have had an impact on the outbreak of the European Sovereign Crisis.

4.3 Theoretical Framework

Information has played a very subtle role in the European Sovereign Crisis. During the months before the outbreak of the crisis in November 2009, all market actors did have the possibility to observe economic fundamentals, but this was not a sufficient condition to avoid turmoil. As Morris and Shin put it "*everyone may know that the fundamentals are sound, but it may not be that everyone knows that everyone knows this*".[115] It is not the amount of information that matters, but whether it is common knowledge. There might indeed a situation whereby investors are well informed about the fundamentals, but they are unsure on the information received by others.

This is important in the context of this study because, for crisis to occur, there is a need for coordination. This is well known. What is less known is what triggers coordination among actors. In this paper, I present evidence of a spike in news related to sovereign debt before the beginning of the crisis and I argue that this might have fostered coordination among investors. News Media constituted a focal point that triggered a "wake up call" in international markets.

Theoretically, this intuition might be explained by the literature on Global Games (Morris and Shin, 1998). This is because their informational assumptions are more realistic than standard studies on crisis in the literature (Flood and Garber, 1984, Obstfeld 1986, 1994, 1996; Calvo, 1988; Eaton Fernandez, 1995; Cole and Kehoe, 1996). By relaxing the common knowledge assumption, they are able to derive a unique equilibrium as well as comparative statics on a) t*he arrival of information and the probability of a crisis* and b) *the variations in speculators' beliefs to the probability of a crisis.*

More precisely, within this literature there are two different research clusters that constitute an ideal framework for the empirical intuition of this paper. One research cluster, led by the seminal work of Morris and Shin (1998), has argued that, in order to understand the onset of a crisis, what matters is not the amount of information, but how *noisy* it is. Noisy signals (such as *political information*) generate uncertainty among investors because they are unsure of each other beliefs and interpretation of the same news. As Morris and Shin put it "*Although market participants each have a window on to the world, the imperfect nature of such a vantage point generates a failure of common knowledge of the fundamentals.*

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[115] Morris and Shin, 1998. p. 558

Thus, everyone may know that the fundamentals are sound, but it may not be that everyone knows that everyone knows this".[116]Information, in this setting, increase uncertainty among investors and eventually serves ad focal point for the beliefs of the group as a whole. In Appendix A.1, I outline Morris and Shin (1998) model and I run a simple comparative exercise to shed light on the theoretical mechanisms behind their analysis.

A second strand of the literature (Metz, 2000, Morris and Shin, 2002) sees information as a coordination device, independently by its quality. Even when the news media is noisy, and has no direct nor precise information on fundamentals, its very public nature constitutes a signal which boosts coordination and allows full play to self-fulfilling beliefs in determining economic outcomes.

These two research clusters reach different conclusions on the role of information in fostering coordination.[117] In one case, news generate uncertainty, which in turn boost coordination. In the second cluster, information represents a signal that constitutes a crucial factor in coordinating investors' actions. Although by following different intuitions, both these models share two different hypothesises that this paper aims to test. First, an increase in the amount of news media that investors receive, increases the probability of an aggregate short sell of the debt. Second, there might be cross country heterogeneity, with a different reaction of the markets in countries whose government is perceive as credible. As Leblang and Satyanath (2002) argue, the coordination among speculators increases when they all believe that the government's announcement, stability or economic policy are sound and stable. In these situations, investors' elasticity to the arrival of news media is lower because a common focal point is already present.

This paper will empirically test these hypotheses. The next section will present the data upon which the analysis is based.

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[116]Morris and Shin, 1998. p. 559
[117]This paper it is not able to disantangle between the two of them

4.4 Data and Empirical Analysis

4.4.1 Data

Measuring uncertainty. As a way to measure uncertainty, I focus on news related to sovereign debt and, in particular, to media stories related to political aspects of the debt. As already explained above, this is because "political news" are less straightforward to interpret since they encompass elements of subjectivity and time inconsistency. This *subjectivity* and *imprecision* of political information increase the possibility that despite good underlying economic fundamentals, imprecise information will lead to unstable market equilibria.

This study applies two different research methodologies to collect a new and unique dataset. The first method involved the analysis of professional news database, Factivia Dow Jones. Factiva is the best database of political, economic and financial news available in the market[118]. Its search engine allows not just to select from multiple options, but also to insert a manually generated algorithm with which the search is performed. To retrieve the articles, I have looked for the two major newspapers (measured as per copies sold) in each of the selected countries.[119]I then formulated a query looking at some specific keywords such as uncertainty, bond market, spread, debt, deficit, increasing, legislative crisis, legislature, political stability, economic policy, vote of no confidence etc. Figure 4.5 provides an example of the search. The search algorithm is specified in the text box and must be written in all the languages of the selected newspapers. The propositions *AND/OR/NOT* are logical functions that define the arguments of the algorithm. This specific type of research is able to retrieve 2012 articles. I then run a human audit of all the articles looking at length and style, keywords used, most mentioned subjects, most mentioned regions, most mentioned institutions and articles distribution by date. Figure 4.6 provides a sample of the search's results.

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[118]Factiva is a business information and research tool owned by Dow Jones & Company. Factiva aggregates content from both licensed and free sources, and provides organizations with search, alerting, dissemination, and other information management capabilities. Factiva products provide access to more than 32,000 sources (such as newspapers, journals, magazines, television and radio transcripts, photos, etc.) from nearly every country worldwide in 28 languages, including more than 600 continuously updated newswires

[119] In Italy: La Repubblica and Il Corriere della Sera. In Spain: El Mundo and El Pais. In France: Le Monde and Le Figarò. In Germany: Faz and Handelsblatt. In UK: Times and Financial Times. In Greece: Estia and Naftemporiki.

The second methodological approach involves the use of social media and, more precisely, Twitter. Today, almost all the news providers and newspaper have and use a twitter account when they present and anticipate their articles with a brief description and the link to them. The 140 characters rule is very useful not just because it summarises the main message of the article, but also because it very often expresses the tone of it.

Collecting data from Twitter is not trivial. The entire procedure is based on the *Streaming Search Real Time Application Programme Interface* (API). The public twitter API allows interacting with the twitter platform. It allows to set up a query for specific data of specific accounts in a specific time frame. Figure 4.7 explains the architecture I'm exploiting to retrieve the data. Using Python programming, I interacted directly with the twitter API interface and, using the same keywords described above, I have retrieved 3640 news. In addition, I have set the search to collect data on articles written by prominent *opinion makers*. In order to select across opinion pieces, I have run interviews with a sample of traders and asked them to provide a list of opinion makers which are most commonly read [120]. Figure 4.8 provides the results of the interviews.

Dependent Variable and Control Variables

Dependent Variable   The dependent variable is the daily 10-year government bond yieldy for the following countries: UK, France, Germany, Spain, Portugal, Italy and Greece.

Since late November 2009, the 10-year government bond yields for euro area countries diverged and differentials vis-à-vis Germany started to widen considerably, as shown in Figure 6. In particular, Greece, Portugal, Spain and Italy experienced the largest increase in their bond spreads.

The data for the dependent variable come from Bloomberg. They are daily and they cover the period September 2007 - July 2014.

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[120]I have run the survey with an open answer typology. Traders were free to mention whoever they read most often. Each trader had 2 options. I then counted the answer and coded them in order to come up with the final set of opinion makers. Those are Nouriel Roubini, Jim O'Neil, Paul Krugman, Martin Wolf, Mohammed El Erian, Mario Draghi, Jean Paul Trichet and Bill Gross

Control Variables. The set of control variables that I include in the paper can be divided in into two broad categories: a group that clusters together financial risk indicators and a group for the economic fundamentals variables.

Financial risk indicators Both Data on the Credit Default Swap and the VIX Index are taken from Bloomberg. These are the *Last Price* of the CDS and VIX. They are recorded daily and they cover the period September 2007 - July 2014.

Data on the EU Confidence Index are taken from the European Commission Consumer Confidence Indicator. The index tracks sentiment among household, investors and consumers. The results are based on surveys conducted among a random sample of households and investors. The data are monthly from September 2007 to July 2014.

Economic Fundamentals The *unemployment, real gdp, debt and inflation* data are collected by Eurostat. They are monthly and they cover the period September 2007 - July 2014.

The *deficit (*as a % of GDP) is collected by the European Commission on a monthly level. They are reported on an annualised base to avoid seasonal issues.

The *current account (*as a % of GDP) and the *household saving* are collected by the OECD.

Both the time series and dynamic panel model analysis will be at the daily level. Controls variable at monthly level are therefore transposed in daily data by interpolation.

Selection of Countries The countries chosen for this paper represent the most important economies of the Eurozone. Germany, Italy and France are respectively the first, second and third economy for manifacturing output. Italy, Spain and Greece are also the economies that have been more exposed and hit by the markets during the crisis. Moreover, I follow the Iversen, Soskice and Hope (2016) by looking at Italy and France in distinction from a "pheripheral country" such as Spain and Greece and from a coordinated market economy (CME) such as Germany. As these scholars explained, these are countries with very different institutional settings and it is therefore very interesting to study whether markets reacted differently to a common shock in news. This study acknoweledges that a

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larger sample of countries would be needed to improve the analysis, but collecting data to measure political news is very challenging and demanding. I have also collected data for the UK, but the news dataset is limited for this country because the UK, with its own currency and central bank, was insulated from the European Sovereign Crisis.[121]

4.4.2 Empirical Analysis

The effect of the amount of news media on sovereign spread   This section introduces the estimation models to analyse the determinants of sovereign bond yields and to assess whether political information might be correlated with the onset of the sovereign debt crisis. The theoretical framework presented in section 3 has provided us with two basic intuitions. First, an increase in the amount and type of information that speculators receive might lead to an increase probability of an aggregate short sell. Second, there might be cross country heterogeneity, with the level of volatility being higher in countries whose government is not perceived as credible. This paper measures noise with the amount and the tone of news related to sovereign debt published in a given day. Hence, empirically I'm going to test whether, conditional to a full set of controls, an increase in news has an effect on bond yields. More precisely, I will estimate my model both with a dynamic panel technique and with cross sectional time series.

I start by running my analysis using a time series dataset and the reason is twofold. First, econometrically, high frequency data on daily prices exhibit some empirical regularity, including fat tailed distributions and volatility clustering. Given this high persistency of the dependent variable, the level of bond yield spread today might also depends on its past values. Hence, as an attempt to control for these features of the data, I estimate a time series model where I regress the bond yield of 6 European countries on the amount of news related to sovereign debt. More precisely, I estimate various version of the following general form:

$$Y_{it} = \beta_o + \beta_1 News_t + \beta_2 Y_{i,t-n} + \beta_3 News_{,t-n} + \beta_4 X_{it} + \varepsilon_{it} \tag{4.1}$$

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[121]The paper decided to include the UK despite the data limitation to follow De Grauwe (2012) and study whether there is a differential effect from Eurozone country and a standing alone country such as the Uk.

Where Y_{it} is the bond yield of the UK, Spain, Italy, Germany, Greece and France over the period 2007-2014. $News_t$ is the overall amount of news related to sovereign debt that have been published at time t. I perform a daily and monthly estimation. The model also include lag variables for Y_{it} and for $News_t$. X_{it} is a vector of control variables which include the following country variables at the monthly level: inflation, Gdp per capita, debt, deficit, current account (% gdp), confidence index, household saving, Vix Index and CDS for the 10 years government bond. ε_{it} is the error term. As both prices and news are serially correlated, I estimate the standard errors with the Newey - West Estimator.[122]

The interesting feature of this estimation is that it allows me to test the importance of the total number of news published in a given day over the bond yield of each of the country in my sample. This is a parameter that I am able to recover exploiting the over time variation of the number of news published. [123]

Table 4.4 provides the results of the estimates. The 6 columns represent the daily bond yield of the countries in my sample. The variable of interest is *News* which, importantly, represents the total number of political news per day. The estimates reveal a positive and significant coefficient for Spain, Italy and Greece, but not for the UK, France and Germany. The interpretation of the coefficient is the following: increasing the number of news by one unit per day leads to an increase in the yield of the sovereign debt. Following the theoretical intuition from section 2, it seems that there is heterogeneity across countries in the impact that news has on prices. A high amount of news related to sovereign debt increases noise. Each investor will be unsure to what other investors would do. The effect that this noise has on the decision to attack the sovereign debt, however, is different depending on the investors' perceptions of the government (in the model, the presence of a focal point). This is the intuition behind the coefficients in Table 4.4 [124]. The governments of Italy, Greece and Spain were not perceived as credi-

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[122]A similar strategy is used by Durante and Zhuravskaya, *forthcoming* Journal of Political Economy

[123]The panel dimension cannot be used to identify the effect of the overall number of news because there is no variation in the explanatory variable.

[124]Of course the coefficients can simply be driven by the fact that more news have been published for these countries compared to the others. However, in order to test this I have checked in Factiva whether the toal number of news published in the 2 major newspapers in the countries of my sample is different. The answer is that the avarage is very total with France having slighly more news per day that the other countries. This is of course encouraging because it constitutes a implicit normalisation of the results.

ble, strong and stable. In normal times, and without any change in the economic fundamentals, this had not triggered any reaction from the markets. However, when confronted with an increase in uncertainty caused by more daily news, investors decided to firstly short sell the debt of these countries.[125]The estimation is conditional to a range of economic controls, and the lag values of the bond yields and the news. The past values of bond yield represent an important control due to the autocorrelation of prices over time, particularly with high frequency data. The past values of news are not just an important control, but they are also an outcome of interest because it might take some time for the news to affect prices. In column 2, the estimates reveal a significant correlation between the amount of news at t-1 and the yield of the spanish governmental bond at time t. In column 2 and 3 a similar effect is present and visible for Italy and Greece where the amount of news at t-2 seems to significantly affect the spread at time t.

In table 4.5, we replicate the same analysis but with a lower frequency of data. When we move to a monthly level, we can observe that the main effect does not change. Columns 2, 3 and 5 show that, for Italy, Spain and Greece, an increase in the amount of monthly news related to sovereign debt is positively and significantly correlated with an increase in yields. As before, the estimates are conditional to a full set of controls, including lag values of the dependent variable and of the main explanatory variable.

Time series estimations help to control for seasonality, autocorrelation across time and non stationarity in the errors. However, although conditional on control, the resulting variation in price is likely to suffer from an omitted variable bias. Specifically, equation 5 does not account for time varying country specific sectors, country level fixed characteristics and any shocks that varies across countries. In order to solve these problems, I run a dynamic panel model with time fixed effect, country level fixed effects and linear time trends. I estimate various form of the following specification:

$$Y_{it} = \beta_o + \beta_1 News_{it} + \beta_2 Y_{i,t-n} + \beta_3 News_{i,t-n} + \beta_4 X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (4.2)$$

Where, as above, Y_{it} represents the bond yield of Italy, France, Spain, Ger-

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[125]News does not represent the number of news per country - I am going to use this measure in the dynamic panel model.

many, Uk and Greece. Differently from equation 1, $News_{it}$ represents the number of news per country published at time t. As before the estimation included lagged values of the dependent and main explanatory variables and a full set of controls. μ_i represents country level fixed effects. λ_t is a parameter for the time fixed effects. Errors are clustered at the country level.

β_1 represents our outcome of interest and it will recover the variation in price in a country whereby there was a change in news compared to a country where at the same time there was a different change in news or the was no change at all.

Table 4.6 presents the results of the estimation. In column 1, I present an OLS regression to test the correlation between $News_{it}$ and Y_{it}. The coefficient is positive and strongly significant. In column 2, I perform a country fixed effect estimation where I control for past values of the dependent variable and of the main explanatory variable. The coefficient loses in magnitude but remains positive and significant. Interestingly, the amount of news published in country i at time *t-2* seems to have a strong effect on variation in prices at time t. Column 3 performs the same speficication, but including important controls such as measure of international risk, the VIX Index, and proxies for the fiscal position of the country, such as debt and deficit. In column 4, I also add the lag values of both debt and deficit. Both the coefficients of $News_{it}$ and $News_{it-2}$ remains stable, positive and significant. Finally, column 5 represents my most completed and preferred specification where the effect of $News_{it}$ on Y_{it} is estimated conditional on a full set of controls, lag values of dependent and independent variables, time fixed effects, country fixed effects and linear time trends. The coefficients of interest remain remarkably stable and significant. The interpretation is the following: the coefficients of $News_{it}$ and $News_{it-2}$ in Column 5 represent the within variation in price in a country whereby there has been an increase in the number of news compared to a country where, at the same time, there was either no change or different variation in the number of news published.

In Table 4.7, I replicate the same analysis looking at $Opinions_{it}$ which represents the count of opinion pieces published by a set of leading opinion makers[126]. Differently from the average news article, opinion pieces do take a position and it is therefore very interesting to test the elasticities of prices these types of information. The coefficient for $Opinion_{it}$ is positive, significant and remarkably stable

[126]See Data section to read how opinion makers have been chosen

across specification. It remains so even in the most stringent estimation (column 5) where we include a full set of controls, country fixed effects, time fixed effects and linear trends. Interestingly, both $Opinion_{it-1}$ and $Opinion_{i,t-2}$ are positive and significant across all specifications. In particular, $Opinion_{i,t-2}$ exhibits the larger magnitude and it is always significant at the 1% level. This suggests us that, for a given country, an increase in the number of opinion pieces published at time *t-2* leads to an increase in the bond yield of that country at time *t*.

I then turn my attention to estimate whether the effect of the number of news published in each country on the respective bond yield is heterogeneous across country. In order to do that, I estimate an interaction model whereby the main effect is identified out of fixed effect strategy. More precisely, I estimate the following equation:

$$Y_{it} = \beta_o + \beta_1(News_{it} * Country_{it}) + \beta_2 Y_{i,t-n} + \beta_3 X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (4.3)$$

This is similar to what I have done in equation 1 but with one crucial difference. In equation 1, $News_t$ represented the total number of news published in a given day. Hence, the estimation was indeed exploiting only the time variations of the explanatory variable. In the interaction model, the variable $News_{it} * Country_{it}$ represents the number of news published in a given day in a given country. The estimation is therefore exploiting both the country and time variation of the data.

I present the result in Table 4.8. All estimations are conditional on a full set of controls (Debt/GDP, Deficit/GDP, Vix Index, CDS) their respective lag values, lag values of the dependent variable, country fixed effects and time fixed effects. Errors are cluster at the country level. The results seem to confirm what emerged in the time series estimation and the economic intuition of Morris and Shin Model. Increasing the number of news published in a given country does have an effect on the bond yield for that country. However, the effect varies across countries. Column 1, 4 and 5 of Table 4.8 shows how increasing by one unit the amount of news published per days has a a positive and significant effect on bond yields of Italy, Spain and Greece, but no Germany and France.

Table 4.9 replicates the same interaction model, but with a focus now on $Opinion_{it}$. The results are similar except for the coefficient of Italy which is not statistically different from zero. This is not surprising as most of the leading

economic commentators have always described the italian debt crisis as severe but curable. Column 2 shows how the interaction of $Opinion_{i,t} * Greece_t$ is always significant at time *t, t-1* and *t-2*.

The "tone effect" of news on sovereign spread It is not just the amount of news that matters, but also their tone. As Basman et al. (2015) puts it, readers might form their beliefs over a topic by reading an article without picking up the actual real facts about that article. In addition, different framing of the same news might trigger different reactions. The "tone effect" (Basman et al. 2015) of information has been studied in the literature (Kahenneman and Tversky, 1986; Barbeis and Thaler, 2003). News media have become a powerful tool in influencing people's opinion. This is particularly true in financial markets where very often, decisions and analysis risk to be "impression driven" rather than "data driven". Basman et al. (2015) investigates the effect of the tone of news on investors' expectations and beliefs. I adopt a similar approach by studying whether positive news have different impact on bond yield than negative news. More precisely, I coded every daily news and opinion pieces into 3 main categories: *positive, negative and uncertain.* In days whereby multiple news are present, I assign a tone category to each of them and I then compute the daily tone average. Table 4.10 provides examples of negative, positive and uncertain news.

I then create a variable $Tone - News_{it} = News_{it-1} * Tone$ where $Tone$[127] captures whether a news is positive, negative or uncertain. I then estimate various versions of the following specifications:

$$Y_{it} = \beta_o + \beta_1 NegativeNews_{it-1} + \beta_2 PositiveNews_{it-1} + \beta_3 UncertainNews_{i,t-1} + \beta_4 Y_{i,t-n} + \beta_5 X_{it} + \mu_i + \lambda$$

(4.4)

In table 4.11, I present the dynamic panel estimations. Column 1 reports the fixed effect modelling controlling for past values of bond yields. Both the coefficients for positive news and negative news are significant and their sign goes toward the expected direction. An additional negative news in country i at time $t-1$ increases the spread of country i at time t. On the opposite, an additional positive news in country i at time $t-1$ decreased the sovereign spread of that respected country at

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[127]When multiple news are published in a given day, *Tone* is the avarage between the numbers of negative, positive and netrual news.

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time t. Uncertain news do not seem to have any impact on the dependent variable. The estimates for negative news are remarkably stable across specifications when I include lagged values of news (Column 2), a full set of controls (Columns 3 and 4), time fixed effects and linear time trends (Column 5). The coefficients for positive news losses its significance when we include time fixed effects. It is quite interesting to observe the magnitude and the significance of past values of positive news on bond yields today.

Table 4.12 replicates the same analysis for *opinion pieces.* As far as the negative opinion pieces is concerned, we observe similar results. The coefficients are strongly significant and stable. When an additional negative opinion piece is published in country i at time $t-1$, the spread of country i at time t increases. Interestingly, positive opinion pieces at $t-2$ (2 days before the bond yield data) seems to have an effect on the spreads (they are highly significant and stable across specifications). This might suggest that the effect of negative news on prices is almost simultaneous, whereas the markets' elasticity to positive news is more delayed.

As previously shown, different countries have been treated differently by the markets. It is therefore natural to investigate whether the "tone effect" of news media on sovereign spread exhibits some cross country heterogeneity. In light of the previous results, we should probably expect that bond yields of countries whose governments are perceived as less credible by the markets will be more elastic to the publication of negative news than "stronger" countries. I test this hypothesis in Tables 4.13 and 4.14, which respectively report the analysis for news and opinion pieces. The estimates in Table 4.13 indeed reveal a level of heterogeneity in the effect, and most importantly how strongly Greece has been hit by the crisis. Greek bond yields increase after the publication of negative news and do not react to positive news. Italian sovereign spread is also quite elastic to the arrival of negative news but it also improves when positive news are published. It is interesting to note that Spain seems to be immune to related news with negative tone, but very elastic to positive news. Countries whose governments are perceived as more credible such as France and Germany are not affected neither by negative nor positive news. Table 4.14 reports the results for opinion pieces. It is interesting to note that exactly the same pattern emerges, with similar cross country heterogeneity.

Threats to Identification   This study is very cautious in claiming causality. Measuring the effect of news media on investors' behaviour independent of actual fundamentals is not trivial. The ideal scenario would be an experiment in which we randomly vary that type of news to which investors are exposed. Consider an ideal design where the same group of investors is exposed to both an increase in news and a change in their tone or to a situation where there is no change in the new media. Why should we expect different reactions from investors holding fixed the actual underlying fundamentals (Eggers and Fouirnaies, 2014)? Obviously observational data cannot convincingly answer to this question since it is difficult to isolate exogenous variation in news (Eggers and Fouirnaies, 2014). This paper is aware of these limitations and tries to set the most rigorous empirical analysis as possible given the data limitation. To this end, a discussion of two concerns is in order. First, the above estimates are not credible if it not news in country i at time *t-1* anticipating a variation in bond yield in the same country at time *t*, but the other way around. This would constitute a serious problem of simultaneous causality and would clearly invalidate our estimates. The concept of causality with high frequency data in time series analysis is slightly different than the classic applied microeconomic approach (Angrist, Imbens and Rubin ,1996). In time series, the direction of causality is tested with a Granger Causality Test. This is a procedure that has not much in common with causality as understood in the potential outcomes framework, rather it focuses on the concept of time precedence. More specifically, a Granger Causality test allows us to observe whether cause happen before consequences, or vice versa. It therefore provides an important control for simultaneous causality that analyses the dynamic evolution over time of bond yields in response to news. Table 4A.1 shows the results by performing a Wald Test. A Wald Test is a way to find out if additional explanatory variables in a model are significant. In table 4A.1 this is applied in the context of a Granger Test and therefore additional lags for both the dependent and independent variables are added. The top two lines of every table show the results when x is used to explain y. The bottom two lines show the results for a model where the causality is inverted. I run the test for the 3 peripheral countries, Greece, Italy and Spain.[128]   The results show that for all the three countries the vari-

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[128]I restrict the robustness checks for the three countries for which I have the main results of the paper. There is no evidence of simultaneous causality when I extend the Granger Test to France and Germany.

ables *news* is never predicted by lag values of bond yield. The *p values* in the bottom panel of the three tables suggest that we can reject the hypothesis that past values of bond yields predict news. It is always difficult to rule completely out concerns on simultaneous causality, but the results of Table 4A.1 certainly provide an important step toward this direction. Another important reassurance to address this problem is via the construction of my dataset whereby information on bond yields are collected at the end of the day whereas information on news are collected on news releases during the day. Finally, in Table 4A.5 I perform a dynamic panel estimation restricting the sample to the years January 2009 - May 2010. With this excercise I aim to test whether my results hold when I focus exclusive on the onset of the crisis. Importantly this helps to tackle simultaneous causality concerns because, as shown in section 4.2, bond yields of the countries under analysis were bundled together until November 2009. In other words, from January to November 2009 there was no turmoil on the market and therefore it is unlikely that, during this period, movements in prices were the causing an increase in the number of news media (simultaneous causality). Table 4A.5 shows that the results hold even when the sample is restricted. The coefficients for *News* are positive, significant and remarkalbly stable across specifications.

A second concern might be related on the reliability and external validity of the newly collected dataset that this paper presents. There might be something peculiar or inherently different in the way the data have been collected that drives the above results. Hence, I replicate my analysis using the Economic Policy Uncertainty Index (EPU Index) created by Bloom et al (2013). [129] The EPU index represents a remarkable achievement in constructing the first measure of economic policy uncertainty. It is ideal to test the validity of my results because 50% of it is constructed using the frequency of references to economic and political uncertainty in 10 leading European newspapers (La Repubblica, il Corriere della Sera, El Pais, El Mundo, Le Monde, Le Figaro, the Financial Times, The Times, Handelsblatt and FAZ). The other 50% of the index is composed by disagreement among economic forecasters about policy relevant variables as a proxy for uncertainty. To construct the news index, Bloom et all performed a month-by-month search of each of the above paper from January 1985 to October 2011. Unfortunately the countries analysed are Italy, Spain, France and UK. Although it is

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[129]Bloom et all (2013) "Measuring Economic Policy Uncertainty". European Data available at http://www.policyuncertainty.com/europe_monthly.html

a limitation to not have the same sample of countries, I can still test whether my results for Spain, Italy and France are confirmed using this dataset.[130] Table 4A.2 in appendix shows the replication of the results using monthly time series regressions analysis conditional on a full set of economic fundamentals, measures of international risks, and lag values of both controls and dependent variables.[131] The coefficients of interest are the *Policy Index* variables. The estimates seem to confirm what this paper has shown in its empirical analysis. An increase of one standard deviation in the level of uncertainty expressed by the Policy Index leads to a significant increase in bond yields in Italy and Spain but does not have any effect for France and the UK. This is reassuring not just because it confirms that direction of the results with different data but also, because the analysis of Table 4A.2 is not performed daily but monthly. This constitutes an additional robustness check that the results of this paper are not driven by the high frequency of the data.[132]

One final concern is represented by the stationarity of the data which is the crucial assumption in time series estimation to properly estimate the parameter of interest. All the estimations presented so far have tested for stationarity, but, to produce an alternative robustness checks, I replicated the main results expressing all the variables in first differences. The first difference of a time series is the series of changes from one period to the next. Table 4A.3 and Table 4A.4 provide

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[130]The EPU loooks specifically for articles containing the words "uncertainty" or "uncertain", the terms "economic" or "economy" and one or more of the following terms: "congress", "deficit", "federal reserve", "legislation", "regulation" or "white house". In other words, to meet the criteria for inclusion, the article must include terms in all three categories pertaining to uncertainty, the economy and policy. To measure forecasters' disagreement (which composed the second part of the index) EPU used Consensus Economics, which is a forecast database for European countries. Precisely: "*For each country, we use data on individual forecasts for the following calendar year of CPI and federal budget balances, taking the interquartile range of each set of country-month forecasts. Due to the nature of the forecasts, asking about the following calendar year and not 1 year ahead, the forecasts become mechanically more accurate as months progress in a year. To correct for this, we deseasonalize the series of interquartile ranges. For the CPI disagreement measure, we then use the raw values. For the budget balance, we scale by a country's GDP. Each country's index is then scaled to standard deviation 1 and summed to create a single European-wide index* "

Finally, Bloom, Baker and Davis have normalized each of the two components – news and forecasts disagreement –by its standard deviation. They then compute the average value of the components, using weights of ½ for each of the two. The result is the overall index of policy related economic uncertainty

[131]I employ the same control variables as in section 4.4

[132]I have indeed performed the same analysis with weekly and monthly data. The results do not change.

an overview of the results. Precise Table 4A.3 shows the replication of the results with time series regression when all the variables are in first difference. Table 4A.4 looks at the dynamic panel estimation. The results are remarkably stables across specifications.

4.5 Conclusion

For crisis to occur there is a need for coordination. This is well known: what is less clear is what trigger coordination? This paper has investigated the role of news in affecting investors' beliefs and in anticipating the beginning of the European Sovereign Crisis. In doing so it has introduced a series of contribution which ranges from the provision of a newly collected dataset and to a new approach to the analysis of the European Sovereign Crisis. The study attempted to provide a rigorous explanation on why did the crisis start when it did. In doing so it argues that, in order to understand the onset of the crisis, there is a need to go beyond a mere analysis of economic fundamental. I build on the existing literature on sovereign crisis, by showing that a significant part of the surge on government bond spreads in the Eurozone was disconnected from underlying changes in a number of economic indicators. I then propose a new approach by studying whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. Testing these claims empirically is not trivial because there is no existing attempt to measure news media that might be relevant for financial investors. Hence, this paper has proposed a unique and newly collected dataset on news from the main media outlets in a set of 5 European Countries from September 2007 to September 2014. I have mostly focused on political information which, by their nature, is not immediately quantifiable, more subjective and difficult to interpret. I defined political information as all the news about political stories/events related to the country sovereign debt. Using different estimation techniques, which range from time series to dynamic panel estimations, my estimates shows that the amount of news fosters the coordination between investors and eventually leads to an increase in bond prices.

It is not just the amount of news that matters, but also its tone. I study whether positive news has a different impact on bond yields than negative news and I find that the tone of the news does indeed have a significant effect on

bond yields. More precisely, negative news in country i at time t-1 increases significantly the sovereign spread of country I at time t. On the contrary, positive news leads to a decrease in sovereign spread. The results are remarkably stable across specifications and to the introduction of a full set of controls, municipal fixed effects, time fixed effects and linear time trends.

This paper differs from these studies in several dimensions and it makes a number of contributions. First, it provides evidence that, although important in the unfolding of the crisis, neither proxies of economic fundamentals nor measures of international risk can be used to explain the outbreak of the European sovereign crisis. Second, it incorporates the important role of politics in the analysis of the onset of the European crisis. It does so not by looking at standard institutional proxies but rather at the day to day policy making processes. Third, it provides a new dataset to measure the political uncertainty generated by variations in the frequency, types and availability of information flows.

4.6 Figures and Tables

4.6.1 Figures

Figure 4.1: Debt to GDP Ratio Over Time
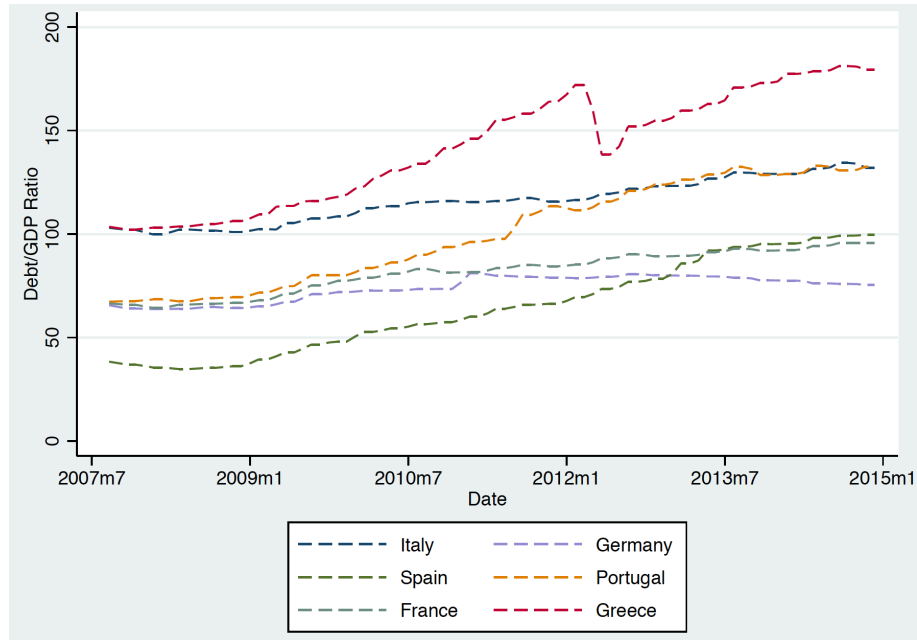
Note: Eurostat - Authors' elaboration. Data are from Eurostat.
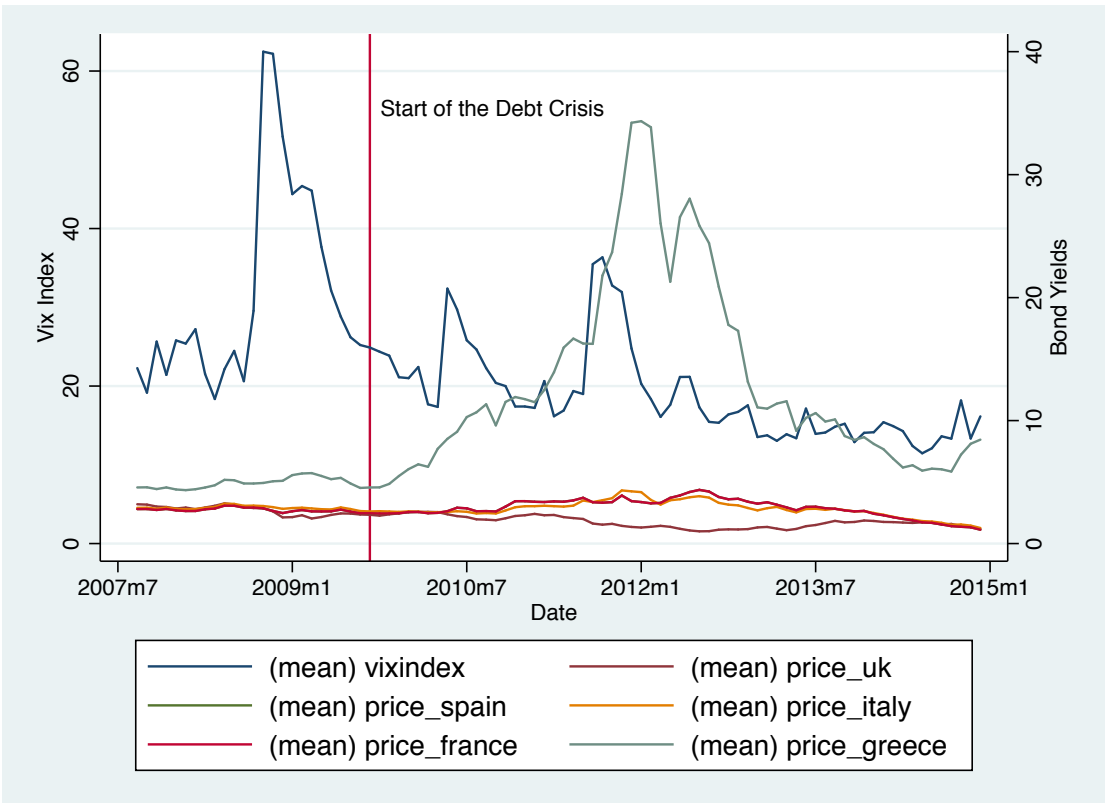
Note: Eurostat - Authors' elaboration. The Chart reports the overtime trend of the sovereign bonds for Italy, France, Greece, UK, Spain and the VIX index. Data are from Bloomberg Professional Services.

Figure 4.3: Bond Yields and CDS Index
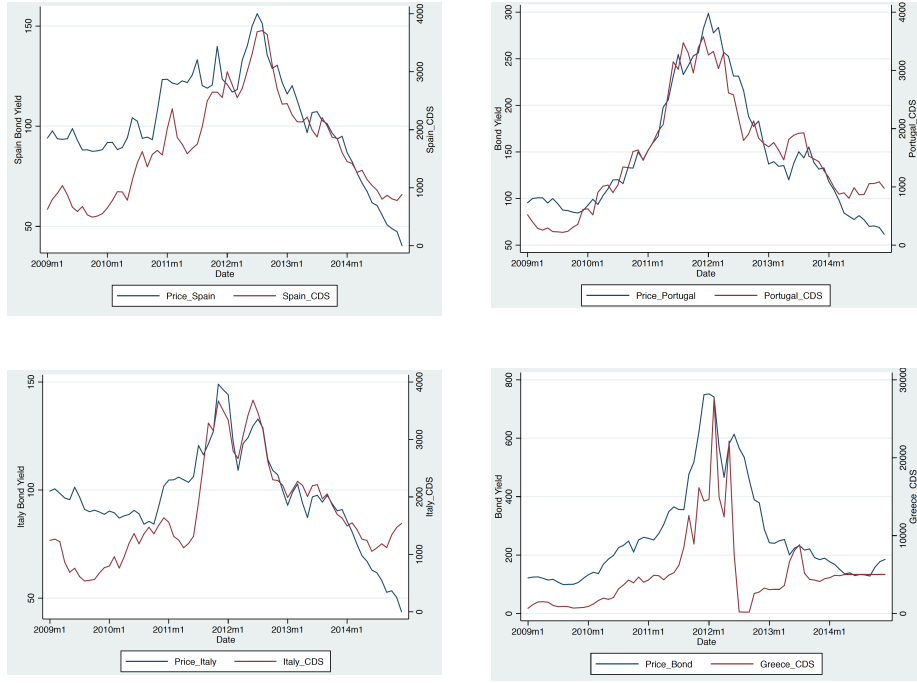
Note: Eurostat - Authors' elaboration. Each chart reports the overtime trend of the sovereing bond and of the related CDS. Data are from Bloomberg Professional Services

Figure 4.4: Bond Yields and News
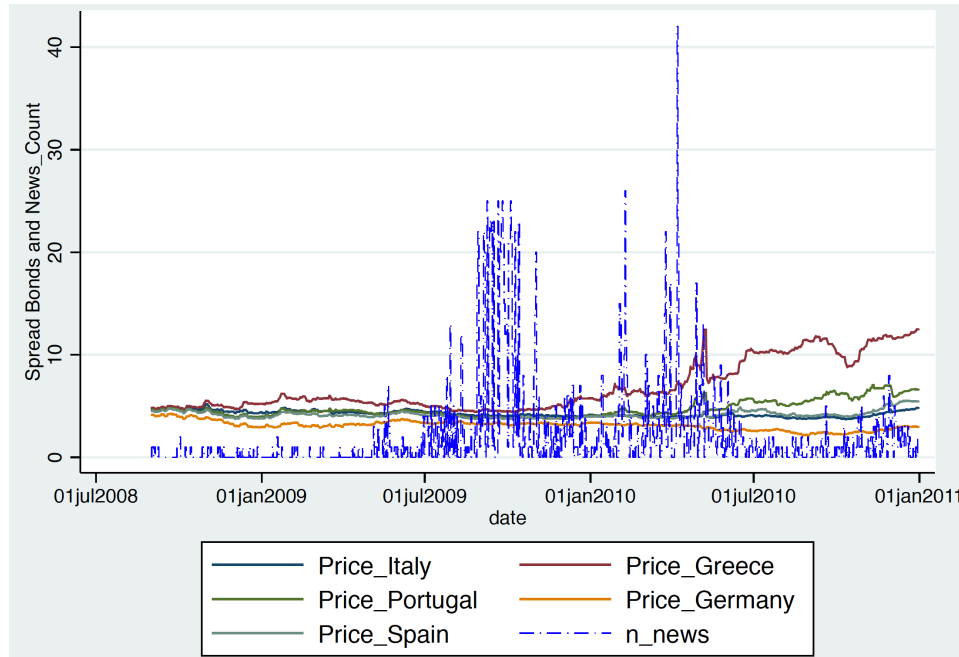
Note: Source: Bloomber - Author's own dataset. Author's elaboration. Together with the spreads, I plot the daily count of the political news stories related to sovereign debt. The picture shows a striking spike in the number of news that has anticipated the divergence of the spreads. Most of the news are clustered around June, July, August and September 2009 when there were no signs of turmoil on the yields and well before the revelation of Greek public finance problems which took place in December 2009. Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

Figure 4.5: Search Sumary - Text

Search Summary	
Text	((uncertainty or uncertain) and (debt or deficit) and (bond market or spread) not (decrease or decreasing or reduction or improvement) politics or legislature) or (stability or political stability) or (economic policy)) or ((incertezza or incerto) and (debito or deficit) and (titoli di stato or spread) not (riduzione or miglioramento or calo) or(stabilita' politica or legislature) or (politica economica)) or ((incertitude or incertain) and (dette or déficit) and (marché obligataire or spread) not (diminuer or diminuant or réduction or amélioration)) or ((incertidumbre or incierto) or riesgoso and (debito or deficit) and (mercado de bonos or spread) not (reduccion or disminucion or disminuir)) or ((Unsicherheit or Unsicher) and (die Schulden or das Defizit) and (der Rentenmarkt or Volkswirtschaft) not (die abnahme or fallend or Absenkung or die Verbesserung)) or ((Αβεβαίοτητα or αβέβαιος) and (χρέος or έλλειμμα) and (αγορά or πτώση) not (βελτίωση or πολιτική or πολιτικά or νομοθετικό))
Date	01/05/2008 to 20/06/2013
Source	Le Figaro - All sources Or Le Monde - All sources Or Financial Times - All sources Or Bloomberg - All sources Or El Pais - All sources Or El Mundo - All sources Or La Repubblica - All sources Or Il Sole - All sources Or Frankfurter Allgemeine Zeitung - All sources Or Handelsblatt - All sources
Author	All Authors
Company	All Companies
Subject	Debt/Bond Markets Or Routine Market/Financial News Or Government Borrowing Or Euro Zone/Currency Or Central Bank Intervention Or Government Borrowing Requirement Or Dow Jones/Reuters Top Wire News
Industry	All Industries
Region	Germany Or France Or Italy Or Spain Or United Kingdom
Language	All Languages

Note: Author's elaboration. The table reports an example of search code using Factiva Technology

Figure 4.6: Search Results - Text

Keyword	Value
Government Borrowing	498
Euro Zone/Currency	476
Government Finance	399
Government Taxation/Revenue	260
Domestic Politics	237
Budget Account	146
European Central Bank (Discontinued from 1st April 2013)	132
Equity Markets	132
News Agency Material	94
Government Debt/Bond Markets	--

Source	Value
El Mundo - All sources	646
El Pais - All sources	418
Financial Times - All sources	167
The Times (U.K.) - All sources	161
La Repubblica - All sources	52
Il Sole - All sources	6
Thomson Reuters ONE - All sources	

Institution	Value
European Central Bank	156
International Monetary Fund	54
The European Union	41
European Commission	27
Generalitat of Catalonia	20
Spain Ministry of Economy and Finance	12
Valencian Generalitat	10
Banco Santander SA	7
Banco Bilbao Vizcaya Argentaria SA	7
World Economic Forum	7

Note:Author's elaboration. the Charts reports a set of outcomes results from the Factiva Search. The first chart reports the most mentioned keywords. The Second the most captured newspapers and, finally, the most mentioned institutions.

Figure 4.7: Twitter API Technology
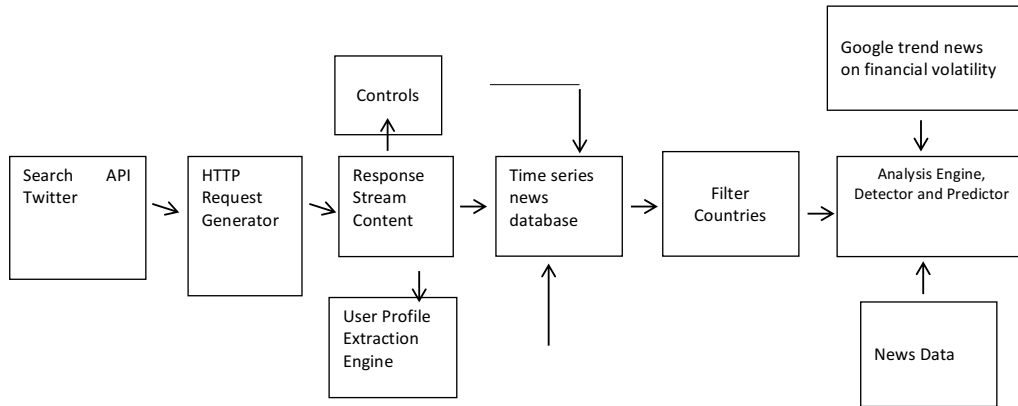
Note: Author's elaboration. The Figure shows the structure and interface of the Twitter API Interface.

Figure 4.8: Opinion Makers

Name	Mentioned
Krugman	16
Mohamed Elarian	14
Wolf	12
Roubini	12
Bill Gross	9
Ezra Klein	8
Daniel Altman	8
Stiglitz	5
Sachs	3
Catherine Rampell	3
Heide Moore	2
Josh Barro	1
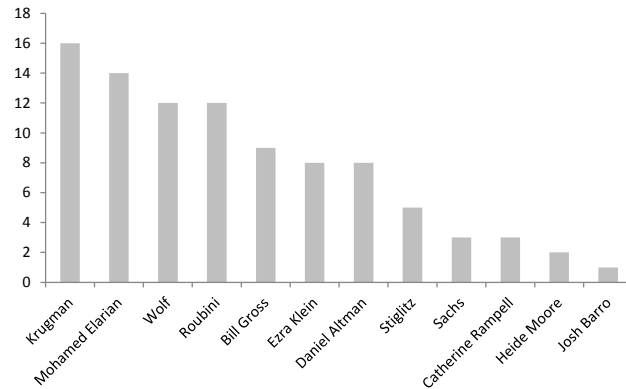
Note:Author's elaboration. The table and the chart shows the result of the interviews that I have conducted with a sample of traders in the city of London. The question I posed was "Which is the opinion maker that you read the most?"

4.6.2   Tables

Table 4.1: Bond Yield and Economic Foundamentals (Time Series Model)

VARIABLES	(1) Bond Yield Portugal	(2) Bond Yield Italy	(3) Bond Yield Spain	(4) Bond Yield Greece
Current Account Portugal	0.0197			
	(0.0325)			
Deficit Portugal	0.00600			
	(0.0176)			
Debt (as % GDP) Portugal	0.00343			
	(0.00869)			
GDP Growth Portugal	-0.00465			
	(0.0134)			
Current Account Italy		0.0307		
		(0.0361)		
Debt (as % GDP) Italy		0.00487		
		(0.00502)		
Deficit Italy		-0.00705		
		(0.0168)		
GDP Growth Italy		-0.00882		
		(0.00680)		
Debt (as % GDP) Spain			0.000590	
			(0.00515)	
Deficit Spain			-0.0208	
			(0.03753)	
Current Account Spain			-0.00617	
			(0.0228)	
GDP Growth Spain			-0.0335	
			(0.0243)	
Debt (as % GDP) Greece				0.0102
				(0.0190)
Deficit Greece				0.0102*
				(0.00575)
Current Account Greece				-0.0767
				(0.0531)
GDP Growth Greece				-0.01000
				(0.0129)
Constant	0.00665	0.00583	0.00574	0.0215
	(0.00928)	(0.00903)	(0.00756)	(0.0257)
Observations	2,676	2,676	2,676	2,676
R-squared	0.998	0.995	0.995	0.997

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Indipendent variables are the first difference of debt, deficit, current account for Italy, Greece, Spain and Portugal. Estimates included past values of bond yields (t-2). The model is estimated with ARMA Time series regressions.

Table 4.2: Bond Yield and Economic Foundamentals (Panel Model)

VARIABLES	(1) Bond Yield
Debt (as % GDP)	0.00844
	(0.00530)
Deficit (as % GDP)	0.00186
	(0.0134)
GDP Growth	-0.00887
	(0.00889)
GDP Growth (t-1)	0.0133
	(0.0126)
GDP Growth (t-2)	-0.00397
	(0.00896)
Debt (t-1)	-0.00809*
	(0.00465)
Debt (t-2)	-0.000476
	(0.00328)
Deficit (t-1)	0.000362
	(0.0190)
Deficit (t-2)	-0.00377
	(0.0134)
Bond Yield (t-1)	1.092***
	(0.00728)
Bond Yield (t-2)	-0.0939***
	(0.00728)
Constant	0.0109
	(0.00685)
Observations	18,725
Number of country	7
R-squared	0.997

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Indipendent variables are the first difference of debt, deficit, current account for Italy, Greece, Spain and Portugal. Estimates included past values of bond yields (t-2), fixed effect and time effect. The model is estimated with a dynamic fixed effect regressions.

Table 4.3: Heterogeneity across Countries - Theoretical Predictions

Quality of the Government	Level of Noise		Probability of Currency Crisis
"Strong" Government	0,7	→	0,32
	0,8	→	0,38
	0,9	→	0,39
"Medium Government"	0,7	→	0,42
	0,8	→	0,48
	0,9	→	0,5
"Weak Government"	0,7	→	0,6
	0,8	→	0,71
	0,9	→	0,79

Note: Calibration of the comparative statics of the model. 4

Table 4.4: News and Bond Yields - Time Series Analysis

VARIABLES	(1) Bond Yield Uk	(2) Bond Yield Spain	(3) Bond Yield Italy	(4) Bond Yield Greece	(5) Bond Yield France	(6) Bond Yield Germany
Total News	4.42e-05	3.04e-05*	0.00220*	0.00164*	5.18e-05	-5.49e-05
	(0.000279)	(0.000764)	(0.00121)	(0.00108)	(0.000250)	(0.000294)
Total News (t-1)	-0.000299	0.000984*	0.00148	-0.00152	7.41e-05	0.000225
	(0.000294)	(0.000557)	(0.00124)	(0.00236)	(0.000253)	(0.000337)
Total News (t-2)	2.30e-05	0.000281	0.00253**	0.00335*	-8.79e-05	-9.01e-05
	(0.000222)	(0.000363)	(0.00117)	(-0.00256)	(0.000178)	(0.000215)
Bond Yield (t-1)	1.021***	1.126***	0.453***	1.084***	1.070***	1.023***
	(0.0272)	(0.0311)	(0.0860)	(0.0342)	(0.0284)	(0.0250)
Bond Yield (t-2)	-0.0515	-0.142***	-0.0969	-0.0726*	-0.0902***	-0.0412
	(0.0371)	(0.0417)	(0.123)	(0.0385)	(0.0318)	(0.0343)
Bond Yield (t-3)	0.0226	0.0102	0.188**	-0.0191	0.0115	0.00795
	(0.0203)	(0.0249)	(0.0877)	(0.0142)	(0.0197)	(0.0200)
Inflation	-0.000682	0.00352*	-0.113***	0.00797	0.000989	0.00137
	(0.00230)	(0.00196)	(0.0126)	(0.00679)	(0.00256)	(0.00215)
GDP Growth	0.00530*	-0.000885	-0.0288***	0.00912*	0.00104	-0.00127
	(0.00318)	(0.00146)	(0.00240)	(0.00469)	(0.00234)	(0.000894)
Unemployment	0.00248	0.00395	-0.151***	0.00787	0.00368	0.0103***
	(0.00323)	(0.00260)	(0.0149)	(0.00859)	(0.00489)	(0.00357)
Confidence Index	-0.000149	0.000377	0.0167***	-0.000641	5.78e-05	0.000237
	(0.000214)	(0.000293)	(0.00133)	(0.000852)	(0.000164)	(0.000200)
Household Saving	0.00134	0.000722	-0.128***		0.000136	0.0111
	(0.00144)	(0.00100)	(0.00747)		(0.00376)	(0.00715)
Current Account	-0.00502*		0.00665	-0.0195**		0.00690**
	(0.00286)		(0.0100)	(0.00808)		(0.00274)
Debt/GDP	-0.000726***	-0.000919*	-0.0374***	0.00222	-0.00120**	0.000348
	(0.000276)	(0.000506)	(0.00262)	(0.00142)	(0.000519)	(0.000513)
Deficit	-0.000341	0.00134	0.151***	-0.00207	-0.000909	-0.00182
	(0.00112)	(0.00160)	(0.00936)	(0.00442)	(0.00151)	(0.00182)
Constant	0.0276	0.0119	9.618***	-0.594***	0.0831	-0.293**
	(0.0215)	(0.0172)	(0.300)	(0.188)	(0.0615)	(0.142)
Observations	2,676	2,676	2,676	2,676	2,676	2,676
R-squared	0.998	0.995	0.933	0.997	0.998	0.998

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Total News represent the total amount of news (count) published at time t. Estimates includes past values of Bond Yields (t-2) and past values of Total News. Results are conditional to a full set of controls, fixed effect and time effect. The model is estimated with ARMA Time series regressions. Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

Table 4.5: News and Bond Yields - Time Series Analysis - Monthly Level

| VARIABLES	(1) Bond Yield Uk	(2) Bond Yield Spain	(3) Bond Yield Italy	(4) Bond Yield Greece	(5) Bond Yield France	(6) Bond Yield Germany
Monthly News	-0.000897	0.00138*	0.00134*	0.000167	0.0115**	0.0269
	(0.0129)	(0.000831)	(0.000710)	(0.000405)	(0.00541)	(0.0225)
Monthly News(t-1)	-0.000775*	-0.00118	-0.000337	-0.000284	-0.0106**	-0.000410
	(0.000443)	(0.000722)	(0.000625)	(0.000506)	(0.00459)	(0.000406)
Monthly News(t-2)	7.26e-05	0.000116	3.90e-05	-0.000484	0.00801*	-0.000489
	(0.000387)	(0.000575)	(0.000543)	(0.000352)	(0.00436)	(0.000320)
Bond Yield (t-1)	1.069***	1.027***	0.954***	1.086***	1.108***	1.041***
	(0.143)	(0.150)	(0.132)	(0.110)	(0.167)	(0.121)
Bond Yield (t-2)	-0.362*	-0.198	-0.254*	-0.323***	-0.414**	-0.340***
	(0.193)	(0.207)	(0.128)	(0.112)	(0.168)	(0.124)
inflation_uk	-0.0351	0.0828	-0.0183	0.0654	0.210*	0.0897
	(0.0657)	(0.0546)	(0.0455)	(0.0594)	(0.111)	(0.0617)
gdpgrowth_uk	0.105	-0.00482	0.0134	-0.0167	0.0515	0.0129
	(0.0718)	(0.0419)	(0.0136)	(0.0235)	(0.159)	(0.0541)
unemployment_uk	0.120	0.0932	-0.0208	0.222**	0.369	0.0818
	(0.0842)	(0.0932)	(0.0914)	(0.0989)	(0.229)	(0.149)
condidenceindex_uk	-0.00108	0.00216	-0.00962	0.00568	-0.0158	-0.00399
	(0.00505)	(0.00661)	(0.00715)	(0.00442)	(0.0222)	(0.00504)
householdsavings_uk	0.0447	0.0253	-0.0795	0.300**	-0.552*	-0.0667
	(0.0372)	(0.0282)	(0.0546)	(0.139)	(0.289)	(0.113)
currentaccount_uk	-0.0796	0.0199	-0.0890	0.0535		0.204
	(0.0712)	(0.104)	(0.0676)	(0.0657)		(0.124)
ukdeficit	0.0105	0.0411	0.0732	-0.00723	-0.00242	-0.0486
	(0.0321)	(0.0646)	(0.0543)	(0.0496)	(0.1000)	(0.0491)
ukdebt	-0.0171**	-0.0225	-0.00986	0.0127	0.0343	-0.0347**
	(0.00658)	(0.0282)	(0.0173)	(0.0134)	(0.0333)	(0.0147)
Constant	0.451	0.327	3.445	-7.123**	-14.46**	3.714*
	(0.737)	(1.544)	(2.188)	(2.893)	(6.425)	(2.026)
Observations	85	86	86	86	86	86
R-squared	0.967	0.940	0.938	0.982	0.963	0.972

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Total News represent the total amount of news (count) published at time t. Estimates includes past values of Bond Yields (t-2) and past values of Total News. Results are conditional to a full set of controls, fixed effect and time effect. The model is estimated with ARMA Time series regressions. Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

Table 4.6: News and Bond Yields - Dinamic Panel Estimation

VARIABLES	(1) Bond Yield	(2) Bond Yield	(3) Bond Yield	(4) Bond Yield	(5) Bond Yield
News	1.086***	0.00402*	0.00388*	0.00384*	0.00204*
	(0.0634)	(0.00233)	(0.00233)	(0.00233)	(0.00185)
price (t-1)		1.088***	1.088***	1.087***	1.084***
		(0.00865)	(0.00865)	(0.00865)	(0.00968)
price (t-2)		-0.0783***	-0.0783***	-0.0776***	-0.0723***
		(0.0128)	(0.0128)	(0.0128)	(0.0143)
price (t-3)		-0.0117	-0.0114	-0.0116	-0.0141
		(0.00865)	(0.00865)	(0.00865)	(0.00968)
news (t-1)		-0.00237	-0.00247	-0.00244	0.000670
		(0.00245)	(0.00245)	(0.00245)	(0.00297)
news (t-2)		0.00585**	0.00572**	0.00572**	0.00664**
		(0.00232)	(0.00233)	(0.00233)	(0.00285)
vixindex			0.000356*	0.000354*	-0.000736
			(0.000194)	(0.000194)	(0.0259)
debt			4.78e-05	0.00909**	0.00566
			(0.000136)	(0.00408)	(0.00483)
deficit			-0.000865	0.00317	0.00175
			(0.000795)	(0.0177)	(0.0201)
Debt (t-1)				-0.00651	-0.00507
				(0.00576)	(0.00683)
Debt (t-2)				-0.00254	-0.000409
				(0.00408)	(0.00483)
Deficit (t-1)				0.000623	0.00715
				(0.0250)	(0.0284)
Deficit (t-2)				-0.00464	-0.00909
				(0.0177)	(0.0201)
Country Dummies	no	yes	yes	yes	yes
Time Dummies	no	no	no	no	yes
Time Trends	no	no	no	no	yes
Constant	4.859***	0.00823***	-0.00842	-0.00792	0.0273
	(0.0432)	(0.00301)	(0.0144)	(0.0144)	(0.565)
Observations	13,385	13,370	13,370	13,370	13,370
R-squared	0.027	0.997	0.997	0.997	0.998
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". The main variable is News which represents the amount of news published at time t in country i. Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

Table 4.7: Opinion and Bond Yields - Dinamic Panel Estimation

VARIABLES	(1) Bond Yield	(2) Bond Yield	(3) Bond Yield	(4) Bond Yield	(5) Bond Yield
opinion	0.773***	0.0166**	0.0160**	0.0159**	0.0140*
	(0.119)	(0.00679)	(0.00679)	(0.00679)	(0.00775)
price (t-1)		1.087***	1.080***	1.079***	1.077***
		(0.00865)	(0.00867)	(0.00868)	(0.00970)
price (t-2)		-0.0781***	-0.0738***	-0.0729***	-0.0682***
		(0.0128)	(0.0127)	(0.0127)	(0.0142)
price (t-3)		-0.0112	-0.0115	-0.0116	-0.0140
		(0.00865)	(0.00863)	(0.00863)	(0.00965)
opinion (t-1)		0.0115*	0.0113*	0.0118*	0.0141*
		(0.00686)	(0.00686)	(0.00687)	(0.00784)
opinion (t-2)		0.0271***	0.0266***	0.0268***	0.0281***
		(0.00686)	(0.00686)	(0.00686)	(0.00784)
vixindex			0.000224	0.000220	-0.000396
			(0.000194)	(0.000194)	(0.0259)
cds			4.61e-05***	4.68e-05***	4.38e-05***
			(5.66e-06)	(5.67e-06)	(6.24e-06)
debt			-0.000309**	0.0102**	0.00686
			(0.000142)	(0.00407)	(0.00482)
deficit			-0.000962	0.00455	0.00311
			(0.000793)	(0.0176)	(0.0200)
debt_l1				-0.00636	-0.00488
				(0.00575)	(0.00681)
debt_l2				-0.00414	-0.00214
				(0.00407)	(0.00482)
deficit_l1				0.000238	0.00708
				(0.0249)	(0.0283)
deficit_l2				-0.00572	-0.0107
				(0.0176)	(0.0200)
Constant	5.047***	0.00816***	0.0321**	0.0333**	0.0545
	(0.0310)	(0.00300)	(0.0152)	(0.0152)	(0.564)
Observations	13,384	13,366	13,366	13,366	13,366
R-squared	0.003	0.997	0.997	0.997	0.998
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". The main variable is Opinion which represents the amount of opinion pieces published at time t in country i. Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. Data on Bonds are from Bloomberg Professional Services. Data on opinion makers are manually collected by the author.

Table 4.8: News and Bond Yields - Heterogeneity Across Countries - Dinamic Panel Estimation

	Bond Yield	Bond Yield	Bond Yield	Bond Yield	Bond Yield
News_Italy	0.00778***				
	(0.00257)				
News_Italy (t-1)	-0.00399				
	(0.00269)				
News_Italy (t-2)	-0.00301				
	(0.00257)				
News_France		0.00294			
		(0.0139)			
News_France (t-1)		0.00215			
		(0.0141)			
News_France (t-2)		0.00125			
		(0.0139)			
News_germany			0.00333		
			(0.0110)		
News_Germany (t-1)			0.00405		
			(0.0111)		
News_Germany (t-2)			-0.00139		
			(0.0110)		
News_Greece				0.00684**	
				(0.00339)	
News_Greece (t-1)				-0.00317	
				(0.00367)	
News_Greece (t-2)				0.0121***	
				(0.00339)	
News_spain					0.00129*
					(0.00102)
News_spain (t-1)					-0.00448
					(0.00483)
News_Spain (t-2)					-0.00466
					(0.00472)
Bond Yield (t-n)	yes	yes	yes	yes	yes
Vix Index	yes	yes	yes	yes	yes
Economic Controls	yes	yes	yes	yes	yes
Economic Controls (t-n)	yes	yes	yes	yes	yes
Constant	-0.00528	-0.00523	-0.00520	-0.00810	-0.00364
	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.0144)
Observations	13,370	13,370	13,370	13,370	13,370
R-squared	0.997	0.997	0.997	0.997	0.997
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Indipendent variables are the amount of news published in country i at time t. Estimates include past values of bond yields (t-2), past values of the news variable, a full set of controls, fixed effect and time effect. The model is estimated with a dynamic fixed effect regressions.Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

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Table 4.9: Opinion and Bond Yields - Heterogeneity Across Countries - Dinamic Panel Estimation

	Bond Yield	Bond Yield	Bond Yield	Bond Yield	Bond Yield
Opinion_Italy	0.00220				
	(0.00500)				
Opinion_Italy (t-1)	-0.00139				
	(0.00515)				
Opinion_Italy (t-2)	-0.00367				
	(0.00500)				
Opinon_Greece		0.0254***			
		(0.00842)			
Opinion_greece (t-1)		0.0337***			
		(0.00842)			
Opinion_Greece (t-2)		0.0163*			
		(0.00860)			
Opinion_Spain			0.023*		
			(0.0143)		
Opinion_Spain (t-1)			0.00965		
			(0.0214)		
Opinion_Spain (t-2)			-0.00606		
			(0.0213)		
Opinion_France				0.0195	
				(0.0683)	
Opinion_France (t-1)				-0.0209	
				(0.0700)	
Opinion_France (t-2)				-0.000235	
				(0.0683)	
Opinion_Germany					0.00498
					(0.0209)
Opinion_Germany (t-1)					0.000399
					(0.0209)
Opinion_Gergmany (t-2)					-0.00423
					(0.0209)
Bond Yield (t-n)	yes	yes	yes	yes	yes
Vix Index	yes	yes	yes	yes	yes
Economic Controls	yes	yes	yes	yes	yes
Economic Controls (t-n)	yes	yes	yes	yes	yes
Constant	-0.00528	-0.00523	-0.00520	-0.00810	-0.00364
	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.0144)
Observations	13,370	13,370	13,370	13,370	13,370
R-squared	0.997	0.997	0.997	0.997	0.997
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Indipendent variables are the amount of opinion peices published in country i at time t. Estimates include past values of bond yields (t-2), past values of the news variable, a full set of controls, fixed effect and time effect. The model is estimated with a dynamic fixed effect regressions. Data on Bonds are from Bloomberg Professional Services. Data on news are manually collected by the author.

Table 4.10: Examples of News Coding - Positive, Negative, Uncertain

Negative News	Positive News	Uncertain News
La incertidumbre castiga la dueda publica espanola	Government bonds recover losses as market fears ease	Eurozone Weighs Bailout Plan for Greece
Euro Under Pressure As Greek Crisis Becomes A 'Huge Game Of Chicken'	Trichet Says ECB 'Confident' Greece Can Cut Deficit: Audio	ECB Set for First Rate Split With Fed in 40 Years: Euro Credit
The pain in Spain will reveal itself very soon	Eurozone Leaders Agree on Bailout Plan for Greece	EU Said to Consider Requiring Collateral for More Greek Aid

Note: The analysis has been run on 5 different languages.

Table 4.11: The Effect of the "Tone Effect" of news on Bond Yields

VARIABLES	(1) Bond Yield	(2) Bond Yield	(3) Bond Yield	(4) Bond Yield	(5) Bond Yield
Positive News	-0.0102**	-0.00717*	-0.00754*	-0.00754*	-0.00697
	(0.00413)	(0.00425)	(0.00425)	(0.00425)	(0.00533)
Uncertain News	0.00167	0.00322	0.00342	0.00333	0.00108
	(0.00442)	(0.00455)	(0.00460)	(0.00460)	(0.00555)
Negative News	0.00768***	0.00890***	0.00906***	0.00903***	0.00501**
	(0.00179)	(0.00197)	(0.00201)	(0.00201)	(0.00236)
Bond Yield (t-1)	1.088***	1.087***	1.087***	1.087***	1.085***
	(0.00861)	(0.00861)	(0.00862)	(0.00862)	(0.00964)
Bond Yield (t-2)	-0.0897***	-0.0889***	-0.0895***	-0.0892***	-0.0876***
	(0.00861)	(0.00861)	(0.00862)	(0.00862)	(0.00964)
Uncertain News (t-1)		-0.00700	-0.00719	-0.00715	-0.00706
		(0.00456)	(0.00465)	(0.00465)	(0.00561)
Negative News (t-1)		-0.000132	-0.000639	-0.000620	0.00190
		(0.00197)	(0.00209)	(0.00209)	(0.00244)
Positive News (t-1)		0.0147***	0.0162***	0.0160***	0.0166***
		(0.00425)	(0.00434)	(0.00434)	(0.00540)
Uncertain News (t-2)			0.000299	0.000325	0.00122
			(0.00461)	(0.00461)	(0.00557)
Negative News (t-2)			-0.000269	-0.000299	-0.000985
			(0.00201)	(0.00201)	(0.00235)
Positive News (t-3)			0.00922**	0.00918**	0.00876*
			(0.00426)	(0.00426)	(0.00532)
Vix Index			0.000315	0.000313	-0.0156
			(0.000194)	(0.000194)	(0.0231)
Debt/Gdp			4.30e-06	0.00861**	0.00527
			(0.000136)	(0.00407)	(0.00483)
Deficit/Gdp			-0.00118	0.00274	0.00258
			(0.000794)	(0.0177)	(0.0201)
Debt/Gdp (t-1)				-0.00861**	-0.00514
				(0.00407)	(0.00483)
Deficit/Gdp (t-1)				-0.00390	-0.00300
Country Dummies	yes	yes	yes	yes	yes
Time Dummies	no	no	no	no	yes
Time Trends	no	no	no	no	yes
Constant	-0.00570	-0.00368	-0.00460	-0.00428	0.320
	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.511)
Observations	13,375	13,375	13,375	13,375	13,375
R-squared	0.997	0.997	0.997	0.997	0.998
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield. The explanatory variables of interest are Negative, Positive and Uncertain News. They represent the tone of the news of country i at time t-1.Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. Data on Bonds are from Bloomberg Professional Services. Data on Tone_News are manually collected and coded by the author.

Table 4.12: The Effect of the "Tone Effect" of opinon pieces on Bond Yields

VARIABLES	(1) Bond Yield	(2) Bond Yield	(3) Bond Yield	(4) Bond Yield
Negative Opinion Piece	0.00875***	0.00992***	0.00989***	0.00766**
	(0.00238)	(0.00260)	(0.00260)	(0.00317)
Positive Opinion Piece	0.00290	0.00388	0.00389	0.000594
	(0.00330)	(0.00334)	(0.00334)	(0.00399)
Uncertain Opinion Piece	0.00117	0.00317	0.00310	-0.000582
	(0.00248)	(0.00266)	(0.00266)	(0.00314)
Bond Yield (t-1)	1.088***	1.088***	1.087***	1.085***
	(0.00862)	(0.00862)	(0.00862)	(0.00964)
Bond Yield (t-2)	-0.0899***	-0.0896***	-0.0892***	-0.0872***
	(0.00861)	(0.00861)	(0.00861)	(0.00964)
Negative Opinion Piece (t-1)		0.00234	0.00244	0.00290
		(0.00256)	(0.00256)	(0.00311)
Positive Opinion Piece(t-1)		-0.00754**	-0.00755**	-0.00537
		(0.00344)	(0.00343)	(0.00411)
Uncertain Opinion Piece(t-1)		-0.00633**	-0.00633**	-0.00343
		(0.00264)	(0.00264)	(0.00312)
Vix Index		0.000321*	0.000319*	-0.0155
		(0.000194)	(0.000194)	(0.0231)
Debt/Gdp		2.15e-05	0.00919**	0.00563
		(0.000135)	(0.00408)	(0.00483)
Deficit/Gdp		-0.00103	0.00318	0.00229
		(0.000791)	(0.0177)	(0.0201)
Debt/Gdp (t-1)			-0.00917**	-0.00549
			(0.00408)	(0.00483)
Deficit/Gdp (t-1)			-0.00419	-0.00266
			(0.0177)	(0.0201)
Country Dummies	yes	yes	yes	yes
Time Dummies	no	no	no	yes
Time Trends	no	no	no	yes
Constant	-0.00691	-0.00589	-0.00552	0.318
	(0.0144)	(0.0144)	(0.0144)	(0.511)
Observations	13,375	13,375	13,375	13,375
R-squared	0.997	0.997	0.997	0.998
Number of country	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield. The explanatory variables of interest are Negative, Positive and Uncertain Opinon Pieces. They represent the tone of the opinion pieces of country i at time t-1.Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. Data on Bonds are from Bloomberg Professional Services. Data on Tone_News are manually collected and coded by the author.

Table 4.13: The Effect of the "Tone Effect" of news on Bond Yields - Heterogeneity Across Countries

VARIABLES	(1) Bond Yield	(2) Bond Yield	VARIABLES	(1) Bond Yield	(2) Bond Yield
negative_news_italy	0.00612***	0.00937***	positive_news_italy	-0.0126	-0.0135*
	(0.00228)	(0.00260)		(0.00774)	(0.00787)
negative_news_greece	0.0154***	0.00977**	positive_news_greece	-0.00818	-0.00512
	(0.00362)	(0.00380)		(0.00560)	(0.00574)
negative_news_spain	0.00292	0.00570	positive_news_spain	-0.0334***	-0.0313**
	(0.00505)	(0.00529)		(0.0129)	(0.0130)
negative_news_france	0.000424	-0.000956	positive_news_france	0.00852	0.00848
	(0.0174)	(0.0178)		(0.0227)	(0.0227)
negative_news_germany	0.00286	0.00167	positive_news_germany	0.00498	0.00495
	(0.0132)	(0.0134)		(0.0203)	(0.0203)
Bond Yield (t-1)	1.088***	1.086***	Bond Yield (t-1)	1.089***	1.088***
	(0.00861)	(0.00862)		(0.00861)	(0.00862)
Bond Yield (t-2)	-0.0900***	-0.0882***	Bond Yield (t-2)	-0.0904***	-0.0897***
	(0.00861)	(0.00861)		(0.00861)	(0.00862)
Negative News (t-1)		Yes	Positive_News (t-1)		yes
Negative News (t-2)		Yes	Positive News (t-2)		yes
Controls		Yes	Controls		yes
Municipal Dummies		Yes	Municipal dummies		yes
Time Dummies		Yes	Time Dummies		yes
Constant	-0.00685	-0.00689	Constant	-0.00443	-0.00295
	(0.0144)	(0.0144)		(0.0144)	(0.0144)
Observations	13,375	13,375	Observations	13,375	13,375
R-squared	0.997	0.997	R-squared	5	0.997
Number of country	5	5	Number of country	0.997	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield. Data on Bonds are from Bloomberg Professional Services. Data on Tone_News are manually collected and coded by the author.

Table 4.14: The Effect of the "Tone Effect" of opinion pieces on Bond Yields - Heterogeneity Across Countries

VARIABLES	(1) Bond Yield	(2) Bond Yield	VARIABLES	(1) Bond Yield	(2) Bond Yield
negative_news_italy	0.00612***	0.00937***	positive_news_italy	-0.0126	-0.0135*
	(0.00228)	(0.00260)		(0.00774)	(0.00787)
negative_news_greece	0.0154***	0.00977**	positive_news_greece	-0.00818	-0.00512
	(0.00362)	(0.00380)		(0.00560)	(0.00574)
negative_news_spain	0.00292	0.00570	positive_news_spain	-0.0334***	-0.0313**
	(0.00505)	(0.00529)		(0.0129)	(0.0130)
negative_news_france	0.000424	-0.000956	positive_news_france	0.00852	0.00848
	(0.0174)	(0.0178)		(0.0227)	(0.0227)
negative_news_germany	0.00286	0.00167	positive_news_germany	0.00498	0.00495
	(0.0132)	(0.0134)		(0.0203)	(0.0203)
Bond Yield (t-1)	1.088***	1.086***	Bond Yield (t-1)	1.089***	1.088***
	(0.00861)	(0.00862)		(0.00861)	(0.00862)
Bond Yield (t-2)	-0.0900***	-0.0882***	Bond Yield (t-2)	-0.0904***	-0.0897***
	(0.00861)	(0.00861)		(0.00861)	(0.00862)
Negative News (t-1)		Yes	Positive_News (t-1)		yes
Negative News (t-2)		Yes	Positive News (t-2)		yes
Controls		Yes	Controls		yes
Municipal Dummies		Yes	Municipal dummies		yes
Time Dummies		Yes	Time Dummies		yes
Constant	-0.00685	-0.00689	Constant	-0.00443	-0.00295
	(0.0144)	(0.0144)		(0.0144)	(0.0144)
Observations	13,375	13,375	Observations	13,375	13,375
R-squared	0.997	0.997	R-squared	5	0.997
Number of country	5	5	Number of country	0.997	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield. Data on Bonds are from Bloomberg Professional Services. Data on the tone of the opinions are manually collected and coded by the author.

4.7   Appendix

4.7.1   Summary of Morris and Shin Model

This section summarises the setting, the timing and the main results of Morris and Shin model. Section 4.7.2 develops a simple comparative statics exercise based on Morris and Shin's Framework.

Setting   In Morris and Shin the economy is characterised by a state of fundamentals θ, which is uniformly distributed over the unit interval [0,1]. Being a model of currency crisis, they characterised the exchange rate in the absence of government intervention as $f(\theta)$. In our setting this might be considered as the interests to be paid on the outstanding governmental debt. Importantly f is strickly increasing in θ, so that higher values of θ correspond to stronger fundamentals.

Market actors have two possible actions. They may attack the country by short selling its sovereign debt or they may refrain to do so. Attacking has a cost which in Morris and Shin is modelled as $t > 0$. If market actors succeed in short selling the debt, they gain a payoff of $\varepsilon^* - f(\theta) - t$ where, once again, in our setting ε^* is the gain from debt repayment interests.

If their attack fail, their payoff is $-t$. The government derives a value of $\nu > 0$ in defending the country from the speculative attack on its debt. There is also a cost in defending which, depends on the strenght of the fundamentals and by the size of the attack. The different outcomes for the Greek and Italian governments during the crisis can indeed be seen under this perspective. The solvency of the sovereign debt of both countries was put under serious questions by international markets, but the size and effectiveness on the attack on Greece, which had very bad economic fundamentals, was not comparable to the Italian case. The cost of defending the debt is therefore modelled as $c(\alpha, \theta)$ where α is the size of the attack and θ the state of fundamentals. Hence the government's payoff in defending the country is $\nu - c(\alpha, \theta)$ with c continuous and increasing in c and decreasing in θ.

Morris and Shin subsequently derive a tripartite classification of fundamentals (Morris and Shin, 1998). They define $\underline{\theta}$ as the value of θ that solves $c(0, \theta)$ which is when the government is indifferent between rescuing the sovereign debt in absence of a speculative attack. They then define $\overline{\theta}$ as the value of θ that solves $f(\theta) = \varepsilon^* - t$ so that the coupon on the bond yield is below the expected gain from an attack by the cost ot the attack itself. Using these two benchmarks, Morris

and Shin derive a tripartite classification of fundamentals that forms the basis for their main results.

- The interval $[0,\underline{\theta}]$ is defined as unstable because the government has no incentive to take any action on the sovereign debt.

- The interval $[\underline{\theta}, \overline{\theta}]$ is interesting. The value of defending the solvency of the debt is greater than the cost but this is conditional on the size of the attack.

- The interval $[\overline{\theta}, 1]$, the fundamentals are so good that the rational action is not to attack.

The interesting space is $[\underline{\theta}, \overline{\theta}]$. Morris and Shin defines it as the *Ripe of Attack* area, whereby it is not clear ex ante which actions will follow (Morris and Shin 1998*)*. In this interval multiple equilibria are possible because of the sell-fulfilling nature of the market actors perceptions. However, the crucial contribution of Morris and Shin is to show that when information are noisy and more difficult to interpret, each state of fundamentals gives rise to a unique equilibrium.

Timing and Main Results Here is the timing as per Morris and Shin (1998):

- Nature chooses the state of fundamentals θ

- Market actors, observe a signal x which is drawn uniformly from the interval $[\theta-\varepsilon, \theta+\varepsilon]$. In our setting, based on the signal received, a speculator decided whether to short sell the sovereign debt or not.

- The government observed the realised proportion of speculators who attack the debt, α, and observes θ.

Once the assumption of common knowledge is relaxed, the model generates a unique equilibrium as well as comparative statics on market makers' perceptions about other speculators perceive the state of fundamentals. In particular, Morris and Shin derive a unique θ^* such that the government does not defend the sovereign debt if and only if $\theta \leq \theta^*$. The location of θ^* is determined by the crossing of two lines: the $s(\theta, I_x)$ line which shows the proportion of speculators who decide to attack the sovereign debt at any given level of fundamentals, and the $a(\alpha)$ line which depicts the proportion of attackers who would make the government indifferent between defending or defaulting on the debt. When $\theta < \theta^*$, then

$s(\theta, I_x) > a(\alpha)$ the government cannot credibly commit to defend its pending debt and the outcome is a sovereign crisis.

The unique equilibrium crucially depends on the (perceived) quality of the fundamentals and on the size of the attack, which Morris and Shin defines as the aggregate short sales $s(\theta, I_{x^*})$[133]. It is useful to report the derivation of the aggregate short sales because I will use it in my comparative statics.

$$s(\theta, I_{x^*}) = \begin{cases} 1 \ if(\theta < x^* - \varepsilon) \\ \dfrac{1}{2} - \dfrac{1}{2\varepsilon}(\theta - x^*) if(x^* - \varepsilon \leq \theta < x^* + \varepsilon) \\ 0 \ if(\theta \geqslant x^* + \varepsilon) \end{cases} \tag{4.5}$$

The extremes are self explanatory. If the fundamentals are very bad there is probability of an aggregate shortsell is very high. If, on the opposite the fundamentals are good, the probability of a shortsell is very low. The interesting area is the "ripe of attack" whereby the situation is *unstable* and it depends on the quality of the signal/information which, in turn, is conditioned by the amount of noise.

4.7.2 Comparative Statics

In this section, I apply Morris and Shin framework (1998) to provide an additional theoretical intuition to the research question of this paper. More precisely, I focus on the *ripe for attack* interval and perform a simple comparative static exercise to understand how variations in noise, ε, impact the probability of an aggregate short sales point, θ^*. In other words, how can we explain this sudden *wake up call* that induced the markets to shortsell the sovereign debt of a precise group of countries? What is the relationship between the level of noise in the information and the probability of an aggregate short sell of the debt?

To analyse these questions, it is necessary to firstly understand the relationship between the level of noise and the final signal x that investors receive. [134]

One of the main prediction from Morris and Shin Model is that variations in noise, ε, do have an effect on x^* which determines whether market actors will

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[133] I_k is an indicator short function which defined a costant parameter k which crucially depends on the quality of the signal x

[134] This can be done in two different ways. The first is by consider x as exogenous and not dipendentent on ε. The second is the most realistic case whereby the signal x that investors receive is endogenous since it depends on how noisy is the information. Appendix XXX deals with the former of the two possibilities and I will now focus on the latter.

decide to shortsell the debt or not (Lemma 3, Morris and Shin 1998). In the model, x^* is the threshold below which a speculator, with whichever x smaller than x^*, will decide to attack. By construction the model assume that variations in noise change not just the quality of information that investors receive, but it also increases the interpretability of the signal which, in turn, causes uncertainty. Hence, before turning our attention to the impact that variations in noise might have on investors decisions, it is crucial to understand how ε affects x^*.

In the model x^* is the value of x according to which $U(k, I_k) = 0$ where U, according to Lemma 2, is continuous and strickly decreasing function of k, where k and I_k are simply two indicators according to which the speculators attach the debt if and only if the message x is less than some fixed number k.

Precisely

$$U(k, I_k) = \frac{1}{2\varepsilon}[\int_{A(\pi) \wedge [x-\varepsilon, x+\varepsilon]} \varepsilon^* - f(\theta)d\theta] - t \qquad (4.6)$$

where $f(\theta)$ increasing and convex. Hence, I numerically simulate the above expression giving the following values, $f(\theta) = \varepsilon^* \frac{\theta^2}{2} + \frac{1}{2}$ and therefore:

$$U(k, I_k) = \frac{1}{2\varepsilon}[\int_{A(\pi) \wedge [x-\varepsilon, x+\varepsilon]} \varepsilon^* - \varepsilon^* \frac{\theta^2}{2} + \frac{1}{2}d\theta] - t \qquad (4.7)$$

Now, in order to solve the above integral and find the value of x^* and its relation with ε, we need the integration bounderies which are given by the intersection of $A(\pi)$ and the interval $x - \varepsilon, x + \varepsilon$. [135]. Following Morris and Shin definition (reference), let's assume that $a(\theta) = 0.2 + \frac{1}{2}$, I can write our final integra

$$U(k, I_k) = \frac{1}{2\varepsilon}\int_{\frac{x}{A}}^{x+\varepsilon}(1 - \frac{\theta^2}{2})d\theta - t = [\frac{1}{12\epsilon}(\frac{1}{A^3} - 1)]x^3 - \frac{1}{4}x^2 + [\frac{1}{12\varepsilon}(1 - \frac{1}{A}) - \frac{\varepsilon}{4}]x + (\frac{1}{2} - \frac{\varepsilon^2}{12} - \frac{t}{2\varepsilon}) = 0$$

$$(4.8)$$

This integral is too complex to be solved analitically. Since the result will be an equation of third grade, we will have three possible solution for x^*. Given the Morris and Shin model implies that x^* must be inside the interval $(\theta - \epsilon, \theta + \varepsilon)$, I will consider simply the positive solution. Figure 4.5 shows the results of the numerical simulation. [136]On the vertical axis I report the values of x^* and on

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[135]$A(\pi)$ denote the event where the government abandons the currency peg if the speculators follow their best response strategy

[136]In the simulation, I employed values of ε bigger than 0.65. For any value of noise smaller than this value, the corresponding value of x^* would have been outside the interval $\theta - \epsilon, \theta + \varepsilon)$

the orizzontal axis the value of ε. An increase in the level of noise ε increases the resulting level of x^*. This is an important results because we know from Morris and Shin that markets will opt for an aggregate short sells if $x < x^*$ and hence, the arrival of more noisy information increases the probability of an attack. Interestingly, the numerical simulation reveals a threshold of 0.5 above which an increase in noise does not affect x^*.

Now, defined the relationship between ε and x^*, I turn to my attention to the question on whether these variations in noise affect θ^* given $x^*(\varepsilon)$. Morris and Shin defines θ^* such that the government does not defend the sovereign debt if and only if $\theta \leq \theta^*$. The location of θ^* is determined by the crossing of two lines: the $s(\theta, I_x)$ line which shows the proportion of speculators who decide to attack the sovereign debt at any given level of fundamentals, and the $a(\alpha)$ line which depicts the proportion of attackers who would make the government indifferent between defending or defaulting on the debt. I'm now able to measure the effect of a variation in noise on θ^* keeping into consideration that x^* is endogenous in ε. In order to find values of θ^*, I will cross $s(\theta, I_x)$ with a set of values a $a(\theta)$.

Note that $a(\theta)$, in Morris and Shin, represents the threshold whereby the government is indifferent in defending the peg. Hence, it is commonly (Leblang and Bernard, Leblang And Satahia) seen as not just a measure of strength of the government, but also as a focal point. In the model this implies that market actors will be relatively certain about the beliefs of other speculators regarding the state of fundamentals when a common focal point is present which, in this context, is a credible government.

I give to $a(\theta)$ three different values that express three different types of government. A "strong" government, a "medium" government and a "weak" government. This tripartite classification will allow me to test for any heterogeneity of changes on the probability of an attack across different "institutional settting". [137] Figure 4.6 shows the results which are then summarised in Table 4.3. When the signal x^* does depend on the level of noise ε, the effect of an increase of the noise on the probability of a currency attack is positive: an increase in noise increases the probability that the markets will decide to attack the sovereign debt. Nevertheless, varying the level of the "quality of the government" $a(\vartheta)$, the numerical simulation reveals that the same increase of noise does not lead to the same increase in ϑ^*.

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and therefore not interpretable.

[137] write down the different values of $a(\theta)$

As Table 4.3 shows, the worse the government is, the bigger is the effect of the increase in noise on ϑ^*. This is consistent with Leblang and Satyanath (2006) who interpret this parameter has a "focal point" which is crucial to reduce the uncertainty generate by noisy information or by political events which are very difficult to interpret.

Figure 4A.1: Information Signal and Noise
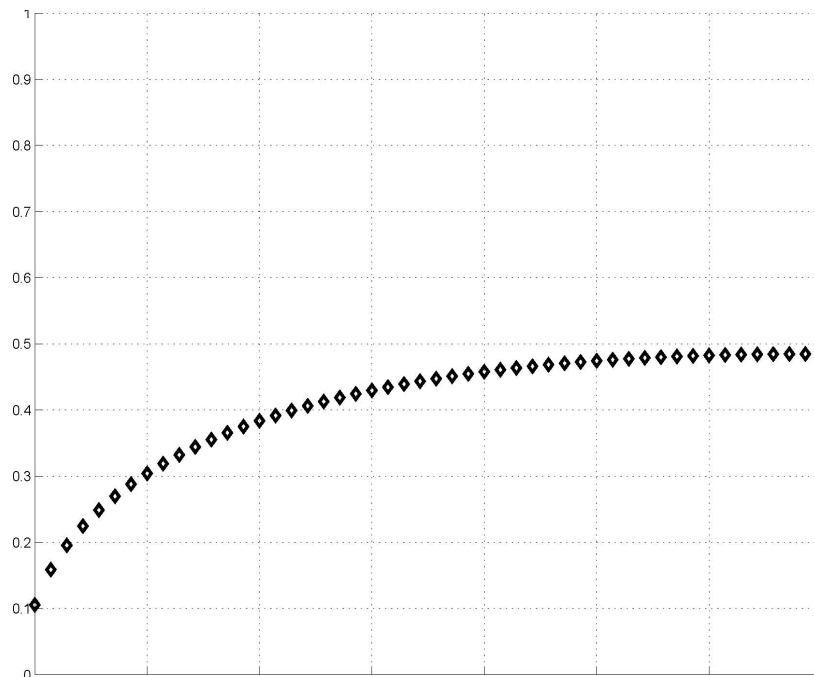
Note: Author's elaboration

Figure 4A.2: Information Signal and Noise and Cross Country Heterogeneity
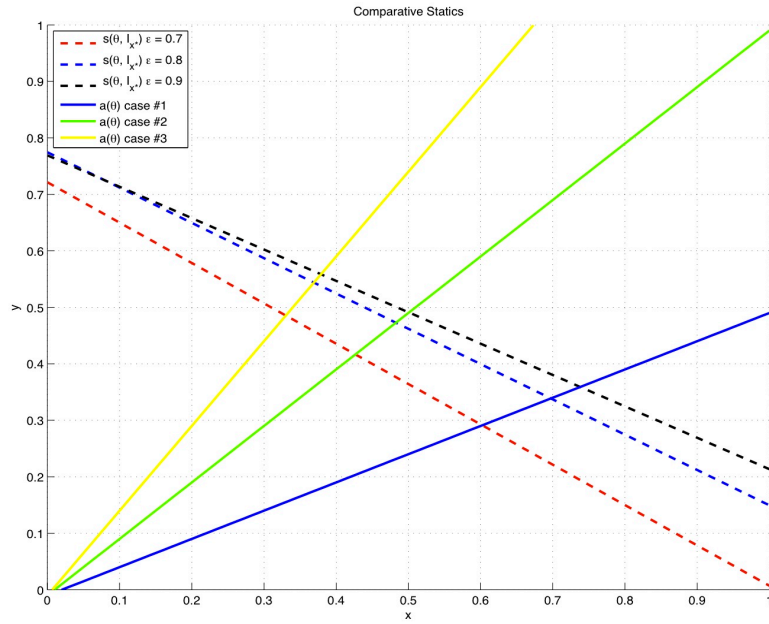
Note: Author's elaboration

Table 4A.1: Granger Causality Test

Equation	Excluded	F	df	df_r	Prob > F
Bond Yield Spain	News	4.4012	2	2671	0.0124
Bond Yield Spain	ALL	4.4012	2	2671	0.0124
News	Bond Yield Spain	4.227	2	2671	0.1047
News	ALL	4.227	2	2671	0.1047

Equation	Excluded	F	df	df_r	Prob > F |
Bond Yield Italy	News	3.9943	2	2671	0.0185
Bond Yield Italy	ALL	3.9943	2	2671	0.0185
News	Bond Yield Italy	1.332	2	2671	0.2641
News	ALL	1.332	2	2671	0.2641

Equation	Excluded	F	df	df_r	Prob > F |
Bond Yield Greece	News	1.1634	2	2671	0.0521
Bond Yield Greece	ALL	1.1634	2	2671	0.0521
News	Bond Yield Greece	2.9606	2	2671	0.3126
News	ALL	2.9606	2	2671	0.3126

Note: Wald Test Estimation for Granger Causality Test. Tables report results respectively for Spain,Italy and Greece. The top two lines of every table shows the results when x is used to explain y. The bottom two lines show the results for a model where the causality is inverted. Results show that for all the three countries the variables news is never predicted by lag values of bond yield. The p values in the bottom panel of the three tables suggest that we can reject the hypothesis that past values of bond yields predict news.

Table 4A.2: News and Bond Yields using Bloom et al EPU Index

VARIABLES	(1) Bond Yield_Italia	(2) Bond_Yield_Uk	(3) Bond_Yield_France	(4) Bond Yield_Spain
Bond Yield Italia (t-1)	1.149***			
	(0.107)			
Bond Yield Italia (t-2)	-0.344***			
	(0.104)			
Policy_Index_Italia	0.607***			
	(0.182)			
Bond Yield Uk (t-1)		0.964***		
		(0.132)		
Bond Yield Uk (t-2)		-0.126		
		(0.137)		
Policy_Index_Uk		0.00325		
		(0.0297)		
Bond Yield France (t-1)			0.902***	
			(0.228)	
Bond Yield France (t-2)			0.0127	
			(0.200)	
Policy_Index_France			0.0475	
			(0.0441)	
Bond Yield Spain (t-1)				1.116***
				(0.201)
Bond Yield Spain (t-2)				-0.148
				(0.197)
Policy_Index_Spain				0.182*
				(0.108)
Economic Fundamentals	yes	yes	yes	yes
Economic Fundamentals (t-n)	yes	yes	yes	yes
Vix Index CDS	yes	yes	yes	yes
Constant	-38.16**	6.335	-2.562	-10.21
	(17.85)	(6.596)	(7.761)	(17.71)
Observations	57	57	57	57
R-squared	0.954	0.740	0.867	0.958

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". The variables of interest are the Policy_Indexes and they represent the EPU index per country i at time t. . Estimates includes past values of Bond Yields (t-2) and are at the monthly level. Results are conditional to a full set of controls, fixed effect and time effect. The model is estimated with ARMA Time series regressions.

Table 4A.3: News and Bond Yields - Time Series Analysis - Correction for Stationarity

VARIABLES	(1) D_Bond Yield	(2) D_Bond Yield	(3) D_Bond Yield	(4) D_Bond Yield	(5) D_Bond Yield
d_News_Italy	0.00778***				
	(0.00247)				
d_News_Italy (t-1)	0.00403				
	(0.00273)				
d_News_Italy (t-2)	0.00156				
	(0.00247)				
d_News_France		0.00200			
		(0.0126)			
d_News_France (t-1)		0.00353			
		(0.0140)			
d_News_France (t-2)		0.00467			
		(0.0126)			
d_News_Greece			0.00301*		
			(0.00214)		
d_News_Greece(t-1)			-0.00209		
			(0.00329)		
d_News_Greece (t-2)			0.00946***		
			(0.00314)		
d_News_Germany				0.00254	
				(0.01000)	
d_News_Germany(t-1)				0.00607	
				(0.0114)	
d_News_Germany (t-2)				0.00417	
				(0.00999)	
d_News_Spain					0.00320**
					(0.00244)
d_News_Spain(t-1)					0.000256
					(0.00497)
d_News_Spain (t-2)					-0.00290
					(0.00444)
Bond Yield (t-n)	yes	yes	yes	yes	yes
Vix index	yes	yes	yes	yes	yes
Economic Controls	yes	yes	yes	yes	yes
Economic Controls (t-n)	yes	yes	yes	yes	yes
Constant	-0.000566	-0.000567	-0.000564	-0.000567	-0.000567
	(0.00173)	(0.00173)	(0.00173)	(0.00173)	(0.00173)
Observations	13,365	13,365	13,365	13,365	13,365
R-squared	0.011	0.010	0.011	0.010	0.010
Number of country	5	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". Total News represent the total amount of news (count) published at time t. Estimates includes past values of Bond Yields (t-2) and past values of Total News. Results are conditional to a full set of controls, fixed effect and time effect. The model is estimated with ARMA Time series regressions. All variables are here expressed in *first differences.*

Table 4A.4: News and Bond Yields - Dynamic Panel Analysis - Correction for Stationarity

VARIABLES	(1) D_Bond Yield	(2) D_Bond Yield	(3) D_Bond Yield
D_News	0.00429***	0.00572***	0.00376*
	(0.00155)	(0.00166)	(0.00193)
D_Debt (as % GDP)	0.00975**	0.00935**	0.00590
	(0.00409)	(0.00407)	(0.00483)
D_Deficit	0.00300	0.00166	0.000548
	(0.0178)	(0.0177)	(0.0200)
D_CurrentAccount	-0.0483*	-0.0465*	-0.0467
	(0.0259)	(0.0257)	(0.0286)
D_Bond Yield (t-1)		0.0890***	0.0857***
		(0.00864)	(0.00966)
D_Bond Yield (t-2)		0.0143*	0.0162*
		(0.00867)	(0.00969)
D_Bond Yield (t-3)		-0.0302***	-0.0258***
		(0.00865)	(0.00967)
D_News (t-1)		0.00333	0.00475*
		(0.00234)	(0.00282)
D_News (t-2)		0.00998***	0.0124***
		(0.00241)	(0.00295)
D_News (t-3)		0.0111***	0.0156***
Country Dummies	yes	yes	yes
Time Dummies	no	no	yes
Time Trends	no	no	yes
Constant	-0.000625	-0.000571	-0.0766
	(0.00173)	(0.00172)	(0.0875)
Observations	13,380	13,365	13,365
R-squared	0.001	0.013	0.238
Number of country	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". The main variable is News which represents the amount of news published at time t in country i. Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. All variables are here expressed in *first differences.*

Table 4A.5: Dynamic Panel -Restricted Sample

VARIABLES	(1) Bond Yield	(2) Bond Yield	(3) Bond Yield	(4) Bond Yield
News	0.00483**	0.00397**	0.00394**	0.00114*
	(0.00197)	(0.00199)	(0.00199)	(0.00100)
price (t-1)	1.087***	1.086***	1.085***	1.083***
	(0.0101)	(0.0101)	(0.0101)	(0.0113)
price (t-2)	-0.0784***	-0.0784***	-0.0778***	-0.0719***
	(0.0149)	(0.0149)	(0.0149)	(0.0167)
price (t-3)	-0.00313	-0.00349	-0.00348	0.000447
	(0.00286)	(0.00287)	(0.00287)	(0.00349)
news (t-1)	0.00596**	0.00541*	0.00539*	0.00658*
	(0.00276)	(0.00278)	(0.00278)	(0.00340)
news (t-2)		0.00154***	0.00154***	-0.00323
		(0.000444)	(0.000444)	(0.0146)
debt		0.000101	0.00890*	0.00580
		(0.000232)	(0.00500)	(0.00574)
deficit		9.06e-05	0.00667	-0.000160
		(0.00177)	(0.0246)	(0.0278)
Debt (t-1)			-0.00641	-0.00539
			(0.00706)	(0.00812)
Debt (t-2)			-0.00240	-0.000512
			(0.00500)	(0.00574)
Deficit (t-1)			0.00867	0.0122
			(0.0348)	(0.0392)
Deficit (t-2)			-0.0152	-0.0129
			(0.0246)	(0.0278)
Country Dummies	Yes	Yes	Yes	Yes
Time Dummies	No	No	No	yes
Time Trends	No	No	No	yes
	(0.00419)	(0.0319)	(0.0319)	(0.365)
Observations	9,740	9,740	9,740	9,740
R-squared	0.996	0.996	0.996	0.997
Number of country	5	5	5	5

Note: Cluster standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1. Dependent variables are the bond yield of "peripheral countries". The main variable is News which represents the amount of news published at time t in country i. Estimates included past values of bond yields (t-2), fixed effects, time effects and linear time trends. Column 1 reports the OLS estimation. In Column 2 countries dummies and past values of dependent and indipendent variables are included. In Column 3 I include a ful set of control variables. In column 4 I include the past values of the control variables. In Column 5 I include linear time trends and time fiexed effects. The model is estimated with dynamic fixed effect regressions. Sample is restricted to January 2009 and May 2010-

5   Conclusion

This thesis studies, theoretically and empirically, distortions and inefficiencies that impede the correct functioning of democratic systems. By focusing on organised crime and media bias, this thesis has specifically addressed the following research questions:

1. *What is the impact of organised crime on the provision of public goods and on the allocation of public resources?*

2. *How strongly can media bias affect public opinion?*

3. *What is the role of information in fostering coordination?*

These questions are examined in three different papers that constitute the chapters of this thesis. Taken together the answers to the above questions suggest that both media bias and organised crime represent severe risks to the democratic stability of any country. In order to be tackled, both of these phenomena have to be properly measured and analysed. This is, ultimately, the overall aim of this thesis.

In the first Chapter, I have presented an analysis of the consequences of the collusion between criminal organisations and politicians over the allocation of public resources and the collection of fiscal revenues. By using sophisticated econometrics strategies, the first Chapter not just operationalised a new way to measure organised crime presence, but also shed light on the consequent impact on public policy decisions. The collusion between criminal organisations and local politicians does not have an effect on total spending, but it does affect the allocation of public resources towards sectors of specific interests for criminal organisations.

In Chapters 3 and 4, I have turned my attention to the second important theme of this thesis: media bias and persuasive communication. Chapter 3 has presented a study of the impact of information on individuals' perceptions of salient topics in political debate, and how this might affect their ultimate voting decisions. We showed that, when individuals are less exposed to biased news, they appear to be less concerned about crime. In Chapter 4 I have investigated the impact of information on perceptions but in a very different setting. I study the case of the European Sovereign Crisis and I test whether different amounts and types of news media might be correlated with the outbreak of the crisis. In this conclusion, I

will summarise the findings of each Chapter and broaden my discussion of the implications of this research. I conclude by commenting on the limitations of the analyses, and outline a number of potential avenues for further work.

Substantive contributions and further implications

The three chapters of this thesis aim to innovate and contribute to the academic literature on organised crime and media bias. The first and most important contribution borne out of this PhD is a new conceptualisation in the study of the above phenomena. Second, I build my analysis of a set of newly-collected datasets which will constitute a public good for all the researchers interested in the study of these topics. The chapters of this thesis are structured as stand-alone papers and therefore they each provide their own share of new results for the research community.

Chapter 2 has provided three significant contributions to the literature. First is a new conceptualisation and measurement of the relationship between criminal organisations and politicians. Most of the political economy literature has measured the presence and intensity of mafia activity by employing proxies such as the number of mafia-related crimes, murders, and violent attacks (Alesina et al., 2016; Daniele and Marani, 2011; Olivieri and Sberna, 2014; Barone and Narciso, 2015), historical or geographical indicators (Bandiera, 2003; Dimico et al., 2012; De Feo and De Luca, 2013; Buonanno et al., 2015; Buonanno et al., 2016), or artificial constructs for counterfactual analysis (Pinotti, 2015). These measures aim to capture the impact of organized crime in a broad sense, encompassing the entire range of possible actions perpetrated by such criminal groups. They do not, however, take into consideration an important fact: organised crime, particularly in developed countries, has evolved over time, progressively reducing the use of violence and becoming increasingly integrated within the boundaries of democratic society, to the point that mafia activities may no longer even be recognisable as criminal enterprises. As stated by Schelling (1971), *"burglars may operate in the underworld, but they seek to govern the real world"*.[138] While in conflict with the State, criminal organisations do not wish to displace the latter but rather to co-exist with it through the creation of a network based on mutual interests. Criminal organisations use violence only as a last resort when previous strategies

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[138]Choice and Consequences. Thomas Schelling, p. 179

have failed. By studying the case of Italy, Chapter 2 has introduced a new non-violent base measure of organised crime presence: its "infiltration" within local governments. We have then compared municipal governments with and without infiltration before and after such infiltration has occurred. The second contribution of Chapter 2 is the use of a highly-disaggregated dataset through which we are able to provide the first rigorous evidence of the impact of the collusion between organised crime and local politics on the allocation of public resources and on the collection of fiscal revenues. Difference–in–differences estimates reveal that infiltrated local governments not only spend more on average on construction and waste management and less on police enforcement but also collect fewer fiscal revenues. The third substantive contribution of Chapter 2 is an analysis of key elements of local elections associated with government-mafia collusion. In particular, Regression Discontinuity estimates (RDD) provide the first causal evidence of the relationship between organised crime and politics: more precisely, they show that infiltrations are more likely to occur when right-wing parties win local elections.

Taken together, these findings suggest that the nature of the relationship between the mafia and the State has changed: rather than representing an enemy to fight, the government has instead become an opportunity to exploit. In studying this phenomenon, researchers have to take this into account in order to identify the real consequences of this distortion and how best to tackle it.

In Chapters 3 and 4 of this dissertation I have moved to an analysis of media bias and persuasive communication. Chapter 3 fits into a growing literature that has examined the impact of news media on political outcomes. Most of the studies (Della Vigna and Kaplan, 2007; Enikopolov et al., 2011; Durante and Knight, 2012) exploited a shock in media provision to study the effect on electoral outcomes. Yet the mechanisms through which news affects individual voting decisions are still unclear. We contribute to these studies by looking at attitudes and perceptions of politically salient topics. More precisely, the first significant contribution of Chapter 3 is to provide the first causal evidence of the impact of news media on individual perceptions. In doing so, we shed light on one of the possible mechanisms through which the media might ultimately affect voting outcomes. We overcome the standard problem of identification by exploiting the staggered introduction of the digital TV signal across Italian regions. Chapter 3 has used a Difference –in- Differences strategy to compare regions with access to

the new TV technology to regions still exposed to the old channels. We find that the increase in the number of available TV channels - and the consequent lower exposure to news broadcasts by partisan outlets - led individuals to revise downward their perceptions of crime. The estimated negative effects of crime concern are larger for individuals who spend more time watching television while using less frequently other media sources such as the internet, radio and newspapers. The second significant contribution of Chapter 3 is that, by exploiting unique viewership and news content data, we are able to make the first step toward a measurement of the elasticity of individuals' beliefs to specific news reporting intensity. We then show that crime is a salient topic of the political debate and, as a consequence, is likely to be one of the drivers of voters' decisions. We indeed provide evidence that high concerns about crime are correlated with support for centre right coalitions. Then, using survey data we provide descriptive evidence to show that 2.4% of individuals older than 51 would have changed their vote from centre right to centre left once exposed to a reduced amount of crime news.

The study of the role of the media in affecting individuals' opinions is central to my thesis. This is reflected in Chapter 4 where I have investigated the role of news in affecting investors' beliefs and in anticipating the beginning of the European Sovereign Debt Crisis. Chapter 4 has introduced a series of contributions which range from the provision of a newly collected dataset to a new approach to the analysis of the European Sovereign Debt Crisis. Chapter 4 attempts to provide a rigorous explanation of why the crisis started when it did. In doing so it argues that, in order to understand the onset of the crisis, there is a need to go beyond a mere analysis of economic fundamentals. I build on the existing literature on the sovereign crisis, by demonstrating that a significant part of the surge of government bond spreads in the Eurozone was disconnected from underlying changes in a number of economic indicators. I then propose a new approach by studying whether the amount and the type of news related to sovereign debt might have played a role in the triggering of the crisis by increasing the level of uncertainty among investors. Testing these claims empirically is not trivial because there is no existing attempt to measure news media that might be relevant for financial investors. Hence, Chapter 4 of the dissertation has proposed a unique and newly collected dataset on news from the main media outlets in a set of 5 European Countries from September 2007 to September 2014. I have mostly focused on political information which, by its nature, is not immediately quantifiable, and

more subjective and difficult to interpret. I defined political information as all the news about political stories/events related to the country's sovereign debt. Using different estimation techniques, which range from time series to dynamic panel estimations, my estimates show that the amount of news fosters coordination between investors and eventually leads to an increase in bond prices. The effect is stronger if the tone of the news is negative. Results also show interesting cross country heterogeneity of the results.

The empirical findings presented in this thesis are based on specific case studies. Chapters 2 and 3 focused on Italy whereas Chapter 4 presented a cross country study that looked at a set of European Countries. As argued in the introduction and, in each of the chapters, making credible inferences requires a careful choice of a case study and of an identification strategy. Nevertheless, we might be worried about the external validity of these results and therefore their applicability and relevance to other contexts. In Chapter 2, we provide evidence of the importance of the object under study for a variety of countries. Particularly in developed countries, the nature of the relationship between organised crime and politics has evolved and it is not more complicated than it used to be. As discussed in Chapter 2, illegal earnings are now heavily re-invested in the legitimate economies in the United States, Spain, Japan and Russia. Hence, in this thesis I argue that the choice of Italy as a case study does not undermine the relevance of the results for similar developed countries with comparable institutional settings. Chapter 3 has continued in the study of Italian case by investigating the influence of news media on individuals' beliefs and perceptions about crime. The reasons for choosing Italy are twofold. First, for over a decade, Italy presented an incredibly concentrated television market with a tendency to over-report crime-related news. Second, to identify the causal effect of biased news on individual perceptions we rely on the peculiar implementation of a television reform which has been introduced across Italian Regions at different points in time. However, similarly to Chapter 2, the external validity of the results is not limited to Italy. The mismatch between perceptions and reality is extremely relevant and applicable to a number of different countries (Della Vigna and Kaplan,, 2007; Enikopolov et al., 2011; Durante and Knight, 2012). Finally, Chapter 4 has studied the role of information, but it has done so in a cross country setting which has inevitably forced me to trade precision in the identification for more external validity given that I examine five different countries.

In conclusion, this thesis has offered different angles and approaches to study crucial topics such as organised crime and media bias. Moreover, it has introduced a number of quantitative measures derived from newly collected datasets and from new observational data which can constitute a public good for all the researchers with an interest in working on these important themes. The papers in this thesis have offered a small contribution to a broader and important research agenda, and represent the very first step for further theoretical and empirical research on organised crime and media bias.

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