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Emilie Sartre

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Thèse de doctorat



# Essais Empiriques en Economie Publique et Politique

Thèse de doctorat de l'Institut Polytechnique de Paris  
préparée à l'École Nationale de la Statistique et de l'Administration Economique

École doctorale n°626 de l'Institut Polytechnique de Paris (ED IP Paris)  
Spécialité de doctorat: Sciences économiques

Thèse présentée et soutenue à Palaiseau, le 27 Septembre 2021, par

**EMILIE SARTRE**

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Edouard Challe Professeur d'Economie, Institut Universitaire Européen	Co-directeur de thèse
Vincent Pons Professeur associé, Harvard Business School, NBER, J-PAL	Invité

# Empirical Essays on Public and Political economy

Ph.D. Dissertation submitted to Institut Polytechnique de Paris  
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# Summary

This PhD dissertation lies at the intersection of public and political economy. Based on empirical studies in France and in the U.S., this dissertation explores some challenges faced by Western democracies in the wake of the twenty-first century: high-level of public indebtedness, populism and partisan segregation.

The first two chapters explore the political and economic consequences of exposure to extreme financial innovation in the public sector. Chapter 1 provides first evidence on the effects of local public debt shocks on economic activity for highly indebted local governments. Exploiting two exogenous shocks on public debt that affect French municipalities indebted with CHF-toxic loans, I am able to disentangle the impact of an information shock on public debt from the effect of an actual debt increase. I find that negative press coverage on local public debt is sufficient to impact – at least temporarily – the intensive margin. Compared to information shocks, actual increase in local public debt burden can trigger persistent consequences on local economic activity, by increasing plant closures in highly-indebted municipalities. Local public debt appears as an important driver of economic activity via the expectation of (inevitable) municipal budget restrictions (i.e., a rise in local business taxation or a decrease in municipal expenditure). Chapter 2 is joint with Gianmarco Daniele and Paul Vertier. It considers the disclosure of public financial scandals as a new mechanism for the rise of populism. Combining administrative data with collected datasets, it exploits the Toxic Loan scandal, which was revealed in 2011 as a case of public-finance mismanagement. Using an instrumental variable as main identification strategy, we find in the subsequent municipal elections that i) both right-wing and left-wing populist parties are entering in municipalities involved in the scandal and experienced as a result a rise in their vote shares, ii) public financial scandals are sufficient to fuel the entry of populist parties - independently from any adverse economic shocks, iii) entries of populist parties are reinforced by cultural and economic factors, meaning that this new mechanism can be viewed as complementary to usual explanations for the rise of populism.

The third chapter is not related to populism per se but investigates how political demand evolves over time. In the U.S., partisan segregation has been linked with the rise of political polarization. Chapter 3 is joint with Jacob Brown, Enrico Cantoni, Ryan Enos and Vincent Pons. To the best of our knowledge, we are the first to use individual-panel data to test whether or not partisan segregation has actually been increasing over

the last decade. Exploring two datasets, we find robust evidence that partisan segregation has been overall increasing between 2008 and 2020 – at the congressional district level, at the county level and even within smaller geographic units. Importantly, we show that partisan segregation is not more likely in rural areas than in urban areas but reinforces the picture of two divided Americas: with a rise of partisan segregation in favor of Republicans in rural areas and in favor of Democrats in urban areas. Finally, this last chapter contributes to the literature by decomposing the rise of partisan segregation into multiple factors. We show that the rise of partisan segregation is mainly driven by change in the composition of the electorate and in particular, by generational change in Democratic-leaning places. In contrast, in Republican-leaning places, partisan segregation is fueled by change in preferences and particularly by change in partisan affiliation among Democrats and Republicans.

**Keywords:** Populism, Toxic Loan, Partisan Segregation, Public debt, Economic activity, Financial innovation

# Résumé

Cette thèse de doctorat est à l'intersection entre l'économie publique et politique. Fondée à partir d'une approche empirique, elle explore plusieurs problématiques touchant les démocraties occidentales en ce début de XXI<sup>e</sup> siècle. Elle se concentre en particulier sur l'augmentation de la dette publique, le populisme ou encore la ségrégation partisane.

Les deux premiers chapitres apportent un regard nouveau sur les conséquences politiques et économiques de l'exposition du secteur public à l'innovation financière. Le premier chapitre regarde les effets de chocs d'endettement locaux sur l'activité économique, au sein de gouvernements locaux fortement contraints budgétairement. Durant les années 2000, plus de 1500 municipalités françaises ont contracté des prêts structurés avec la banque DEXIA. De par la structure de ces contrats, les taux d'intérêt sont fixes durant les premières années, avant de devenir indexés sur les variations d'indices financiers au cours des années suivantes, pour en moyenne 19 ans. Certaines de ces municipalités étaient exposées aux variations du Franc Suisse. En 2011, la révélation de l'existence des prêts structurés de DEXIA a conduit le grand public à s'intéresser particulièrement aux emprunts soumis au Franc Suisse. Ces derniers étaient alors présentés comme davantage risqués. Ce premier choc en 2011 apparaît comme essentiellement informationnel: les municipalités endettées sur le Franc Suisse ont une dette présentée comme particulièrement risquée, y compris parmi les autres municipalités ayant contracté d'autres prêts structurés. Pour autant, leur niveau d'endettement n'augmente pas davantage que celui des municipalités endettées sur d'autres indices financiers. En 2015, un autre événement vient également frapper les municipalités exposées au Franc Suisse. Le Franc Suisse subit alors une forte appréciation à la suite de la décision, prise par la Banque Nationale de Suisse, de brutalement lever son taux plancher. Cette forte appréciation conduit à une augmentation soudaine et non anticipée de l'endettement des municipalités soumises au Franc Suisse. En se concentrant sur les conséquences économiques de ces deux événements, il apparaît qu'un choc sur l'endettement public local affecte défavorablement l'activité économique dans les municipalités concernées. En particulier, une couverture médiatique défavorable sur l'endettement public local est suffisante pour entraîner une légère diminution du nombre d'heures travaillées et de la masse salariale, tout en laissant inchangé le nombre d'emplois. Par contre, une montée réelle de l'endettement

local engendre des effets importants et persistants sur l'activité économique locale, notamment via l'augmentation des fermetures d'établissements. Dans les municipalités concernées, les établissements en difficulté anticipent une détérioration future (inévitabile) des conditions économiques, soit via l'augmentation de la taxation locale qui touche directement les entreprises, soit via la diminution des dépenses municipales. Notons toutefois que l'augmentation de l'endettement local affecte négativement l'activité économique des établissements implantés dans ces localités sans que soit pour autant observé une dégradation actuelle des conditions d'activité économique. L'endettement public local envoie donc un signal fort d'attractivité économique, et peut conduire, tout particulièrement, à une dégradation significative de l'activité économique en présence d'un endettement public local élevé.

Le second chapitre est co-écrit avec Gianmarco Daniele et Paul Vertier. Il prend appui sur la montée du populisme observée dans plusieurs pays européens à la suite de la crise financière de 2008. La littérature scientifique a montré que les crises financières sont en mesure d'engendrer une augmentation du vote populiste. Cependant, jusqu'à aujourd'hui, les mécanismes restent plus ou moins méconnus. Comment les crises financières propulsent la montée du populisme? Peuvent-elles favoriser le vote populiste sans qu'il y ait pour autant une dégradation de l'activité économique? Ce chapitre propose de considérer la révélation de scandales financiers comme un nouveau mécanisme entre populisme et crises financières. En effet, les crises financières n'apportent pas qu'une dégradation des conditions d'activité économique. Elles sont souvent perçues comme symptomatiques des dysfonctionnements du monde financier, entraînant avec elles un flot d'informations défavorables sur les banques, les élites financières et le monde politique – plus ou moins impliqués dans la mauvaise gestion des finances. Ces dysfonctionnements du monde de la finance et des élites qui l'entourent peuvent être au cœur de la rhétorique populiste. Cette dernière consiste en effet à séparer les élites, perçues comme corrompues, du reste du peuple, considéré comme moralement pur. A l'aide de données administratives et collectées, ce chapitre prend également appui sur l'affaire des prêts structurés de Dexia, révélée en 2011. En utilisant une stratégie d'identification par variable instrumentale, nous observons aux élections municipales de 2014 les résultats suivants: i) une candidature populiste de droite, comme de gauche, est plus probable dans les municipalités concernées – ce qui entraîne une augmentation du vote populiste, ii) cette affaire fut suffisante pour propulser les partis populistes – indépendamment de chocs économiques adverses, iii) l'entrée des partis populistes est renforcée par les facteurs usuels de la montée du populisme - ce qui fait des scandales financiers un mécanisme distinct mais complémentaire à la littérature sur le populisme. La révélation des dysfonctionnements de

la sphère financière apparaît particulièrement propice à la montée du vote populiste. Contrairement aux autres formations politiques, les partis populistes sont plus à même d'utiliser la révélation de scandales financiers comme une arme politique – leur permettant d'étendre leur rhétorique populiste au sein du jeu politique.

Le troisième chapitre ne porte pas directement sur le populisme. Il se place néanmoins du côté de la demande politique pour étudier son évolution au cours du temps. Dans plusieurs pays, le populisme est associé à la montée des extrémismes et de la polarisation politique. Ce dernier chapitre se concentre sur l'évolution de la demande politique au cours du temps, dans un monde qui tend à être polarisé. Il est co-écrit avec Jacob Brown, Enrico Cantoni, Ryan Enos et Vincent Pons. A notre connaissance, il est le premier à utiliser des données de panel au niveau individuel pour tester la montée de la ségrégation partisane aux Etats-Unis au cours de la dernière décennie. Deux questions de recherche sont au cœur de cette étude. La première, est-ce que les Démocrates tendent de moins en moins à se mélanger avec les Républicains en vivant dans des endroits géographiquement séparés? Si oui, quels sont les facteurs contribuant à l'augmentation de la ségrégation partisane? A partir de deux sources de données quasi-exhaustives sur l'ensemble de l'électorat américain, nous observons une augmentation de la ségrégation partisane entre 2008 et 2020 – aussi bien au niveau des districts congressionnels, qu'à celui des comtés ou encore à celui d'unités géographiques inférieures. Cela signifie que sur la dernière décennie, l'électorat américain est de plus en plus divisé au sein de l'espace géographique. A l'intérieur même des mêmes quartiers résidentiels, les Démocrates tendent à vivre séparément des Républicains. Par conséquent, nous constatons une augmentation de la ségrégation partisane à travers et à l'intérieur même des unités géographiques des Etats-Unis. Une vision très répandue est que l'Amérique est profondément divisée entre ses grands centres urbains et sa ruralité. Nous observons que l'augmentation de la ségrégation partisane n'apparaît pas davantage dans les zones rurales que dans les zones urbaines. Toutefois, l'augmentation de la ségrégation partisane ne peut que renforcer la vision de deux Amériques divisées. Elle est en effet en faveur des Démocrates dans les zones urbaines et à leur détriment dans les zones rurales. Il existe plusieurs explications potentielles à ce phénomène : telles que la mobilité de l'électorat au sein des Etats-Unis, le renouvellement des générations, les changements d'affiliation partisane ou encore les changements d'inscription aux registres électoraux. A l'aide des données, nous sommes en mesure de suivre les individus au cours du temps et de percevoir quels sont les facteurs qui contribuent le plus à l'augmentation de la ségrégation partisane. Dans les zones à tendance républicaine, nous trouvons que la ségrégation partisane s'accompagne d'un changement de préférences au sein de l'électorat. Nous obser-

vons notamment une part croissante de Démocrates devenant Républicains dans des aires géographiques où les Républicains sont déjà majoritaires. Dans les zones à tendance démocrate, des changements de composition au sein de l'électorat sont au contraire à l'œuvre. En particulier, nous remarquons une dynamique intergénérationnelle prononcée: les jeunes générations atteignant la majorité politique ont plus tendance à être démocrates et contribuent ainsi à la montée de la ségrégation partisane.

**Mots clés:** Populisme, Emprunts Toxiques, Ségrégation partisane, Dette publique, Activité économique, Innovation financière

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# General Introduction

This PhD dissertation lies at the intersection between the fields of Public Economics and Political Economy. Research in public economics analyzes how government policies affect the economy, and, how they should be designed to reach their goals efficiently. Literature in political economy focuses, on the other hand, on the interplay between political forces and the economy, analyzing the determinants and the consequences of political actors' behavior.

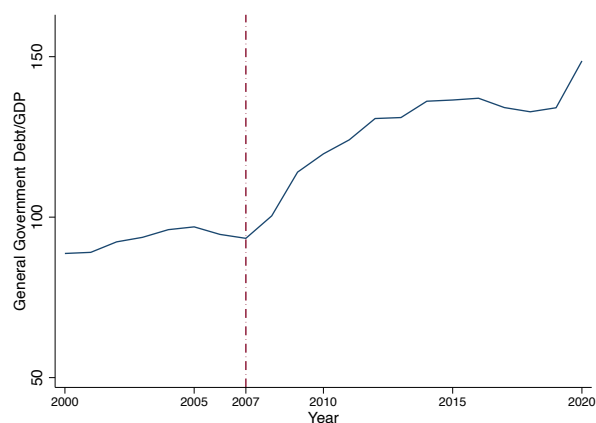
This dissertation uses the tools of both fields to improve our understanding on some challenges faced by Western democracies in the wake of the twenty-first century, such as the high-level of public indebtedness, the rise of populism and the existence of partisan segregation. The first two chapters underline the political-economic aftermath of the Global financial crisis on the public sector, focusing on the increase in public indebtedness and on the rise of populist extreme parties. In particular, it explores the political and economic consequences of exposure to extreme financial innovation in the public sector. The third chapter focuses instead on changes in electoral demand. It studies geographic partisan segregation as one potential driver of the rise of extremism via diminished exposure to competing ideas.

In the general introduction, I first provide the theoretical motivations for studying the political-economic aftermath of the global financial crisis on the public sector, insisting on the relationship between financial crises, public debt and populism. I then outline the determinants and consequences of geographic partisan segregation. The second part of the introduction summarizes the different chapters and details their contribution to the literature.

## Financial crisis and Public debt

Following the global financial crisis, many developed countries have experienced a sharp increase in public debt. Figure 1 displays the average evolution of general government debt expressed in percentage of GDP among G7 countries. The increase has been particularly strong since 2007, going from 93% in 2007 to 148% on average in 2021. It appears even reinforced by the COVID-19 pandemic. In 2021, nearly 1/3 of the OECD countries have a debt ratio above 100%.

Figure 1: Ratio Debt/GDP of G7 countries



Data source: OECD Database - Between 2000 and 2021.

During the last financial crisis, public debt has been particularly useful to fiscally support the economy at a time of bank failures and mass lay-offs. However, its persistent growth has raised concerns regarding its fiscal sustainability, both in the political sphere and in the academia. Since March 2012, the European Fiscal Compact has been used to limit the size of budget deficits run by European countries. This political decision was in line with [Reinhart and Rogoff \(2010\)](#). To prevent any default risk, they suggest a threshold of 90% of the debt-to-GDP ratio under which countries should remain. The underlying assumption was that large budget deficits can be harmful to economic growth.

This view has been however long debated in the scientific literature. Most theoretical models have been divided between the Keynesian and the Neoclassical approaches. In Keynesian models (like the IS-LM framework), fiscal restrictions have a direct negative effect on GDP via aggregate demand and an indirect effect via the “crowding in” of private expenditure, through lower interest rates. Overall, they predict a net negative effect of fiscal restrictions on economic activity. The traditional neoclassical approach instead underlines a small or null effect of fiscal expansions. An increase in public expenditure usually “crowds out” private expenditure via rise in interest rates. Such models are particularly well known for the “Ricardian Equivalence” ([Barro 1979, 1989a,b](#)). Based on the rational behavior of economic agents and the permanent income hypothesis, any future debt burden should be anticipated, leaving investment and economic growth unaffected.

Since then, several theoretical frameworks have been developed. [Krugman \(1988\)](#) introduces the concept of debt overhang describing the relationship between the

sovereign debt and the national product with an inverted U-shape. [Leiderman and Razin \(1988\)](#) test Ricardian neutrality using an intertemporal stochastic model. Recent studies focus on the channels through which public debt can negatively affect economic activity ([Aizenman, Kletzer, and Pinto 2007](#); [Corsetti et al. 2013](#)).

Despite this rich literature, theoretical evidence on the debt-growth relationship remain mixed and empirical research, conducted on cross-country comparison, is not particularly conclusive ([Tamborini and Tomaselli 2020](#)). How does public debt affect economic activity? Should we care about some threshold of the debt-GDP ratio? For now, there is no one-way conclusion on this subject.

For policy-makers, the lack of definitive answers may be particularly crucial. During the Great Recession, many austerity measures have been supported by empirical papers promoting the existence of “Non-Keynesian effects of fiscal policy”. Using panel data at the country level, this strand of the literature finds that fiscal consolidations are not necessarily harmful for economic growth and may have, on the contrary, a positive effect on economic activity ([Giavazzi and Pagano 1990](#); [Alesina et al. 1995](#); [Alesina and Ardagna 2010, 2013](#)). Others papers underline instead negative effects of fiscal consolidation on economic growth ([Guajardo, Leigh, and Pescatori 2014](#); [Jorda and Taylor 2016](#); [in 't Veld 2013](#); [Beetsma et al. 2015](#)) and, the existence of very large fiscal multipliers ([Hebous 2011](#); [Gechert, Hallett, and Rannenberg 2016](#)).

Surprisingly, local government debt and its economic implications have been so far neglected in the scientific literature. Over the last decades, local public debt has been yet increasing. In the U.S., the level of local debt securities and loans is equal to \$8.30 trillion in 2021 and is nearly multiplied by eight between 1990 and 2021. In European countries, local government debt represents a total amount of €867.4 billion. Instead of relying on cross-country comparisons, empirical studies at the local level can easily identify exogenous public debt shocks, control for country characteristics and deal with a large number of observations. Chapter 1 tries to fill this gap by assessing the causal economic impact of local public debt shocks in highly-indebted local governments. By doing so, it distinguishes for the first time between information shock on public debt and actual increase in debt burden.

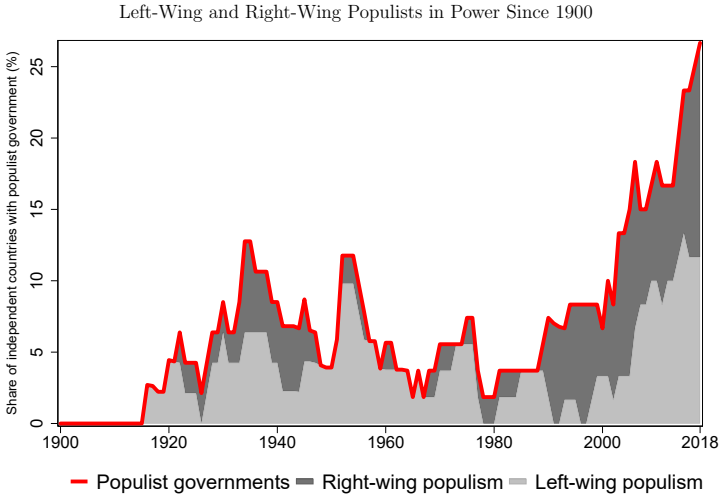
## **Financial crisis and Populism**

In the aftermath of the Global financial crisis, many countries have not only experienced an increase in public debt but also a rise of populism. Since 2009, a large number of populist candidates have gained power in European countries and in the U.S.

- such as Victor Orban in Hungary, SYRIZA and Independent Greeks in Greece, Law and Justice in Poland, Trump in the U.S., and Lega Nord and the Five Star Movement in Italy. The term “populist” includes a large variety of public policies. It can be defined as a “thin-centered” ideology that divides society between two groups: the “pure people” and the “corrupt elite” (Mudde 2004, 2007; Mudde and Kaltwasser 2017). In other words, populist candidates are characterized by anti-pluralism and anti-elitism.

Figure 2 features the share of populist governments among 60 independent countries which represent more than 90% of global GDP (Funke, Schularick, and Trebesch 2020). The recent increase in populist parties is particularly strong, with 16 countries run by populists in 2018 (i.e., seven by the left-wing populist party and nine by the right-wing populist party). In that sense, the Great Recession recalls the Great Depression that took place during the 1930’s. In 1929, there were 24 fully democratic countries in Europe but only 11 in 1939 (Capoccia 2005). The rise of right-wing populist parties was strongly correlated with the Great Depression and young democracies were the most affected (de Bromhead, Eichengreen, and O’Rourke 2013). Doerr et al. (2020) show that the rise of the Nazi party was fueled in Germany by the 1931 banking crisis as it amplified the Great Depression and allowed Nazis to blame Jews.

Figure 2: Rise of populist governments over time



Source: Funke, Schularick, and Trebesch (2020), Figure 1. The sample comprises 60 large countries.

Over the past 140 years, many far-right populist movements have risen after financial crises (Funke, Schularick, and Trebesch 2016). Yet, the mechanisms between financial crises and populism are still unclear (Guriev and Papaioannou 2020). How do financial crises translate into populism? Are financial crises sufficient to explain the rise of populism? Do populist parties strategically enter in political spheres at time of financial crises? Today it remains difficult to disentangle the impact of financial

crises per se from the effects of austerity policies and economic deprivation on populism (Fetzer and Schwarz 2019; Fetzer, Sen, and Souza 2019; Bó et al. 2018). Chapter 2 considers financial scandals as a new mechanism which enhances the entry of far-right and far-left populist parties, independently from adverse economic conditions.

### **Geographic Partisan segregation**

The rise of populism reveals a profound political divide among society and is at the heart of a trust crisis (Algan et al. 2017). Can this divide be translated across space? Could geographic partisan segregation and populism reinforce each other? There is little systematic evidence on the actual trend in geographic partisan segregation (Fiorina 2005; Glaeser and Ward 2006; Abrams and Fiorina 2012; Sussell 2013; Kaplan, Spenkuch, and Sullivan 2021).

Geographic segregation has yet strong consequences on social behaviors. In psychology, the contact theory demonstrates that social interactions between groups favor positive emotions and reduce anxiety or threat (Allport 1954; Brown and Hewstone 2005; Moody 2001; Pettigrew 1961; Pettigrew and Tropp 2012). Geographic segregation can be linked indeed with negative attitudes and stereotypes. Through interviews conducted in a newly desegregated beach in South Africa, Durrheim and Dixon (2005) observe that the beach was still spatially segregated, with black and white beachgoers grouping in different places. On the one hand, the lack of social contact was interpreted by black beachgoers as an attitude of racism. On the other hand, white beachgoers still consider black beachgoers as “dangerous” and prefer avoidance. Henze (2001), Besharati and Foster (2013) and Spitz (2015) confirm that geographic segregation reinforces negative beliefs and stereotypes. It also increases ingroup identification and perception of threat (Turner et al. 1987; Tajfel and Turner 1979), and can even lead to feelings of anxiety, fear and insecurity (Stephan, Diaz-Loving, and Duran 2000; Stillerman and Salcedo 2012). It fuels a divide between citizens along their partisan affiliation – by decreasing exposure to competing ideas (Cramer 2016). As a result, it may strengthen political extremism, populism and partisan affective polarization (i.e., the tendency to dislike and distrust other party’s members).

Several determinants are underlined in the literature for the existence of geographic partisan segregation. First, partisan segregation can be a legacy of racial and class segregation (Massey and Denton 1993; Trounstine 2018). Rodden (2019) supports that the left began to cluster in urban districts among the industrial working class in the late nineteenth century - while suburban and rural places remained conservative. These historical patterns can be reinforced today with the clustering of new socio-

demographic groups across partisan lines ([Levendusky 2013](#)). Second, partisan segregation may be explained by residential sorting, with Democrats moving to Democratic neighborhoods in the U.S. and vice versa for Republicans ([McDonald 2011](#); [Strickler 2016](#); [Mummolo and Nall 2017](#)).

Still, in practice, little is known about the current trend and the current drivers of geographic partisan segregation. Is it increasing? Can it be fueled by mobility, by demographic change or by change in partisan affiliation? Chapter 3 assesses the evolution of geographic partisan segregation using for the first time individual-panel data.

### **This dissertation**

This dissertation builds upon these insights to present empirical investigations on the political and economic aftermath of the Global financial crisis and on the current change in electoral demand. Linking administrative, commercial and collected data, I aim to provide causal evidence on the political-economic costs of exposure to extreme financial innovation in the public sector. We will show that exposure to financial innovation in the public sector negatively affects local economic activity in the aftermath of financial crises. In particular, adverse information shocks on public debt are sufficient to trigger adjustments on the intensive margin in highly indebted local governments. We will provide consistent evidence that the disclosure of the use of financial innovation in the public sector was interpreted as a case of public finance mismanagement during the global financial crisis and fuels as a result, the entry of populist parties – transforming the electoral supply. The last part of this thesis dissertation will underline the current change in electoral demand in the US. It shows for the first time that geographic partisan segregation has been actually rising during the last decade, using individual-panel data, and then decomposes this increase into different explaining factors.

### **Chapter 1. Toxic Loans and Local Economic Activity: Evidence on the Costs of Public Debt Shocks**

Can public debt impact economic activity? The question has long been debated in the scientific literature, starting with [Ricardo \(1817\)](#) and [Barro \(1979\)](#). During the worldwide Great Recession, it made the headlines again as many countries experienced strong rise in public indebtedness and thus feared economic consequences. While the relationship between government debt and economic growth has been extensively studied, there is surprisingly scarce evidence on the potential impact of local public debt on economic activity ([Sauvagnat and Vallée 2021](#)).

This chapter explores a unique setting of exogenous local debt increase. Between 1996 and 2011, around 1,500 French municipalities contracted more than 3,000 structured loans with Dexia bank for a total amount of €8.94 billion, with various exposure to financial international assets. This study exploits this design by comparing the local economic conditions of CHF-exposed municipalities with non-CHF-exposed municipalities which were indebted with other underlying assets. It relies on two exogenous events that differently impacted municipalities depending or not on their CHF-exposure: i) the disclosure of the Toxic Loan scandal in September 2011, and ii) the unpeg of the Swiss Franc from the Euro in January 2015. The 2011 disclosure should be seen as an information shock on public debt that negatively signals CHF-indebted municipalities among municipalities contracting with Dexia. The unpeg of the Swiss Franc in 2015 can be interpreted as an actual debt increase on CHF-exposed municipalities.

**Results.** Combining a Difference-in-Difference design with an Instrumental Variable strategy similar to [Sauvagnat and Vallée \(2021\)](#), I explore the causal impact of local public debt on economic activity using administrative and collected panel data at the municipality and at the plant levels. In this paper, I make the two following contributions. First, I find that a negative information shock on local public debt can be sufficient to trigger slight change on local economic activity. In municipalities adversely impacted by an information shock, I observe a slight decrease in the number of hours worked and in total wage bills in 2012. It suggests that plants located in these municipalities temporarily react to the information by adjusting their intensive margin. Second, I show that a sudden increase in local public debt leads to a significant rise in plant closures in affected municipalities. In terms of magnitude, a rise by €100 in municipal debt per inhabitant is associated with an approximate increase in plant closures by 2.8% per 10,000 inhabitants. The effect is strong and persistent – with CHF-exposed municipalities still experiencing relatively more plant closures in 2019 compared to their counterparts. Importantly, a rise in local public debt is sufficient to impact local economic activity – even in the absence of a current increase in local business taxes or a current decrease in municipal expenditure. It suggests that plants forecast future budget adjustments and adapt in consequence their economic activity.

**Contribution.** This chapter contributes first to the large literature studying public debt and its economic impact. Earlier studies either focus on Ricardian equivalence ([Leiderman and Razin 1988](#); [Evans 1988, 1991](#)) or on the channels through which public debt can negatively affect economic activity – such as sovereign risk spillovers ([Corsetti et al. 2013](#)), higher distortionary taxation ([Barro 1979](#); [Dotsey 1994](#)), lower



public expenditure ([Aizenman, Kletzer, and Pinto 2007](#)) or higher inflation ([Cochrane 2011](#)). Since then, several empirical studies have emerged on the impact of public debt on economic activity. One strand of this literature relies on cross-sectional variation to estimate local fiscal multipliers ([Cohen, Coval, and Malloy 2011](#); [Chodorow-Reich et al. 2012](#); [Nakamura and Steinsson 2014](#); [Suárez Serrato and Wingender 2016](#)). Other papers focus on the effects of public debt on economic growth using cross-country comparison with usually mixed results; such as [Schclarek \(2004\)](#) on industrial and developing countries or [Reinhart and Rogoff \(2010\)](#) on 20 developed countries. At the local level, evidence is particularly scarce – even if it would provide better identification settings by controlling for endogenous shock at the national level. To the best of my knowledge, there are only three empirical studies focusing on local public debt: [Cornaggia, Cornaggia, and Israelsen \(2018\)](#) study the impact of credit ratings on municipal bond prices; [Sauvagnat and Vallée \(2021\)](#) use the toxic loan setting to explore how a local debt increase affects municipal budgets and electoral chances of incumbent mayors; and [Adelino, Cunha, and Ferreira \(2017\)](#) look at how Moody’s recalibration expands debt capacity and local government spending to improve local economic condition. This chapter contributes to this literature by investigating for the first time, using plant-level data, how a high level of indebtedness incurred by local government can negatively affect local economic activity. Second, this chapter is also related to the recent literature using quasi-experimental settings to identify the causal impact of indebtedness on various economic agents. [Agarwal et al. \(2017\)](#), [Di Maggio et al. \(2017\)](#), [Ganong and Noel \(2019\)](#) explore exogenous debt payment reductions to show that borrowing households are more likely to experience lower probability of default and tend to increase spending on durable goods. A growing set of empirical studies relies instead on credit shocks to either focus on the role of household leverage ([Mian, Rao, and Sufi 2013](#); [Mian and Sufi 2014a,b](#)) or on the role of firm leverage ([Giroud and Mueller 2017](#); [Chodorow-Reich 2014](#); [Greenstone, Mas, and Nguyen 2020](#); [Bentolila et al. 2018](#)) during the Great Recession. [Gilje \(2016\)](#) uses quasi-random shocks to identify the causal impact of an increase in firm leverage on risk-shifting. Closer to my empirical setting, [Verner and Gyöngyösi \(2020\)](#) exploit variation in exposure to household foreign currency debt as an exogenous shock on household debt burden. They find a decline in local demand with negative spillovers. This chapter contributes to this literature by exploring for the first time a quasi-experimental design disentangling an exogenous information shock on public debt from an actual exogenous increase in public debt. Finally, this paper relies on an emerging literature investigating the aftermath of highly-risky financial innovation. [Pérignon and Vallée \(2017\)](#), [Gyongyosi and Verner \(2020a\)](#), [Sartre, Daniele, and Vertier \(2020\)](#) explore the political aftermath

of financial innovation – studying the impact on populism and on the likelihood of reelection for the incumbent. [Sauvagnat and Vallée \(2021\)](#) analyze the effect on municipal budgetary outcomes. This chapter focuses instead on the impact of highly-risky financial innovation on local economic activity.

## **Chapter 2. Toxic Loans and The Rise of Populist Candidacies**

**(With Gianmarco Daniele and Paul Vertier) - Lead author**

While the importance of the 2008 financial crisis has been acknowledged in explaining the growing trend towards populist voting, the mechanisms and the entry of populist candidacies have been underexplored. In this chapter, we study how public financial scandals induced by financial deregulation and market volatility lead to the entry of populist candidacies. To the best of our knowledge, this chapter is the first to causally identify the impact of public financial scandals on the rise of populism and in particular, on the entry of populist candidacies.

To do so, we use as a quasi-natural experiment the disclosure in 2011 of the "Toxic Loan scandal" by a French national newspaper (*Libération*). These revelations are of particular interest for two reasons. First, the scandal constitutes a salient institutional shock revealing several aspects of public finance mismanagement. Mayors were put in the spotlight. They were accused of being involved in one of the biggest European scandals of the 2008 financial crisis ([Piffaretti 2012](#)). They were blamed for taking ill-considered risks by adopting structured products based on foreign capital markets. They faced strong criticisms on their involvement in glamorous cultural events paid by the bank to promote their products ([Cori and Le Gall 2013](#)). Although some mayors may have acted in good faith, they were in the awkward position of having to publicly defend their contracts with the bank in the press. The scandal had then all the ingredients to appeal to the populist rhetoric – the responsibility of elites, the collusion between public officials and the bank, the danger of foreign capital markets and the fear of fiscal austerity. Second, the French revelations were of particular interest to properly identify the impact of public financial scandals on the rise of populism. The disclosure does indeed contain spatial and temporal heterogeneity. Geographic areas were differently exposed to the revelation. Some French municipalities were clearly mentioned in the *Libération* newspaper while others were not. The disclosure also happened at one point in time, right in the middle of the municipal electoral term (i.e, between March 2008 and March 2014). We therefore use this event to analyze whether indebted municipalities with toxic loan(s) saw a rise in populist voting and an entry of populist candidacies in 2014 compared to municipalities which were not.

Our main identification strategy relies on an instrumental variable. Dexia was created in 1996 as a merger of the French and Belgian banks specialized in credits to local governments (respectively *Crédit Local de France* - hereafter *CLF* and *Crédit Communal de Belgique* - hereafter *CCB*). In 1994, many local governments became shareholders of the *CLF*, among which 362 municipalities. As we show, municipalities located close to the shareholder municipalities were much more likely to subsequently adopt toxic loans. The presence of a Dexia toxic loan is therefore instrumented by the geographical distance to the closest shareholder municipality - excluding the latter from the estimation. This instrument builds upon an established literature showing the importance of distance for credit adoption (Degryse and Ongena 2005; Bharath et al. 2009), and upon the idea, documented by qualitative evidence, that shareholder municipalities had strong historical ties with the *CLF* and were more likely to adopt structured loans. Our exclusion restriction is likely to be warranted, since our instrument relies on mayors' decisions made two electoral terms before the largest increase in structured loan contracting (2001-2008), and 17 years before the unexpected leak by *Libération*. We include county fixed effects in our regressions and add a large variety of controls (such as the urban status of municipalities, historical municipal budgets, incumbent and population characteristics). We also confirm the validity of our main results using a fixed-effect identification strategy.

**Results.** First, we show that the municipalities involved in the scandal experienced a large increase in vote share for populist parties, both for the populist far-right and the populist far-left. Note that populist parties were the only political orientation benefiting from the scandal. Neither the mainstream left, nor the mainstream right, nor even the greens saw their vote share increasing in these municipalities. The rise of populist voting occurred at the expense of the incumbent's political party, which experienced a 20ppt decrease in vote share. These electoral results suggest that public financial scandals lead to a rise in populist voting at the expense of the mainstream elite in power. Second, we find that the electoral results are mainly driven by the entry of populist parties in these municipalities. In municipalities which contracted Dexia toxic loans, the likelihood of having a populist candidacy increases six times for the populist far-right and five times for the populist far-left. We know that a large share of populist candidates was neither in office nor former municipal councilor between 2001 and 2013 in the municipalities which contracted toxic loans (51% for the populist far-left party and 89% for the populist far-right). These results confirm that populist candidacies entered in municipalities impacted by the scandal. By doing so, they contribute to the rise in electoral competition (i.e., in the number of candidacies). Third, we observe that the populist far right enters in municipalities which contracted toxic

loans but even more when, these municipalities are historically disadvantaged or have recently experienced migration inflows. The entry of far-right candidacies is reinforced in municipalities with initially low median income or high unemployment before the 2008 financial crisis. Overall, these results confirm that the right-wing populist wave can be fueled by local economic and social conditions. Finally, we show that public financial scandals can be viewed as a new explanation per se for the rise of populism. In the literature, one main challenge is to disentangle the impact on populism of actual adverse economic shocks from the aftermath of media uproar. During the last electoral term, municipalities which contracted toxic loans did not experience more firm closure, more unemployment or more taxation than the municipalities which did not. Thus, our findings are more likely to reflect a generalized hostile reaction towards mainstream politicians than a reaction to the actual economic consequences of such decisions.

**Contribution.** This chapter speaks to several strands of the literature. First, it relates to the literature exploring the emergence of extreme and populist votes. Political scientists have been investigating this matter for a long time. They have stated that events discrediting the elites are particularly important to trigger the emergence of such political movements (Panizza 2005). The recent waves of populism across Europe and the United States have led economists to study such phenomena more closely. On the empirical side, two sets of studies can be mentioned. The first one points to cultural factors, referring to cultural backlash of previously dominant strata of society (Inglehart and Norris 2016; Mutz 2018; Colantone and Stanig 2018a), or to hostility towards migrants (Becker, Fetzer et al. 2016; Hangartner et al. 2017; Dustmann, Vasiljeva, and Damm 2016; Viskanac 2017; Edo et al. 2018; Dustmann and Damm 2019). The second one focuses on the role played by economic conditions, whether it relates to openness to trade (Dippel, Gold, and Heblich 2015; Dorn et al. 2016; Malgouyres 2017; Colantone and Stanig 2018b), unemployment shocks (Algan et al. 2017; Lechler 2019), or fiscal cuts (Becker, Fetzer, and Novy 2017). Relatedly, some studies highlight the specific role of financial crises on the rise of extreme votes. Algan et al. (2017) find a strong relationship between increases in unemployment and voting for populist parties during the Great Recession. Similarly, de Bromhead, Eichengreen, and O'Rourke (2013) and Funke, Schularick, and Trebesch (2016) show that financial crises lead to increased polarization and higher support for far-right parties. In contrast to these studies, we do not test the overall political effects of the financial crisis. Instead we are interested in a specific mechanism, i.e. public financial scandals, which contributes to explain how financial crisis trickled down to politics. Second, while the determinants of votes for specific parties are largely explored, empirical evidence on the mechanisms driving the

entry decisions of politicians are still at an early stage (Dal Bó et al. 2017), despite important theoretical contributions (Besley and Coate 1997; Osborne and Slivinski 1996). Recent studies have stressed the importance of analyzing the supply-side of politics, with a specific focus on populism (Rodrik 2017; Guiso et al. 2017; Guriev and Papaioannou 2020). In this chapter, we specifically tackle this dimension, studying populist party candidate entry in French local elections. Finally, this chapter more generally contributes to our understanding of the consequences of public finance mismanagement. Previous studies have focused on corruption or mismanagement scandals to determine to what extent corrupt politicians are likely to be reelected (Ferraz and Finan 2008; Hirano and Snyder Jr 2012; Nannicini et al. 2013), whether corruption sways voters away from the booths (Giommoni 2017) or whether corruption induces a change in candidate quality and party labeling (Cavalcanti et al. 2016; Daniele et al. 2017). However, to the best of our knowledge, we are among the first to assess the impact of a public finance mismanagement scandal on the entry of populist politicians.

### **Chapter 3. The Increase in Partisan Segregation in the United States**

**(With Jacob Brown, Enrico Cantoni, Ryan Enos and Vincent Pons)**

In the United States, the geographic separation of Democrats and Republicans is visible at all levels of geographic aggregation, from states to small neighborhoods (Brown and Enos 2021). Efforts to measure the extent and causes of this phenomenon have been impeded by persistent data and measurement problems. Until recently, over-time geographic data on the partisan composition of the electorate were only available at coarse levels of aggregation. As a consequence, first order questions on the trend and causes of partisan segregation in the U.S. remain unanswered. Is partisan segregation increasing, and at what speed? What factors are contributing to its rise or decline? Specifically, to what extent are changes in the geographic distribution of the American electorate produced by changes in the composition of the electorate, due to U.S. internal migration or generational change, vs. changes in the partisan leaning of voters, changing their registered partisan affiliation or their registration status?

In this chapter, we draw on two individual-level panel datasets covering the near universe of U.S. voters between 2008 and 2020 to measure changes in partisan segregation across the U.S. Focusing on the 30 states that record partisanship on their voter rolls, we measure two distinct dimensions of segregation: i) how different geographic areas evolve over time (using the ratio of Democrats to Democrats and Republicans hereafter  $D/(D+R)$ ), and ii) how evenly Democrats and Republicans are distributed within areas and neighborhoods (using the index of dissimilarity). We measure both

metrics over time and across multiple geographic levels ranging from counties and congressional districts to small neighborhoods. Thanks to our ability to track individuals across time as they move or change their partisan registration, we further decompose the sources of changes in partisan composition across places, quantifying the respective influence of generational change, U.S. internal migration, change in partisanship, and change in registration status.

**Results.** Our results are twofold. First, the data show a clear and continuous year-to-year increase in partisan segregation across the U.S.: more areas become predominantly Republican or Democratic, and few areas remain mixed. We observe this trend across a range of geographic levels, from counties and congressional districts, to smaller geographies such as census tracts, block groups, and blocks. Furthermore, looking at changes in dissimilarity indices at the county and congressional district levels, we find that the neighborhoods within these units are growing more distinct in terms of partisanship. Partisan segregation partly reflects a rural-urban political divide, with rural places becoming predominantly Republican and highly urbanized centers predominantly Democratic. We further observe that the rise in partisan segregation is more pronounced among White voters and among the youths. Second, increasing partisan segregation in areas that are growing more Democratic is primarily driven by generational change as new voters who enter the electorate are predominantly Democrats in these areas. In areas trending Republican, the change is mostly driven by voters changing their partisanship from Democrat to Republican. Residential mobility is also an influential, albeit secondary determinant of increasing partisan segregation.

**Contribution.** First, we contribute to the public and scholarly debate on whether or not Democrats and Republicans are becoming increasingly divided across space. Among the media, it has been a common view since [Bishop \(2009\)](#) that Republicans and Democrats are increasingly clustered in like-minded neighborhoods. This idea has been harshly discussed in the literature. [Fiorina \(2005\)](#), [Glaeser and Ward \(2006\)](#), and [Abrams and Fiorina \(2012\)](#) observe very low levels of partisan sorting. More recent studies find more evidence of partisan clustering, such as [Sussell \(2013\)](#), [Johnston, Manley, and Jones \(2016\)](#) or [Kaplan, Spenkuch, and Sullivan \(2021\)](#). Due to data limitation, this literature often fails to capture the actual geographic segregation of voters, using mainly aggregates at the county-state levels subject to the modifiable areal unit problem ([Openshaw 1983](#)). By contrast, [Brown and Enos \(2021\)](#) use cross-sectional individual data to capture partisan segregation at various geographic units, but their analysis is static. The present paper uses two individual-level panel data covering

the vast majority of the U.S. voting-eligible population to study changes in partisan segregation since 2008. Second, we shed light on the causes of partisan sorting. In a seminal paper, [Tiebout \(1956\)](#) argues that individuals sort based on their preferences for public policies: for instance, Democrats may locate in neighborhoods with better public infrastructures if they are willing to accept higher tax rates. Recently, several papers have studied the origins of partisan segregation. Among them, a great number focuses on residential sorting, such as [McDonald \(2011\)](#), [Tam Cho, Gimpel, and Hui \(2013\)](#), [Gimpel and Hui \(2015\)](#), [Strickler \(2016\)](#) or [Mummolo and Nall \(2017\)](#). But U.S. internal migration flows appear too small to fully explain the extent of partisan segregation ([Martin and Webster 2018](#); [Lang and Pearson-Merkowitz 2015](#)). Other papers provide alternative explanations for the rise in partisan segregation. Partisan sorting could be the consequence of sorting on other dimensions – such as income segregation ([Gelman 2010](#); [Hersh 2015](#)) or racial segregation. In that case, the underlying causes for the rise of partisan segregation could be similar to the concentration of poverty and to the cultural barriers, observed by [Massey and Denton \(1993\)](#) or by [Rugh and Trounstine \(2011\)](#). Individuals could also change their partisan preferences to align with the people they are living with. Several studies support this hypothesis: [Huckfeldt and Sprague \(1987\)](#) and [Johnston and Pattie \(2011\)](#) show that preferences are more likely to align when people have been living a long-time side by side. Our paper complements this literature by providing a full statistical decomposition of changes in the partisan composition of the electorate into changes in the population of registered voters and changes in their party registration, using administrative individual-level data. Finally, our paper builds on the vast literature on political polarization. While polarization on policy issues appears limited ([DiMaggio, Evans, and Bryson 1996](#); [Evans 2003](#); [Fiorina and Abrams 2008](#); [Levendusky and Pope 2011](#)), the U.S. are experiencing a growing trend in social polarization, leading to a rise in partisan ideological sorting ([Fiorina 2005](#); [Jacobson 2004](#); [Bafumi and Shapiro 2009](#); [Abramowitz and Saunders 2008](#); [Mason 2015](#)). Several recent papers show that increases in affective polarization are particularly large in the U.S. – meaning that citizens increasingly dislike members from other political parties than their own ([Iyengar et al. 2019](#)). Among nine OECD countries, the U.S. have experienced the strongest rise in affective polarization over the past four decades ([Boxell, Gentzkow, and Shapiro 2020](#)). Geographic partisan sorting may contribute to affective polarization due to the social distance it generates between groups ([Allport 1954](#); [Iyengar, Sood, and Lelkes 2012](#); [Iyengar and Westwood 2014](#); [Enos 2015, 2017](#)).

# Introduction Générale

Cette dissertation se situe à l'intersection entre l'économie publique et l'économie politique. La recherche en économie publique analyse comment les politiques gouvernementales affectent l'économie. Elle s'intéresse notamment à la manière dont les politiques doivent être conçues pour être efficaces et optimales. La littérature en économie politique se concentre, quant à elle, sur la manière dont interagissent la politique et l'économie, en analysant les déterminants et les conséquences du comportement des acteurs politiques.

A travers les outils de ces deux champs scientifiques, ce manuscrit vise à améliorer la connaissance sur plusieurs problématiques auxquelles font face les démocraties occidentales, en ce début de XXI siècle. Quelles sont les conséquences économiques et politiques de chocs sur les finances publiques? Sont-ils en lien avec la montée des partis populistes? Peut-on également observer des changements au sein de l'électorat conduisant à la radicalisation de celui-ci? Les deux premiers chapitres cherchent à explorer les conséquences politiques et économiques de l'exposition du secteur public à l'innovation financière. Le troisième chapitre étudie l'évolution et les déterminants de la ségrégation partisane, renforçant potentiellement la radicalisation de l'électorat.

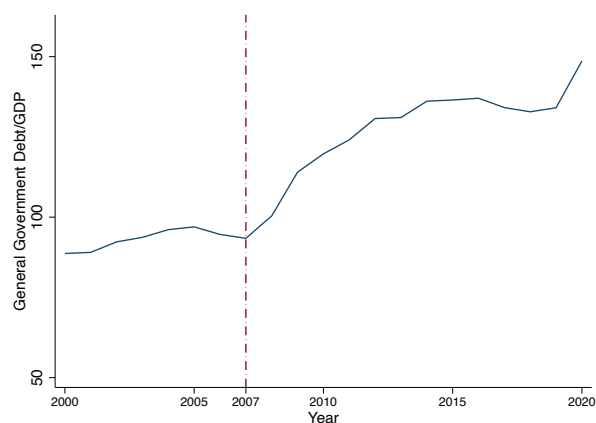
Cette introduction générale examine les fondements théoriques qui sous-tendent l'analyse de ce manuscrit, en insistant notamment sur la relation entre crises financières, endettement public et populisme, et en étudiant les déterminants et les conséquences de la ségrégation partisane. Les différents chapitres et leurs contributions respectives à la littérature seront détaillées dans un second temps.

## **Crise financière et dette publique**

A la suite de la crise financière de 2007-2008, un grand nombre de pays développés ont vu leur dette publique fortement augmenter. Le graphique 3 montre l'évolution moyenne de l'endettement public, exprimé en pourcentage du PIB, parmi les pays du G7. L'augmentation est particulièrement forte depuis 2007 – allant de 93% du PIB en 2007 à 148% en moyenne en 2021. Désormais, la Covid-19 ne fait que renforcer ces niveaux d'endettement. En 2021, presque 1/3 des pays de l'OCDE ont un ratio d'endettement supérieur à 100%.



Figure 3: Ratio Dette/PIB des pays du G7



Data source: OECD Base de données - Entre 2000 et 2021.

Lors de la dernière crise financière, l'endettement public a été particulièrement utile pour soutenir financièrement l'économie, au moment où les banques faisaient faillites et où les licenciements étaient massifs. Cependant, l'augmentation persistante de l'endettement public a soulevé des inquiétudes concernant sa soutenabilité fiscale – à la fois dans les sphères politiques et académiques. Le pacte budgétaire européen, signé en mars 2012, a depuis tenté de surveiller et de limiter le montant des déficits actuels encourus par les pays européens. Dans une logique tout aussi similaire, [Reinhart and Rogoff \(2010\)](#) ont suggéré la présence d'un seuil limite que les pays ne devraient dépasser afin de se prémunir de tout risque de défaut. Le seuil est fixé selon eux à 90% du PIB. L'intuition derrière de telles propositions est que l'endettement public peut compromettre à terme la croissance économique.

Cette vision a longtemps été débattue dans l'académique. La plupart des modèles théoriques sont divisés entre les approches keynésiennes et les approches néo-classiques. Les modèles keynésiens (comme les modèles de type IS-LM) prédisent un effet négatif net des restrictions budgétaires sur l'activité économique. Les politiques budgétaires restrictives ont un impact direct négatif sur le PIB via la demande agrégée et un effet indirect en attirant l'investissement privé, via une diminution des taux d'intérêt. Au contraire, l'approche traditionnelle néoclassique prédit un effet nul ou négligeable des politiques fiscales expansionnistes. Une augmentation de la dépense publique conduit à un effet d'éviction de l'investissement via une augmentation des taux d'intérêts. Cette approche a été popularisée par la suite par l'équivalence ricardienne ([Barro 1979, 1989a,b](#)). Fondée sur l'hypothèse de rationalité des agents économiques et l'existence d'un revenu permanent, toute augmentation de la dette fu-

ture est anticipée par les agents – laissant inchangés l’investissement et la croissance économique.

Depuis, plusieurs modèles théoriques ont été développés. [Krugman \(1988\)](#) introduit le concept de surendettement où les acteurs ne peuvent plus se financer facilement sur les marchés même si un emprunt leur serait profitable. Il en conclut une relation en forme de U inversé entre la dette souveraine et le PIB. [Leiderman and Razin \(1988\)](#) testent l’équivalence ricardienne à l’aide d’un modèle inter-temporel stochastique. Des études plus récentes se concentrent quant à elles sur les mécanismes par lesquels la dette publique peut impacter négativement l’activité économique ([Aizenman, Kletzer, and Pinto 2007](#); [Corsetti et al. 2013](#)).

Malgré cette vaste littérature, la théorie reste partagée sur la relation entre endettement public et croissance. La recherche empirique n’est pas non plus particulièrement conclusive ([Tamborini and Tomaselli 2020](#)). Comment l’endettement public peut affecter l’activité économique? Doit-on tenir compte des ratios d’endettement sur le PIB? Aujourd’hui, les réponses à ces questions ne sont toujours pas définitives.

Pour les décideurs publics, l’absence de directions précises peut s’avérer particulièrement cruciale. Durant la Grande Récession, beaucoup de politiques d’austérité ont été soutenues par des articles empiriques prônant l’existence « d’effets non-keynésiens à la politique fiscale ». En utilisant des données de panel au niveau des pays, cette partie de la littérature a argumenté que la consolidation fiscale n’était pas nécessairement dommageable pour la croissance économique – et pouvait, au contraire, avoir un effet positif sur l’activité économique ([Giavazzi and Pagano 1990](#); [Alesina et al. 1995](#); [Alesina and Ardagna 2010, 2013](#)). Depuis, d’autres papiers ont démontré un impact négatif des politiques d’austérité sur la croissance économique ([Guajardo, Leigh, and Pescatori 2014](#); [Jorda and Taylor 2016](#); [in ’t Veld 2013](#); [Beetsma et al. 2015](#)) ou du moins, l’existence de multiplicateurs fiscaux particulièrement importants ([Hebous 2011](#); [Gechert, Hallett, and Rannenberg 2016](#)).

De manière surprenante, la littérature sur l’endettement public s’est concentrée sur l’endettement des gouvernements centraux et a négligé l’endettement local et ces implications sur l’activité économique – à une époque, où l’endettement local croît également. Aux Etats-Unis, le niveau d’endettement local est égal à 8.3 billions de dollars. Il a été presque multiplié par huit entre 1990 et 2021. Dans les pays européens, l’endettement local représente un montant total de 867.4 milliards d’euros. En se concentrant sur le niveau local, on pourrait être en mesure d’améliorer notre compréhension sur la manière dont l’endettement public affecte l’activité économique. Au lieu

d'utiliser des comparaisons entre les pays, étudier la dette publique locale permettrait d'identifier plus facilement des chocs d'endettement exogènes, en contrôlant pour les caractéristiques des pays, en prenant en compte un grand nombre d'observations et en précisant les mécanismes sous-jacents. Le premier chapitre constitue un premier pas dans cette direction. Il étudie l'impact causal de chocs d'endettement locaux sur l'activité économique locale, au sein de gouvernements locaux particulièrement endettés. En faisant ainsi, il distingue pour la première fois entre chocs informationnels sur l'endettement public et augmentation réelle de la dette publique.

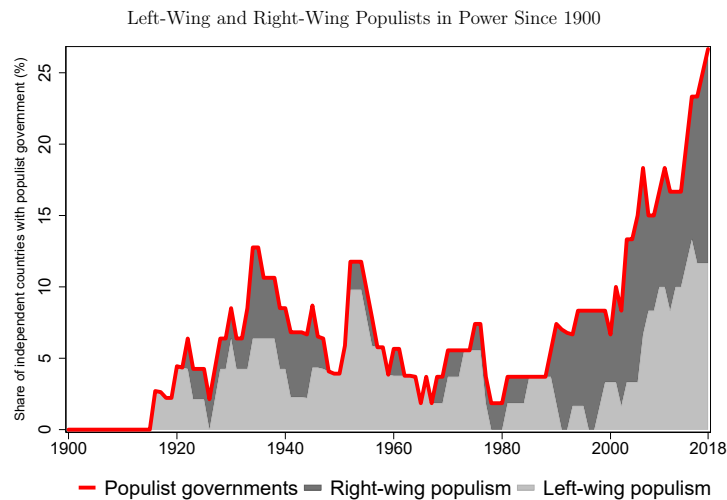
### **Crise Financière et Populisme**

A la suite de la crise financière mondiale de 2007-2008, plusieurs pays n'ont pas seulement vu leur dette augmenter mais aussi l'idéologie populiste gagner du terrain. Depuis 2009, nombreux sont les candidats ou les partis populistes à voir leur influence s'accroître dans les pays de l'Union Européenne ou les Etats-Unis – comme Victor Orban en Hongrie, SYRIZA et les Grecs indépendants, Droit et Justice en Pologne, Trump aux Etats-Unis, ou encore, la Ligue du Nord et le Mouvement Cinq Etoiles en Italie. Le terme populiste inclue une grande diversité d'idéologies et de politiques. Il prend appui sur une rhétorique scindant la société en deux groupes distincts: le peuple présenté comme pure et l'élite perçue comme corrompue (Mudde 2004, 2007; Mudde and Kaltwasser 2017). En d'autres termes, les mouvements populistes sont caractérisés par l'anti-pluralisme et l'anti-élitisme.

Le graphique 4 représente la part des pays ayant un gouvernement populiste parmi les 60 pays représentant plus de 90% du PIB (Funke, Schularick, and Trebesch 2020). La montée des partis populistes y est particulièrement forte – avec 16 pays gouvernés par une formation populiste en 2018 (soit sept par un gouvernement populiste de gauche et neuf par un gouvernement populiste de droite). En ce sens, la Grande Récession rappelle la Grande Dépression des années 1930. En 1929, plus de 24 pays européens étaient démocratiques mais seulement 11 persistent en 1939 (Capoccia 2005). La montée de la droite populiste a été fortement corrélée à la Grande Dépression, et les jeunes démocraties étaient souvent les premières affectées (de Bromhead, Eichengreen, and O'Rourke 2013). Doerr et al. (2020) ont même montré que la montée du parti Nazi a été aggravée en Allemagne par la crise financière de 1931, qui amplifiait les effets de la Grande Dépression et permettait plus facilement aux Nazis d'attaquer le peuple juif.

Par conséquent, au cours des 140 dernières années, beaucoup de mouvements populistes d'extrême-droite apparaissent renforcés à la sortie des crises financières (Funke,

Figure 4: Montée des gouvernements populistes au cours du temps



Source: Funke, Schularick, and Trebesch (2020), Figure 1. The sample comprises 60 large countries.

[Schularick, and Trebesch 2016](#)). Les mécanismes entre crises financières et populisme restent pour autant méconnus ([Guriev and Papaioannou 2020](#)). De quelles manières les crises financières peuvent-elles conduire à une montée du populisme ? Peut-on observer une entrée stratégique des partis populistes dans les sphères de pouvoir à la suite de ces dernières ? Au regard de la montée du populisme, de telles questions peuvent apparaître pertinentes. Cependant, il reste difficile de distinguer l'impact des crises financières des effets de l'austérité politique ou des conséquences de celles-ci sur l'activité économique ([Fetzer and Schwarz 2019](#); [Fetzer, Sen, and Souza 2019](#); [Bó et al. 2018](#)). Le second chapitre considère alors les scandales politico-financiers comme un nouveau mécanisme potentiel pour l'entrée des partis populistes d'extrême-droite et d'extrême-gauche – indépendamment de toutes conditions adverses sur l'activité économique.

### Ségrégation géographique partisane

La montée du populisme révèle une division profonde de la société qui est au cœur d'une crise de confiance ([Algan et al. 2017](#)). Peut-on retrouver ces divisions idéologiques au sein même de l'espace public à travers la séparation géographique des partisans ? Est-ce que la ségrégation partisane et le populisme peuvent se renforcer mutuellement ? La littérature scientifique reste divisée sur l'évolution actuelle de la ségrégation partisane ([Fiorina 2005](#); [Glaeser and Ward 2006](#); [Abrams and Fiorina 2012](#); [Sussell 2013](#); [Kaplan, Spenkuch, and Sullivan 2021](#)).

La ségrégation partisane engendre pour autant de profondes transformations sur les comportements sociaux. En psychologie, la littérature du contact a démontré que les interactions sociales entre les groupes favorisent les émotions positives et réduisent les émotions négatives comme l'anxiété ou la menace (Allport 1954; Brown and Hewstone 2005; Moody 2001; Pettigrew 1961; Pettigrew and Tropp 2012). Au contraire, la ségrégation au sein de l'espace géographique peut être associée à des attitudes négatives et des stéréotypes. Si la littérature en sociologie ou en psychologie sociale s'intéresse d'avantage aux groupes ethniques et religieux, plusieurs évidences sur le terrain semblent confirmer les effets délétères de la ségrégation sur les comportements humains. A travers des interviews réalisés sur une plage d'Afrique du Sud où l'Apartheid a pris fin, Durrheim and Dixon (2005) observent que les baigneurs continuent d'occuper néanmoins des espaces bien distincts sur la plage. L'absence de contact social est interprétée différemment selon les groupes. Les personnes de couleurs envisagent cette ségrégation comme une attitude raciste alors que les personnes de type caucasien interprètent l'attitude regroupée des personnes de couleurs comme un signal de dangerosité – et préfèrent par conséquent les éviter. D'autres études, conduites dans un contexte un peu plus neutre, confirment que la ségrégation géographique renforce les croyances et les stéréotypes négatifs (Henze 2001; Besharati and Foster 2013; Spitz 2015). Cela contribue à augmenter l'identification au groupe et la perception des autres comme d'une menace (Turner et al. 1987; Tajfel and Turner 1979). Cela peut même conduire à des sentiments d'anxiété, de peur et d'insécurité (Stephan, Diaz-Loving, and Duran 2000; Stillerman and Salcedo 2012). La ségrégation partisane pourrait donc renforcer les divisions entre les citoyens selon leur idéologie politique. Elle réduit l'exposition de chacun à la contradiction de ses propres idées (Cramer 2016). Par conséquence, elle peut renforcer et être renforcée par l'extrémisme politique, le populisme et la polarisation affective partisane (autrement dit, la tendance à peu apprécier les membres des autres partis politiques que le sien).

Afin de comprendre la présence de ségrégation partisane au sein de l'espace géographique, la littérature a souligné plusieurs déterminants. D'une part, la ségrégation partisane peut être l'héritage de la ségrégation raciale et sociale (Massey and Denton 1993; Trounstine 2018). Par exemple, Rodden (2019) soutient que la gauche s'est rassemblée dans les centres urbains au moment de la montée de la classe ouvrière, à la fin du XIX siècle. Les endroits ruraux sont restés quant à eux conservateurs. Cette division a pu être renforcée au cours du temps par la séparation de nouveaux groupes socio-démographiques autour de lignes partisanes (Levendusky 2013). Deuxièmement, la ségrégation partisane peut être le résultat aux Etats-Unis d'une mobilité

spatiale – les Démocrates choisissant des quartiers Démocrates et vice versa pour les Républicains (McDonald 2011; Strickler 2016; Mummolo and Nall 2017).

Cependant, en pratique, l'évolution récente de la ségrégation partisane et les déterminants de celle-ci ne sont que peu connus. Est-ce qu'elle tend à augmenter? Quels rôles jouent la mobilité géographique, le changement démographique ou le changement d'affiliation partisane au cours de cette dernière décennie? Pour répondre définitivement à ces questions, cette dernière étude fait le choix de données individuelles de panel exhaustives.

## **Cette dissertation**

Cette dissertation prend appui sur l'ensemble de cette littérature pour regarder les conséquences économiques et politiques de la Crise financière mondiale de 2007-2008 et les évolutions actuelles de la demande électorale. A l'aide de données administratives, commerciales et collectées, nous sommes en mesure de montrer l'impact causal de l'exposition du secteur public à l'innovation financière. Nous montrerons que cette exposition affecte négativement l'activité économique locale à la suite de crises financières. En particulier, l'impact d'un choc informationnel sur l'endettement du secteur public est suffisant pour engendrer des ajustements sur la marge intensive dans des gouvernements locaux fortement endettés. Nous montrerons également que la révélation de l'usage par le secteur public d'instruments financiers sophistiqués a été interprétée comme signalant une mauvaise gestion des finances publiques durant la crise financière. En conséquence, elle renforce la division entre le peuple et l'élite, nourrit une idéologie populiste et engendre l'entrée de partis populistes dans les endroits concernés, modifiant ainsi l'offre électorale. La dernière partie de cette thèse soulignera les changements actuels de la demande électorale aux Etats-Unis en montrant pour la première fois à l'aide de données individuelles de panel une augmentation réelle de la ségrégation géographique partisane. Elle décomposera par ailleurs cette augmentation entre différents facteurs explicatifs.

## **Chapitre 1. Emprunts toxiques et Activité Economique Locale : Analyse des Coûts de Chocs d'Endettement**

Est-ce que l'endettement public peut impacter l'activité économique? La littérature scientifique a longtemps débattue cette question, en commençant par Ricardo (1817) et Barro (1979). La Grande Récession l'a remise au devant de la scène – au moment où plusieurs pays ont vu une forte augmentation de leur endettement public et ont pris peur, des conséquences sur leur activité économique. Alors que la relation entre

endettement public national et activité économique a largement été explorée, il existe très peu d'évidence sur les effets de la dette publique locale sur l'activité économique (Sauvagnat and Vallée 2021).

Ce chapitre prend appui sur le scandale des emprunts toxiques touchant certaines municipalités françaises. Entre 1996 et 2011, plus de 1500 municipalités ont contracté plus de 3000 prêts structurés avec la banque Dexia pour un montant total de 8.94 milliards d'euros – avec des expositions variées à des sous-jacents financiers. Cette étude prend appui sur ce contexte institutionnel pour comparer l'activité économique locale de municipalités exposées au Franc Suisse à celles de municipalités exposées à d'autres sous-jacents financiers. Elle utilise deux événements exogènes qui ont impacté de manière différente les municipalités selon leur exposition ou non au franc suisse : i) la révélation du scandale des emprunts toxiques en septembre 2011 qui a mis en évidence la haute toxicité des prêts sur le Franc Suisse par rapport à d'autres sous-jacents, et ii) l'abandon du taux plancher du Franc Suisse à l'Euro en janvier 2015, provoquant une brutale montée des taux d'intérêt des prêts structurés sur le Franc Suisse. La révélation du scandale des emprunts toxiques en 2011 peut être perçue comme un choc informationnel sur l'endettement public impactant négativement les municipalités exposées au Franc Suisse parmi les autres municipalités endettées avec Dexia. L'abandon du taux plancher en 2015 correspond par contre à une augmentation réelle de la dette des municipalités exposées au Franc-Suisse.

**Résultats.** A l'aide de deux stratégies d'identification, l'une par le biais de Doubles Différences, l'autre à l'aide de variables instrumentales, l'article explore l'impact causal de l'endettement public local sur l'activité économique. Il contribue de deux manières à la littérature actuelle. Premièrement, nous trouvons qu'un choc informationnel négatif sur l'endettement public local est suffisant pour engendrer de petits changements sur l'activité économique locale. Dans les municipalités négativement affectées par le choc informationnel, nous observons une légère diminution du nombre d'heures travaillées et des salaires totaux annuels en 2012 – suggérant que les établissements localisés dans ces municipalités réagissent temporairement à l'information en ajustant leur marge intensive. Par ailleurs, nous trouvons qu'une augmentation soudaine de l'endettement public conduit à une augmentation significative des fermetures d'établissement dans les municipalités impactées. Du point de vue de la magnitude des effets, une augmentation de l'endettement municipal de 100 euros par habitant est associée à une augmentation des fermetures de 2.8% dans une ville moyenne de 10,000 habitants. L'effet est fort et persistant – avec des municipalités qui restent affectées en 2019, année de clôture de nos données. Une augmentation de l'endettement public local

est ainsi suffisante pour engendrer un impact persistant sur l'activité économique – et ce même en l'absence d'une augmentation de la taxation locale ou d'une diminution de l'investissement municipal. Cela suggère que les établissements anticipent d'inévitables politiques de restriction budgétaire au niveau municipal ainsi qu'une dégradation des conditions l'activité économique. La dette publique locale apparaît donc comme un facteur important de l'activité économique.

**Contribution.** Ce chapitre de thèse contribue tout d'abord à une vaste littérature sur les conséquences économiques de la dette publique. Les premières études se sont concentrées sur l'équivalence ricardienne (Leiderman and Razin 1988; Evans 1988, 1991), ou sur les mécanismes par lesquels la dette publique peut négativement affecter l'économie – tel que le risque souverain (Corsetti et al. 2013), l'augmentation de la taxation (Barro 1979; Dotsey 1994), la diminution des dépenses publiques locales (Aizenman, Kletzer, and Pinto 2007) ou encore l'augmentation de l'inflation (Cochrane 2011). Plusieurs études empiriques ont depuis émergé sur ce sujet. Une partie de celles-ci repose sur des variations en coupe transversale pour estimer des multiplicateurs fiscaux locaux (Cohen, Coval, and Malloy 2011; Chodorow-Reich et al. 2012; Nakamura and Steinsson 2014; Suárez Serrato and Wingender 2016). D'autres papiers regardent les effets de la dette publique sur la croissance économique à l'aide de comparaisons à travers les pays. Les résultats sont néanmoins partagés (Schclarek 2004; Reinhart and Rogoff 2010). La dette publique local n'a d'ailleurs été que très peu étudiée – même si potentiellement, une meilleure identification empirique pourrait être développée en contrôlant pour des chocs endogènes au niveau national. A ma connaissance, il n'y a que trois études empiriques se concentrant pour l'instant sur la dette publique locale : Cornaggia, Cornaggia, and Israelsen (2018) étudient l'impact des agences de notation sur le prix des obligations municipales; Sauvagnat and Vallée (2021) utilisent également l'affaire des emprunts toxiques pour explorer l'impact de l'augmentation de la dette publique locale sur les budgets municipaux et les chances de réélection des maires sortant; enfin, Adelino, Cunha, and Ferreira (2017) regardent comment les changements de notation de Moody ont permis une augmentation de la capacité d'endettement et un accroissement des dépenses budgétaires pour améliorer les conditions économiques locales. Ce chapitre repose sur cette littérature en explorant pour la première fois, à l'aide de données individuelles au niveau établissement, comment de hauts niveaux d'endettement locaux peuvent négativement impacter l'activité économique. Deuxièmement, ce chapitre est en lien avec un ensemble d'études récentes utilisant des dispositifs quasi-expérimentaux pour identifier l'impact causal de l'endettement sur une variété d'agents économiques. Agarwal et al. (2017), Di Maggio et al. (2017), Ganong and Noel (2019) montrent que les ménages endettés



sont moins à même de faire défaut et tendent à augmenter leurs dépenses sur les biens de consommation durable face à une diminution exogène des remboursements de la dette. Un nombre croissant d'études empiriques prend également appui sur des chocs de crédit pour soit étudier l'impact de l'endettement des ménages (Mian, Rao, and Sufi 2013; Mian and Sufi 2014a,b), soit celui des firmes (Giroud and Mueller 2017; Chodorow-Reich 2014; Greenstone, Mas, and Nguyen 2020; Bentolila et al. 2018). Gilje (2016) utilise l'existence de chocs quasi-aléatoires pour identifier l'impact causal d'une augmentation de l'endettement au niveau des entreprises sur le partage du risque. Plus proche de ce chapitre, Verner and Gyöngyösi (2020) utilisent quant à eux des différences dans l'exposition des ménages à des taux de change internationaux. Ils constatent une diminution de la demande locale – avec des effets en chaîne négatifs. Ce chapitre de thèse s'inspire de cette littérature tout en distinguant, pour la première fois, l'impact d'un choc informationnel de celui d'un choc réel sur l'endettement public. Enfin, ce papier repose sur une littérature émergente sur les conséquences réelles de l'innovation financière. Pérignon and Vallée (2017), Gyongyosi and Verner (2020a), Sartre, Daniele, and Vertier (2020) regardent les suites politiques de cette dernière en étudiant son impact sur le populisme ou sur la probabilité de réélection des maires sortants. Sauvagnat and Vallée (2021) analysent l'effet de l'innovation financière sur les budgets municipaux. Ce chapitre se concentre plutôt sur les effets de l'innovation financière à haut risque sur l'activité économique locale.

## **Chapitre 2. Emprunts Toxiques et Montée des Candidatures Populistes**

**(Avec Gianmarco Daniele et Paul Vertier)**

**Premier auteur**

Bien que le rôle des crises financières dans la montée du populisme soit avéré, les mécanismes tout comme les stratégies des partis populistes ont été pour leur part négligés. Dans ce chapitre, nous étudions comment des affaires impliquant une mauvaise gestion des finances publiques peuvent engendrer l'entrée de candidats populistes. A notre connaissance, ce chapitre est le premier à identifier causalement l'impact de scandales politico-financiers sur la montée du populisme et en particulier, sur l'entrée de candidats populistes.

Pour se faire, nous utilisons un dispositif quasi-expérimental: la révélation en 2011 par le journal Libération de l'affaire des emprunts toxiques. Premièrement, la révélation des emprunts toxiques fut un choc institutionnel largement médiatisé en France, pointant la responsabilité politique sur les maires des communes affectées. Cette affaire fut considérée comme un des plus grands scandales financiers européens du

début du XXI siècle (Piffaretti 2012). Les maires ont été alors accusés de prendre des risques non considérés en adoptant des produits structurés indexés sur des indices financiers internationaux. La presse a également rendu public leur participation à de belles réceptions lors d'évènements mondains, payés par la banque pour promouvoir leurs produits financiers (Cori and Le Gall 2013). Même si les maires ont pu agir en bonne foi, ils se sont retrouvés dans la position difficile de devoir défendre leurs contrats vis-à-vis de leurs concitoyens. Cette affaire possède tous les ingrédients pour sous-tendre une rhétorique populiste: la responsabilité des élites, la collusion entre les banques et le secteur public, les dangers des marchés financiers internationaux et la peur de l'austérité. Deuxièmement, les révélations de la presse française interviennent dans un contexte permettant d'identifier causalement l'impact d'affaires politico-financières sur la montée du populisme. Cette affaire implique aussi bien de l'hétérogénéité spatiale que de l'hétérogénéité temporelle. Certaines municipalités sont clairement mentionnées par Libération alors que d'autres ne le sont pas. La révélation intervient au milieu du mandat électoral à un point donné dans le temps. Nous pouvons donc utiliser cet évènement pour analyser si les municipalités françaises affectées par les emprunts toxiques, voient une montée du vote populiste et une entrée plus prononcée des candidatures populistes à l'issue des élections de 2014, en comparaison d'autres municipalités.

Pour stratégie d'identification, nous utilisons une variable instrumentale. La banque Dexia a été créée en 1996 à la suite de la fusion du Crédit Local de France et du Crédit Communal de Belgique. En 1994, 362 municipalités sont entrées dans le capital du Crédit Local de France. Nous montrons que les municipalités situées à proximité des municipalités actionnaires sont plus à même d'adopter des emprunts toxiques en raison de la stratégie commerciale de Dexia. La présence d'un prêt structuré avec Dexia est donc instrumentée par la distance géographique à la municipalité actionnaire la plus proche - excluant cette dernière de notre estimation. Notre instrument apparaît exogène. La décision d'entrer dans le capital du Crédit Local de France fut prise en amont de la contraction des prêts structurés (entre 2001 et 2008 principalement), et également 17 ans auparavant la révélation inattendue par le journal Libération de l'affaire des emprunts toxiques. Dans nos régressions, nous incluons également des effets fixes départementaux et un large nombre de contrôles, tels que les statuts urbains des municipalités, les budgets municipaux historiques et les caractéristiques de la population et des maires sortants. Nous confirmons aussi la validité de nos résultats principaux à l'aide d'une stratégie d'identification par effets fixes.

**Résultats.** Premièrement, nous montrons que les municipalités impliquées dans l'affaire font face à une montée des voix populistes, à la fois de droite et de gauche, à la suite de la révélation par Libération. Notons que les partis populistes sont les seules orientations politiques bénéficiant de cette affaire. La gauche et la droite modérées, le centre, ou même les verts ne voient pas leurs parts de voix augmenter. La montée du vote populiste intervient alors aux dépens du maire sortant, qui voit ses parts de voix diminuer de 20 points de pourcentage. Ces résultats électoraux suggèrent que les scandales publics financiers conduisent à la montée du vote populiste au détriment de la classe politique modérée au pouvoir. Deuxièmement, les résultats électoraux des partis populistes sont expliqués par la plus grande probabilité de ces derniers à se présenter dans ces municipalités. Plus précisément, dans les municipalités contractant avec Dexia, la probabilité d'avoir un candidat populiste est multipliée par six pour le parti populiste de droite et par cinq pour les partis populistes de gauche. Nous savons qu'une grande partie des candidats populistes n'occupaient pas de fonction politique auparavant, ni en tant que maire, ni en tant que conseillers municipaux entre 2001 et 2013 dans les municipalités qui ont contracté des emprunts toxiques. Ces résultats confirment que les candidats populistes ont ciblé les municipalités impactées par l'affaire pour effectuer une première entrée dans l'arène politique. Se faisant, ils ont contribué à l'augmentation de la compétition électorale. Troisièmement, nous observons que l'entrée de l'extrême-droite populiste à la suite de ce scandale se trouve renforcée dans les municipalités à faible revenu médian ou à taux de chômage élevé avant la crise financière de 2008. Enfin, nous montrons que les scandales financiers touchant le secteur public jouent un rôle en soi dans la montée du populisme. Dans la littérature sur le populisme et les crises financières, une des difficultés est de séparer l'impact du populisme de chocs adverses sur l'activité économique. Durant le dernier mandat électoral, il n'y a pas eu plus de fermetures d'entreprises dans les municipalités qui ont recouru aux emprunts toxiques, ni un taux de chômage ou une taxation plus élevée. Nos résultats confirment que cette affaire a entraîné une réaction hostile généralisée contre la classe politique en cours – plus qu'une réaction aux conséquences économiques de ces décisions financières.

**Contribution.** Ce chapitre contribue de plusieurs manières à la littérature. Premièrement, il s'inscrit dans la lignée des articles explorant l'émergence du vote extrême et populiste. Il a été montré que des événements attaquant la légitimité des élites jouent un rôle dans l'émergence de mouvements populistes (Panizza 2005). Les dernières vagues de populisme à travers l'Europe et les Etats-Unis ont conduit à approfondir ce phénomène. La littérature empirique peut se diviser entre deux lignes d'études: celles portant sur les déterminants culturels du populisme ; et celles se concentrant

sur leurs déterminants économiques. Les premières examinent un potentiel rejet des classes anciennement dominantes (Inglehart and Norris 2016; Mutz 2018; Colantone and Stanig 2018a), ou une hostilité accrue envers les migrants (Becker, Fetzer et al. 2016; Hangartner et al. 2017; Dustmann, Vasiljeva, and Damm 2016; Viskanac 2017; Edo et al. 2018; Dustmann and Damm 2019). Les autres études pointent le rôle des facteurs économiques, que cela soit via l'ouverture au commerce (Dippel, Gold, and Heblich 2015; Dorn et al. 2016; Malgouyres 2017; Colantone and Stanig 2018b), la présence de chômage (Algan et al. 2017; Lechler 2019), ou l'effet de restrictions fiscales (Becker, Fetzer, and Novy 2017). En lien avec cette littérature, un certain nombre d'articles étudient le rôle des crises financières dans la montée du populisme. Algan et al. (2017) trouvent une forte corrélation entre l'augmentation du chômage et la montée des partis populistes au cours de la dernière crise financière. Similairement, de Bromhead, Eichen-green, and O'Rourke (2013) et Funke, Schularick, and Trebesch (2016) montrent que les crises financières conduisent à l'augmentation de la polarisation politique et à un soutien croissant envers les partis d'extrême-droite. A la différence de ces études, nous nous concentrons sur un mécanisme particulier: l'apparition de scandales touchant les finances publiques au cours des crises financières comme un vecteur de la montée du populisme. Deuxièmement, alors que les déterminants du vote ont été largement explorés, les stratégies d'entrées des partis politiques ont été négligées (Dal Bó et al. 2017), malgré d'importantes contributions théoriques à ce sujet (Besley and Coate 1997; Osborne and Slivinski 1996). Des études récentes soulignent la nécessité d'analyser l'offre électorale, notamment dans le cas de la montée du populisme (Rodrik 2017; Guiso et al. 2017; Guriev and Papaioannou 2020). Dans ce chapitre, nous prenons en compte cette dimension, en étudiant l'entrée des partis populistes aux élections locales françaises. Enfin, ce chapitre contribue plus généralement aux études explorant les conséquences de la mauvaise gestion des finances publiques. Les études se sont auparavant concentrées sur des scandales de corruption ou de mauvaise gestion des finances publiques pour déterminer dans quelle mesure les politiciens ont moins de chances d'être réélus (Ferraz and Finan 2008; Hirano and Snyder Jr 2012; Nannicini et al. 2013), pour voir si la corruption augmente l'abstention (Giommoni 2017) ou entraîne du moins, des changements dans la qualité des candidatures ou dans les étiquettes politiques en lice (Cavalcanti et al. 2016; Daniele et al. 2017). Toutefois, à notre connaissance, nous sommes les premiers à examiner l'impact d'un scandale touchant les finances publiques sur l'entrée des candidatures populistes.

### **Chapitre 3. La montée de la ségrégation partisane aux Etats-Unis**

**(Avec Jacob Brown, Enrico Cantoni, Ryan Enos et Vincent Pons)**

Aux Etats-Unis, la ségrégation spatiale des Démocrates et des Républicains est visible à tous les niveaux d'agrégation, des états fédérés aux quartiers résidentiels (Brown and Enos 2021). Les efforts pour mesurer l'étendue et les causes de celle-ci ont été entravés par des problèmes de qualité des données et de mesures. Jusqu'à récemment, des données géographiques sur la composition partisane des individus au cours du temps n'étaient disponibles qu'à des niveaux agrégés. Par conséquent, des questions de premier ordre portant sur l'évolution et les causes de la ségrégation partisane aux Etats-Unis restent irrésolues. Est-ce que la ségrégation partisane augmente au cours du temps et si oui, à quelle vitesse? Quels sont les facteurs qui contribuent à sa montée tout comme à son déclin? En l'occurrence, en quelle mesure ces changements dans la distribution géographique de l'électorat américain sont produits par des changements dans la composition de celui-ci (migrations internes ou dynamiques intergénérationnelles), ou par des changements dans les affinités partisanes des électeurs (changements de leur affiliation partisane ou changement du statut d'inscription sur les listes d'électeurs)?

Dans ce papier, nous utilisons des données de panel au niveau individuel – couvrant presque l'univers des votants aux Etats-Unis entre 2008 et 2020 pour mesurer des changements dans la ségrégation partisane à travers les Etats-Unis. En se concentrant sur les 30 états fédérés qui enregistrent l'affiliation partisane dans les fichiers d'électeurs, nous mesurons deux dimensions distinctes de la ségrégation : i) comment des aires géographiques différentes évoluent au cours du temps (en utilisant le ratio des Démocrates sur les Démocrates et Républicains), et ii) comment les Démocrates et les Républicains sont distribués à l'intérieur des aires géographiques et des quartiers (en utilisant l'indice de dissimilarité). Nous mesurons à la fois ces deux indicateurs au cours du temps et à travers des niveaux géographiques différents regardant les états fédéraux, les districts congressionnels, jusqu'aux petits arrondissements. Grâce à notre possibilité de suivre les individus à travers le temps, l'espace et leurs changements sur les registres d'inscription, nous sommes en mesure de décomposer les sources de ce changement en regardant l'influence de la dynamique intergénérationnelle, des migrations internes, des changements dans le statut partisan et enfin, des changements dans les statuts d'inscription sur les listes d'électeurs.

**Résultats.** Premièrement, les données montrent une augmentation claire et précise de la ségrégation partisane à travers les Etats-Unis : de plus en plus d'endroits géographiques deviennent Républicains ou Démocrates de manière prédominante. Nous observons cette tendance à tous les niveaux géographiques, des comtés et des districts congressionnels, aux unités géographiques les plus petites, tels que les secteurs de re-

censements, les blocs de recensement et les blocs. En observant l'évolution de l'indice de dissimilarité au cours du temps, nous trouvons que les unités géographiques à l'intérieur des comtés et districts congressionnels deviennent de plus en plus distinctes au regard de leur composition partisane. La ségrégation partisane reflète partiellement la division entre les zones rurales et urbaines, avec les zones rurales qui deviennent davantage républicaines et les centres urbains davantage démocrates. La montée de la ségrégation partisane est également plus prononcée parmi les votants caucasiens et les jeunes. Deuxièmement, l'augmentation de la ségrégation dans les endroits devenant de plus en plus démocrates est principalement causée par une dynamique intergénérationnelle – les jeunes votants étant majoritairement démocrates dans ces unités géographiques. Dans les endroits où le nombre de républicains augmente, l'augmentation de la ségrégation partisane est causée par des changements d'affiliation partisane: des démocrates deviennent donc républicains. Bien que la mobilité résidentielle contribue également, elle demeure un déterminant secondaire de l'augmentation de la ségrégation partisane.

**Contribution.** Premièrement, ce chapitre de thèse enrichit le débat sur la ségrégation partisane et son évolution au cours du temps. Dans la sphère médiatique, cette vision est devenue dominante depuis [Bishop \(2009\)](#). Ce livre grand public documente une augmentation de l'homogénéité partisane. Pour autant, il n'y a pas de consensus scientifique sur ce sujet. [Fiorina \(2005\)](#), [Glaeser and Ward \(2006\)](#), et [Abrams and Fiorina \(2012\)](#) observent de très faible niveau de ségrégation partisane. Des études plus récentes ont mis en évidence des regroupements selon l'affiliation partisane, comme [Sussell \(2013\)](#), [Johnston, Manley, and Jones \(2016\)](#) ou [Kaplan, Spenkuch, and Sullivan \(2021\)](#). Cette littérature ne permet pas de capturer le niveau de ségrégation actuelle de l'électorat – leurs données étant agrégées au niveau des comtés-états ([Openshaw 1983](#)). Au contraire, [Brown and Enos \(2021\)](#) utilisent des données en coupe transversale pour observer la ségrégation partisane à des niveaux d'unités géographiques différents. Cependant, leur analyse reste essentiellement statique. Ce papier utilise deux sources de données de panel au niveau individuel couvrant la majorité de la population des Etats-Unis en âge de voter pour étudier les changements de la ségrégation partisane depuis 2008. Deuxièmement, nous mettons en lumière les causes de la ségrégation partisane. [Tiebout \(1956\)](#) défend que les individus pourraient choisir leur endroit d'habitation selon leurs préférences pour un certain niveau de politiques publiques. Par exemple, les démocrates pourraient se rassembler dans des quartiers avec un meilleur niveau d'infrastructures que les républicains. En contrepartie, leur niveau de taxation serait plus élevé. A la suite de ces travaux, un grand nombre d'articles se sont focalisés sur la mobilité résidentielle pour expliquer la ségrégation partisane ([Mc-](#)

Donald 2011; Tam Cho, Gimpel, and Hui 2013; Gimpel and Hui 2015; Strickler 2016; Mummolo and Nall 2017). Cependant, les flux migratoires au sein des Etats-Unis apparaissent trop petits pour expliquer l'étendue de la ségrégation partisane (Martin and Webster 2018; Lang and Pearson-Merkowitz 2015). D'autres papiers soulignent des explications alternatives à la montée de la ségrégation partisane. Cette dernière pourrait être la conséquence de la ségrégation économique (Gelman 2010; Hersh 2015) ou de la ségrégation raciale. Dans ce cas, les causes sous-jacentes de la ségrégation seraient similaires à celles de la concentration de la pauvreté ou des barrières culturelles, constatées par Massey and Denton (1993) ou par Rugh and Trounstine (2011). Les individus pourraient aussi changer leur préférence partisane pour s'aligner avec leur entourage. Plusieurs études soutiennent cette hypothèse : Huckfeldt and Sprague (1987) et Johnston and Pattie (2011) montrent que les préférences sont en mesure de s'aligner lorsque les individus vivent depuis un certain temps dans la même aire géographique. Notre chapitre complète cette littérature en décomposant entièrement les changements de la ségrégation partisane en changements de la population d'électeurs inscrits et en changements dans l'inscription partisane. Enfin, ce chapitre prend appui sur une vaste littérature portant sur la polarisation politique. Alors que la polarisation sur les politiques publiques apparaît limitée (DiMaggio, Evans, and Bryson 1996; Evans 2003; Fiorina and Abrams 2008; Levendusky and Pope 2011), les Etats-Unis voient une augmentation croissante de la polarisation sociale, conduisant à une augmentation des divisions partisans (Fiorina 2005; Jacobson 2004; Bafumi and Shapiro 2009; Abramowitz and Saunders 2008; Mason 2015). Plusieurs papiers récents montrent que l'augmentation de la polarisation affective est particulièrement large aux Etats-Unis. Parmi neuf pays de l'OCDE, les Etats-Unis voient l'augmentation de la polarisation affective la plus forte, au cours des quatre dernières décennies (Boxell, Gentzkow, and Shapiro 2020). La ségrégation géographique partisane peut contribuer à l'augmentation de la polarisation affective due à la distance sociale qu'elle génère entre les électeurs (Allport 1954; Iyengar, Sood, and Lelkes 2012; Iyengar and Westwood 2014; Enos 2015, 2017).

# Chapter 1

## Toxic Loans and Local Economic Activity: Evidence on the Costs of Public Debt Shocks

FIRST DRAFT

### Abstract<sup>1</sup>

This paper provides first evidence on the effects of local public debt shocks on economic activity for highly indebted local governments. It exploits two exogenous shocks on local public debt affecting French municipalities exposed to the Swiss Franc: i) an information shock in 2011 signaling the degree of their debt toxicity, and ii) a sudden rise in their debt repayment following the 2015 unpeg of the Euro/Swiss Franc. Using a difference-in-difference strategy and relying on plant-level data, I first find that negative press coverage on local public debt is sufficient to temporarily decrease the total number of hours worked and the wage bill of plants located in CHF-indebted municipalities. Compared to an information shock, an actual increase in local public debt triggers strong and persistent consequences on local economic activity, by increasing plant closures in highly-indebted municipalities. Overall, these findings suggest that plants forecast a rise in local business taxes or a decrease in public investment in impacted municipalities.

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# 1 Introduction

Can public debt impact economic activity? The question has long been debated in the scientific literature, starting with [Ricardo \(1817\)](#) and [Barro \(1979\)](#). It has made the headlines again during the world-wide Great Recession, when many countries experienced strong rise in public indebtedness and feared, as a result, consequences on their economic activity. While the relationship between government debt and economic growth has been extensively studied, both through theoretical and empirical studies, there is surprisingly scarce evidence on the potential impact of local public debt on economic activity ([Sauvagnat and Vallée 2021](#)).

Improving our knowledge on local public debt appears relevant for several reasons. First, among developed countries, many local governments are currently highly indebted, potentially affecting local economic activity. In the U.S. for instance, state and local governments have experienced a sharp increase in the level of debt securities and loans between 1990 and 2020 – from around \$1.65 trillion in 1990 to more than \$8.30 trillion in 2021 . In European countries, local government debt is non-negligible as well - with a total amount of €867.4 billion, representing more than 7% of the EU27's general government gross debt in 2020 . Second, as most of the literature has focused on central government debt, it has missed the particular features of local government debt and their potential implication for local economic activity. Unlike central governments, local governments often have to balance their operating budgets every year, as it is the case in France or in the U.S. In presence of budget shortfalls, they could be forced to react rapidly – either by increasing their local taxation, or by decreasing their expenditure or even by renegotiating their debt. As a result, local economic conditions could be directly impacted by an increase in public debt. Last, by focusing on local public debt, empirical studies can better identify exogenous public debt shocks, control for time-variant country characteristics and deal with a large number of observations. Here, the main empirical challenge is to find an institutional setting where the increase in debt burden does neither depend on local government characteristics nor on their local policies.

This paper overcomes these challenges by exploring a unique setting of exogenous local debt increase. Between 1996 and 2011, around 1,500 French municipalities contracted more than 3,000 structured loans with Dexia bank for a total amount of €8.94 billion. Through these financial contracts, municipalities have to repay fixed interest rates for the first years (on average between 2 and 7 years) before relying on variable

interest rates indexed on international underlying assets for a longer period of time. Among municipalities indebted with Dexia structured loans, 17% are exposed to the Swiss Franc foreign exchange rates (usually, the Euro or the Dollar). This study exploits this design by comparing the local economic conditions of CHF-exposed municipalities with non-CHF-exposed municipalities, indebted with other underlying assets. It relies on two exogenous events that differently impacted municipalities depending or not on their CHF-exposure: i) the disclosure of the Toxic Loan scandal in September 2011, and ii) the unpeg of the Swiss Franc from the Euro in January 2015. The disclosure of the Toxic Loan scandal can be viewed as an information shock on the debt stock of CHF-exposed municipalities – independently from their characteristics or their local policies. It released the name of involved municipalities, the name of the contracts (indicated their exposure or not to the Swiss Franc), and the excess interests theoretically incurred by borrowing municipalities. Importantly, excess interests were announced as particularly large for CHF-exposed municipalities, due to the strong appreciation of the Swiss Franc between mid-2008 and mid-2011. Nevertheless, the 2011 disclosure remains purely informational. In other words, there is no significant difference in terms of actual debt stock or even actual debt repayment between CHF-exposed and non-CHF-exposed municipalities, as many municipalities postpone their debt repayment in the immediate aftermath by renegotiating their loans or challenging them in court. In addition to the 2011 disclosure, this paper explores another event, which is also orthogonal to municipal decisions or policies. In January 2015, the Swiss National Bank decided to unpeg the Swiss Franc from the Euro leading to a strong and sudden appreciation of the Swiss Franc. This event negatively impacts the debt of French municipalities exposed to the CHF – leaving unchanged debt repayment and debt stock in other municipalities. While the 2011 disclosure should be seen as information shock on public debt that negatively exposed CHF-indebted municipalities *among* municipalities contracting with Dexia, the unpeg of the Swiss Franc in 2015 could be interpreted as an actual debt increase on CHF-exposed municipalities.

To identify and compare the economic impact of an adverse *information* shock on public debt from an *actual* increase in public debt, I rely on the hypothesis that conditional on contracting toxic loans, municipalities indebted with the Swiss Franc are similar to municipalities exposed to other underlying assets. Two points are consistent with this hypothesis. First, there is no evidence suggesting that Dexia bank selected particular municipalities to contract with on the Swiss Franc. As shown by [Cori and Le Gall \(2013\)](#), structured loans were instead considered as a sort of insurance against financial volatility – with municipalities themselves insuring Dexia on a variety of financial assets. Second, CHF-loans were not seen ex-ante as riskier financial products

among other structured loans. The Swiss Franc was particularly stable before the mid-2008, meaning that neither the bank nor the municipalities had any prior when they selected the Swiss Franc instead of another underlying asset. In line with the identification assumption, I do not find any large difference on observable variables between CHF-exposed municipalities and non-CHF-exposed municipalities.

Combining a Difference-in-Difference design with an Instrumental Variable strategy used by [Sauvagnat and Vallée \(2021\)](#), I rely on administrative and collected panel data at the plant and at the municipality level, to explore respectively the causal impact of negative press coverage on public debt and, the causal impact of an actual debt increase on local economic activity. In this paper, I make the two following contributions. First, I find that a negative information shock on local public debt can be sufficient to trigger slight change on local economic activity. In municipalities adversely impacted by the information shock, I observe a slight decrease in the number of hours worked and in the total wage bills in 2012, suggesting that plants located in these municipalities temporarily react to the information by adjusting their intensive margin. Second, I show that a sudden increase in local public debt leads to a significant rise in plant closures in affected municipalities. In terms of magnitude, a rise by €100 in municipal debt per inhabitant is associated with an approximate increase in plant closures by 2.8% per 10,000 inhabitants. The effect is strong and persistent – with CHF-exposed municipalities still experiencing relatively more plant closures in 2019 compared to their counterparts. Importantly, a rise in local public debt is sufficient to impact local economic activity – even in the absence of an increase in local tax rates or a decrease in municipal investment. Despite municipal efforts to mitigate the economic impact of local public debt, plants still forecast worse economic conditions in impacted municipalities. Local public debt appears therefore as an important driver of economic activity.

This paper is related to several strands of the literature. First, it relies on the large literature studying public debt and its economic impact. Earlier studies either focus on Ricardian equivalence ([Leiderman and Razin 1988](#); [Evans 1988, 1991](#)) or on the channels through which public debt can negatively affect economic activity – such as sovereign risk spillovers ([Corsetti et al. 2013](#)), higher distortionary taxation ([Barro 1979](#); [Dotsey 1994](#)), lower public expenditure ([Aizenman, Kletzer, and Pinto 2007](#)) or higher inflation ([Cochrane 2011](#)). Since then, several empirical studies have emerged on the impact of public debt on economic activity. One strand of this literature relies on cross-section variation to estimate local fiscal multipliers ([Cohen, Coval, and Malloy 2011](#); [Chodorow-Reich et al. 2012](#); [Nakamura and Steinsson 2014](#); [Suárez Serrato and](#)

Wingender 2016). Other papers focus on the effects of public debt on economic growth using cross-country comparison with usually mixed results; such as Schclarek (2004) on industrial and developing countries or Reinhart and Rogoff (2010) on 20 developed countries. At the local level, evidence is particularly scarce – even if it would provide better identification settings by controlling for endogenous shock at the national level. To the best of my knowledge, there are only three empirical studies focusing on local public debt: Cornaggia, Cornaggia, and Israelsen (2018) study the impact of credit ratings on municipal bond prices; Sauvagnat and Vallée (2021) use the toxic loan setting to explore how a local debt increase affects municipal budgets and electoral chances of incumbent mayors; and Adelino, Cunha, and Ferreira (2017) look at how Moody’s recalibration expands debt capacity and local government spending to improve local economic condition. This paper contributes to this literature by investigating instead for the first time, using plant-level data, how a high level of indebtedness *incurred by* local government can negatively affect local economic activity.

Second, this paper is related to the recent literature using quasi-experimental settings to identify the causal impact of indebtedness on various economic agents. Agarwal et al. (2017), Di Maggio et al. (2017), Ganong and Noel (2019) explore exogenous debt payment reductions to show that borrowing households are more likely to experience a lower probability of default and to increase spending on durable goods. Gilje (2016) uses quasi-random shocks to identify the causal impact of an increase in firm leverage on risk-shifting.<sup>2</sup> Closer to my empirical setting, Verner and Gyöngyösi (2020) exploit variation in exposure to household foreign currency debt as an exogenous shock on household debt burden. They find a decline in local demand, with negative spillover effects. This article contributes to this literature by exploring for the first time a quasi-experimental design disentangling an exogenous *information* shock on public debt from an *actual* exogenous increase in public debt.

Finally, this paper relies on an emerging literature investigating the aftermath of highly-risky financial innovation. Pérignon and Vallée (2017), Gyongyosi and Verner (2020a), Sartre, Daniele, and Vertier (2020) explore the political aftermath of financial innovation – studying its impact on populism or its consequences on the likelihood of reelection for the incumbent. Sauvagnat and Vallée (2021) analyze its effect on municipal budgetary outcomes. This article focuses instead on the effects of highly-risky financial innovation on local economic activity.

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<sup>2</sup>In parallel, a growing number of empirical studies rely on credit shocks to either focus on the role of household leverage (Mian, Rao, and Sufi 2013; Mian and Sufi 2014a,b) or on the role of firm leverage (Giroud and Mueller 2017; Chodorow-Reich 2014; Greenstone, Mas, and Nguyen 2020; Bentolila et al. 2018) during the Great Recession.

The remainder of the paper is organized as follows. Section 2 presents the institutional setting and the data. Section 3 describes the empirical strategy. Section 4 investigates the economic impact of an information shock on local public debt. Section 5 explores the economic aftermath of an actual increase in local public debt. Section 6 concludes.

## 2 Institutional setting and Data

### 2.1 Institutional setting

#### Toxic Loans and Dexia Bank

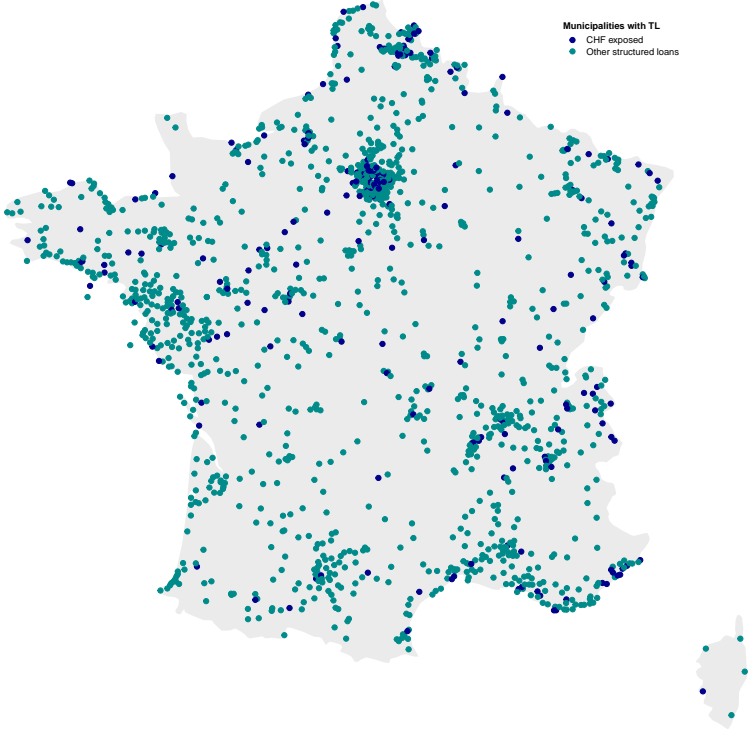
Many European local governments had relied on structured products before the Global Financial crisis (Sauvagnat and Vallée 2021). In France, structured loans were particularly widespread, involving several layers of local governments (such as regions, French departments, establishments of inter-municipal cooperation and municipalities). In 2011, 15% of the debt of French municipalities were contracted through structured loans. At that time, Dexia bank was the main source of funding for the public sector (Cour des Comptes 2013) and granted a large share of structured products. According to an investigation report written by the National Assembly (Bartolone and Gorges 2011), Dexia had a 70% market share for structured loans in 2011.

Before being labelled as “Toxic Loans” by the media, structured loans were speculative instruments. Local governments enjoyed low fixed interest rates for the first years before relying on variable interests, indexed on financial underlying assets. The average maturity was around 19 years but could sometimes go up to 50 years. There were various types of underlying assets, such as inter-bank offered rates, constant maturity swap, inflation or foreign-exchange rates. Among municipalities indebted with structured products, around 17% were exposed to CHF exchange rates (usually the Euro/Swiss Franc or the Dollar/Swiss Franc exchange rates). As detailed by Sauvagnat and Vallée (2021), given the structure of the contracts, an appreciation of the CHF against another currency of 0.01 usually raises the interest rate by 0.5% to 1% when the option is in the money. Due to the long maturity of their loans, CHF-indebted municipalities have a long-lasting exposure to the CHF appreciation.

At the time the contracts were signed, there was no evidence suggesting that CHF-exposed municipalities differed from non-CHF exposed municipalities, conditional on

contracting toxic loans. First, CHF exchange rates were considered as particularly stable before the financial crisis. Thus the subsequent appreciation of the Swiss Franc was not forecast ex ante, neither by the bank nor by the municipalities. Importantly, a large part of CHF-exposed municipalities contracted on the Swiss Franc before 2008. Only 12% signed for a loan exposed to CHF after 2008. It confirms that CHF-exposed municipalities were mostly unaware of their riskier position - compared to their counterparts. Second, there is no evidence that Dexia bank itself selected particular municipalities on the Swiss Franc. According to journalists [Cori and Le Gall \(2013\)](#), Dexia bank used instead these structured products as a way to be insured against financial volatility, once the options were in the money. Figure 1.1 displays the map of the 1,586 municipalities which contracted toxic loans before 2011 with Dexia bank. Municipalities exposed to the CHF are in darker blue while other municipalities are featured in green. CHF-exposed municipalities are located all over the territory and there is no evidence suggesting geographic clustering according to their exposure.

Figure 1.1: Map of CHF-exposed Municipalities



Note: The map features all French municipalities which contracted Toxic Loans with *Dexia* bank before 2011. Municipalities with (resp. without) exposure to the CHF are featured in darker blue (resp. in green). *Data source:* *Libération* newspaper.

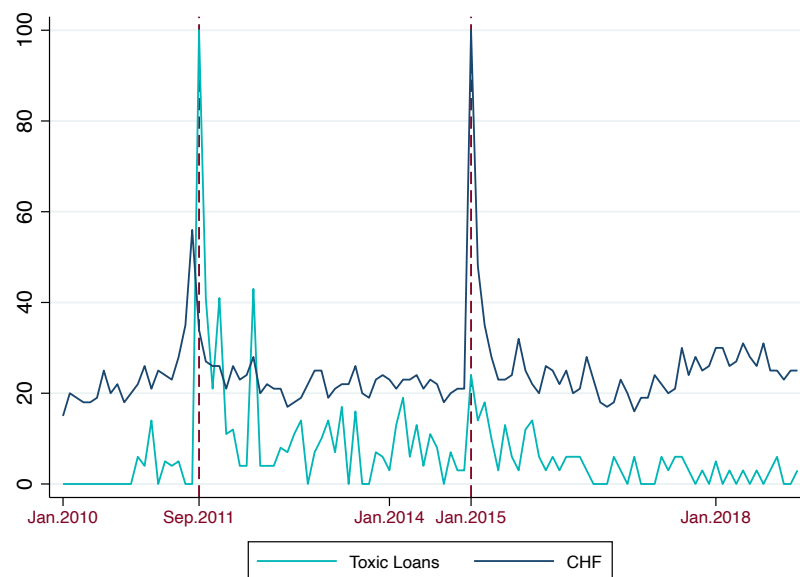
## The Toxic Loan Scandal disclosure (2011)

In September 2011, the national newspaper *Libération* released on its website a confidential file detained by Dexia. They disclosed for the first time the name of all French municipalities which had contracted structured loans with Dexia bank. As shown by Appendix Figure 1.13, the map features various colored dots indicating for each municipality the degree of ex-post toxicity of the loans. The rare dots in green represent municipalities that benefit from structured loans (i.e., their interests are lower than the original fixed interest rate for which the contract was signed). The darker the dots are, the higher the amount of excess interests is announced. By clicking on each dot, citizens easily have access to detailed information concerning all the loans that their municipalities had contracted: such as the borrowed amount, the estimated excess interests, the date of contracting, the end date of the contract and the counterpart bank.

The disclosure of the Toxic Loan scandal occurred at a time where negotiations on a bail-out of Dexia were being held. However, the information was really unlikely to be anticipated by municipalities or economic actors. First, mayors were not required to disclose their loan contract during municipal councils (Pérignon and Vallée 2017). The only publicly-available information was the total amount of debt and the annual repayment that the municipality incurred. Second, mayors had no particular incentives to reveal the type of loan contracts they selected, if they want to be reelected (Sartre, Daniele, and Vertier 2020). Third, looking at Google trends, there is no virtual request for the French translation of the word “Toxic Loan” before the disclosure by *Libération* (Figure 1.2). In September 2011, when the information was revealed, a large spike of requests occurred before decreasing to a level higher than before. It seems therefore convincing that economic actors were mostly unaware of these loans before the 2011 disclosure.

CHF-exposed municipalities were highly-profiled in the press. Once the map of *Libération* was online, it was relatively easy for journalists and for an informed audience to disentangle CHF-exposed municipalities from other indebted municipalities. The names of the toxic-loan contracts are indeed particularly explicit. CHF-linked loans are named either after the word “CHF” or after the word “Swiss” (such as “Tofix Digi Swiss Flexi” or “Tofix Dual EUR-CHF”). As a result, there is a large number of journalistic articles published in 2011 on Toxic Loans and the Swiss Franc exchange rate. Figure 1.3 displays two bar charts: on the right, the frequency of each underlying asset among *Dexia* toxic-loan contracts; on the left, the number of articles mentioning the word “Toxic Loans” and the name of at least one underlying asset, among the

Figure 1.2: Google Trends for the words *Toxic Loans* and *Swiss Franc*



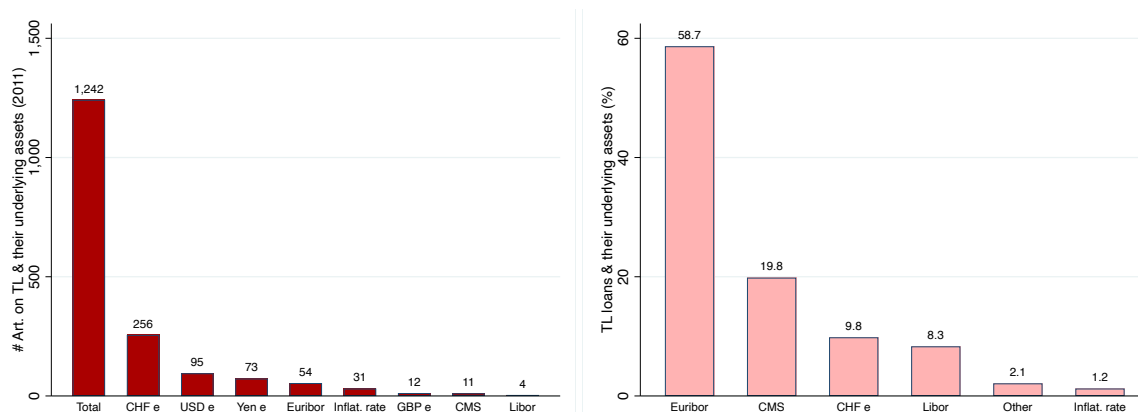
Note: The graph plots Google trend indices for the word *Toxic Loans* in green and for the word *Swiss Franc* in darker blue. The first vertical red line indicates the disclosure of toxic loans by the French newspaper *Libération* on September 20, 2011. The second vertical red line displays the strong appreciation of the Swiss franc following its sudden unpeg by the Swiss National Bank on January 15, 2015.

1,242 articles published in 2011 on “Toxic Loans”. Surprisingly, structured loans on CHF only represent 10% of all the toxic-loan contracts granted by Dexia. However, compared to other underlying assets, there are particularly well exposed in the media – with 256 press articles mentioning the French translation for the words Toxic Loans and Swiss Franc (or CHF) in 2011. CHF-indebted municipalities were also more featured in the press than non-CHF-indebted municipalities, with other exposures. Table 1.1 displays the average number of press articles published in 2011 mentioning the name of one municipality. While most municipalities were not mentioned in the press (i.e., the average is equal to 0.18), there was around 1 press article published on average per CHF-indebted municipality.

CHF-indebted municipalities were well covered in the press for two reasons. First, their debt was perceived as particularly “toxic” in 2011. Table 1.1 features the overhead ratio announced by *Libération* based on the files detained by Dexia. The overhead ratio is a measure of the ex-post toxicity of the debt. It is defined as the sum of excess interests divided by the total amount of the structured products contracting with Dexia. During the financial crisis, there was a strong appreciation of the Swiss Franc – with the EUR/CHF going from 1.65 in November 2007 to 1.13 in July 2011. As the result, the overhead ratios computed by Dexia for CHF-exposed municipalities are definitely higher on average compared to other municipalities (26% vs 9%). Second, the Swiss



Figure 1.3: Number of articles published in 2011 on Toxic Loans and their underlying assets vs. Frequency of Toxic Loans per underlying asset



Note: The bar chart on the left features the number of journalistic articles published in 2011 containing the word *Toxic Loan* and the type of underlying asset - *Data source:* Factiva. The bar chart on the right describes the frequency of each underlying asset among *Dexia* toxic-loan contracts.

National Bank announced on September 6, 2011 (i.e. 14 days before the *Libération* disclosure) a floor on the EUR/CHF exchange rate of 1.2. This event contributes to the high-profile of CHF-indebted municipalities in the media. It does not remove however the high toxicity of their debt. As most municipalities contracted CHF-toxic loans before 2008, the EUR/CHF is fixed at a lower bound, which implies in theory very high interest rates (unfortunately stable) for the upcoming years in these municipalities.

Table 1.1: Media coverage in 2011 - CHF exposed vs Other structured loans

CHF-exposed Municipalities vs Not					
	Av. w/o CHF (1)	N (1)	Av. w/ CHF (2)	N (2)	Diff.
# Articles (2011)	0.18	1,245	1.07	218	0.89***
Overhead ratio	0.09	1,245	0.24	218	0.15***

Note: The table displays the number of journalistic articles published in 2011 containing the word "*Toxic Loans*" and the name of each municipality, either exposed to CHF (2) or to other structured loans (1) - *Data source:* Factiva. The overhead ratio is defined as the excess interests divided by the total amount of the loans. This variable was computed by *Dexia* for each involved municipality. The information was revealed by the journal *Libération*. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

After the disclosure by *Libération*, many municipalities renegotiate their loans with the bank or even challenge them in court – postponing their debt repayment ([Cori](#)

and Le Gall 2013). The first sentences were generally in favor of municipalities as the overall effective interest rate was not always indicated in the contracts (Pérignon and Vallée 2017). On July 29th 2014, a law was passed enacting however the retroactive validity of the contracts.

CHF-exposed municipalities could have higher debt stock and higher annual repayment than non-CHF exposed municipalities – depending on their total amount of indebtedness contracted over time. However, the disclosure of the Toxic Loan scandal does not imply an actual sudden increase in local debt, neither for non-CHF-exposed municipalities nor for CHF-exposed municipalities. The 2011 disclosure appears as an information shock on local public debt, where CHF-exposed municipalities are presented as indebted with higher-risky products than their counterparts.

### **The Unpeg of the Swiss Franc**

On January 15, 2015, the Swiss National Bank (SNB) announced the unpeg of the Euro/Swiss Franc exchange rate. This decision was taken in the aftermath of the strong appreciation of the Dollar against the Euro at the end of 2014, which leads to the depreciation of the Swiss Franc against the Dollar. The decision was nevertheless sudden and unanticipated. On January 14, 2015, the Vice-President of the SNB even declared that the floor on the Euro/Swiss Franc should be maintained.

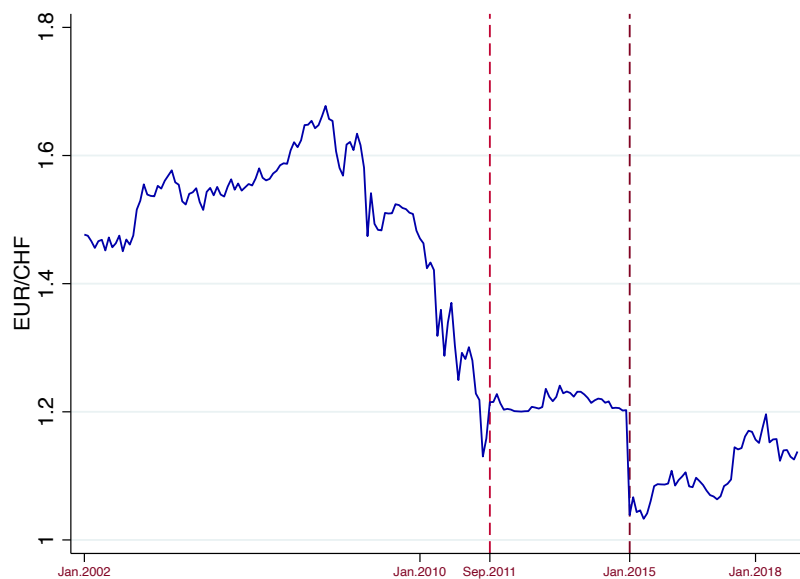
Figure 1.4 plots the Euro/Swiss Franc exchange rate over time. While the EUR/CHF remains stable between September 2011 and January 2015, the Swiss Franc strongly appreciates against the Euro on January 2015. This appreciation is particularly large and brutal relative to exchange-rate fluctuations in advanced economies. Compared to December 2014, the Euro/CHF appreciated by more than 20% in January 2015, with the gap remaining large for the following years.

This shock impacted CHF-exposed municipalities in a different way than municipalities indebted with other structured loans. Contrary to the 2011 disclosure, the strong appreciation of the CHF led to a sharp increase in the debt burden of CHF-exposed municipalities (Sauvagnat and Vallée 2021). After the law enacting the retroactive validity of the toxic-loan contracts, a relief fund was created by the central government. It enables to restructure municipal debt through an average refund of 50% of the early loan repayment fees. In exchange, municipalities should abandon judicial litigation. The program payments started in 2016 and covered 578 local governments, including nearly all municipalities exposed to the CHF. As a result, the CHF appre-

ciation led to a short-term rise in annual repayment and a long-term increase in debt stock.

The Unpeg of the Euro/Swiss Franc exchange rate can be interpreted as an exogenous shock on local public debt which affects CHF-exposed municipalities. Compared to 2011, toxic loans were less mentioned in the press at that time. Looking at Google trends for the French translation of the words “Swiss Franc” and “Toxic Loans”, there are indeed less Google requests for the word “Toxic Loans” in 2015 compared to 2011 (Figure 1.2).

Figure 1.4: The Euro-Swiss Franc exchange rate



Note: The graph plots the Euro/Swiss franc exchange rate at the monthly frequency between January 2002 and January 2019. The first vertical red line indicates the disclosure of toxic loans by the French newspaper *Libération* on September 20, 2011. The second vertical red line displays the strong appreciation of the Swiss franc following its sudden unpeg by the Swiss National Bank on January 15, 2015.

## 2.2 Data

This paper combines collected and administrative datasets at the municipality level.

**Structured loan data.** Structured loan data were collected based on the interactive map available on the *Libération* website. It contains detailed information on 3,016 structured loans contracted with Dexia by 1,586 municipalities. The name, the starting and end dates of the contract, the total amount of the loans and the overhead ratios are publicly available. As in [Sartre, Daniele, and Vertier \(2020\)](#), I use the names of the contracts to identify municipalities exposed to the CHF.

**Municipalities's characteristics.** Data on municipal budgets are provided by the French Ministry of Economy and Finance (DGFIP) from 2002 to 2019. It enables to explore how the 2011 disclosure and the unpeg of the Euro/Swiss Franc exchange rate affect the debt burden of CHF-exposed municipalities. Variables such as municipal investment, debt stock and annual debt repayment are collected. They are completed by datasets on the local taxation of French municipalities, available through the Inventory of local taxation ("REI") from 2002 to 2019. All local tax rates are available, whether they are decided by regions, French departments, establishments of inter-municipal cooperation (hereafter EIMC) or municipalities. To study the impact of local debt shocks on economic activity, this paper focuses on the three local taxes incurred by plants and firms in the municipality where they are located: the business tax, the property tax on developed land and the property tax on undeveloped land. Data on legal population and municipal characteristics are delivered by censuses, conducted by the National Institute of Statistics and Economic Studies (INSEE). Population characteristics – such as the share of homeowners, the level of education and unemployment rate – are publicly available.

**Plant's characteristics.** To study the economic impact of local debt shocks, this paper relies on two administrative datasets providing plant-level information. I use French Social Security data (DADS) at the establishment level between 2002 and 2015. Each establishment has a unique identifier, named as the SIRET, as long as they stay in the same place. The DADS data deliver detailed information at the plant level – such as the location of the plant, the firm identifier, the number of employees, gross and net wage bills, the total number of hours worked, the sector of the plant as well as the legal status of the plant (such as the individual-entrepreneur status). Unfortunately, the DADS data at the establishment level ended in 2015. I therefore complete the DADS data with another administrative dataset: the SIRENE directory. The latter is established at the plant level and keep track of all plants created in France since the 70's. It provides several information, such as municipality identifiers, creation year and year of closure. To observe whether or not a plant has changed of location (and at the same time of SIRET identifier), I also rely on the SIRENE directory, assembling almost exhaustively all the successors and predecessors of an establishment.

## 3 Identification strategy

### 3.1 Sample of analysis

This paper wants to assess the economic impact of two events which affect CHF-exposed municipalities: i) a negative information shock on local public debt, and ii) an adverse shock on the public debt of highly-indebted local governments. To do so, I want to estimate, respectively, the causal effects of both shocks on CHF-exposed municipalities. CHF-exposed municipalities are included in the treatment group. Municipalities with other underlying assets are in the control group.

I use a balanced panel of municipalities located in metropolitan France and in Corsica, excluding overseas territories. To make sure that CHF-exposed municipalities did not select voluntarily riskier-loans than their counterparts, I focus on municipalities that contracted all their structured products on CHF before 2008 and the subsequent appreciation of the Swiss Franc. These municipalities represent 88% of the total number of CHF-exposed municipalities. The control group contains municipalities which are not exposed to the Swiss Franc but are indebted with other underlying assets. The control group appears as a natural counterpart for CHF-exposed municipalities, as both the treatment and the control groups select themselves into contracting structured products with Dexia.<sup>3</sup> Note that the control group is also impacted by the 2011 disclosure on debt toxicity. In that sense, any negative impact of the 2011 disclosure on CHF-exposed municipalities should be interpreted as a lower bound estimate. To improve comparability between the treatment and control groups, I finally choose to restrict the sample to municipalities over 1,000 inhabitants, as all CHF-exposed municipalities are over 1,000 inhabitants.

The final main sample of analysis at the municipality level is a balanced panel of 1,463 municipalities, with 218 municipalities in the treatment group and 1,245 municipalities in the control group. All these municipalities represent around 12% of the municipalities above 1,000 inhabitants in France. Due to the small number of municipalities, regressions are conducted on a long period of time, starting from 2002 to 2019. I also complement the analysis by running regressions at the plant level using DADS data, from 2002 to 2014. The treatment group corresponds to the plants located in CHF-exposed municipalities and the control group includes all the plants located in

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<sup>3</sup>Comparing CHF-exposed municipalities with municipalities non-indebted with structured loans would raise instead concerns of strong endogeneity issues, as explained by [Sartre, Daniele, and Vertier \(2020\)](#)

municipalities with other exposures - excluding the agricultural and public sectors as well as individual entrepreneurs.

Table 1.2 provides descriptive statistics on the treatment group in 2011 and compares CHF-exposed municipalities with the control group. The first panel displays the toxic-loan characteristics of the municipalities. On average, CHF-exposed municipalities have more structured loans than non-CHF-exposed municipalities (3.07 vs. 1.68) and their loans are described as highly toxic by the newspaper *Libération* than the ones of their counterparts. The share of excess interests per loan amount is 1ppt higher in CHF-exposed municipalities than in non-CHF-exposed municipalities. The contracting year of the first structured loan is globally the same. The second panel features plant characteristics. Local economic activity in CHF-exposed municipalities is very similar to the one in indebted municipalities with other exposure. There is no significant difference for the number of plants, the number of new plants created, the number of plant closures, gross wages per capita and hours worked per capita. The only difference concerns the number of employees but in terms of magnitude, the difference is relatively small (4,554 vs. 4,022). The population is relatively similar among the treatment and control groups. Adult population is as likely to attend graduate schools. There are slightly less homeowners in CHF-exposed municipalities and higher unemployment (resp. 0.53 vs. 0.61 and 0.12 vs. 0.11). Population is however clearly larger in CHF-exposed municipalities. The empirical strategy accounts for this difference by including municipal fixed effects and controlling for the number of inhabitants in robustness checks. The last panel looks at the differences in terms of municipal budgets, between CHF-exposed municipalities and the control group. Debt stock, annual debt repayment and municipal investment are computed for an average municipality of 10,000 inhabitants. Unsurprisingly, debt stock and annual debt repayment are higher in CHF-exposed municipalities in 2011 than in non-CHF exposed municipalities – due to their higher amount of debt contracting over time. It does not mean however that the debt burden of CHF-exposed municipalities increases relatively more over time than the debt stock of the control group, at least before the unpeg of the Euro/Swiss Franc exchange rate. Section 3.2 investigates it properly and determines whether or not the 2011 disclosure can be interpreted as a pure information shock on local public debt. Contrary to the level of indebtedness, there is no significant difference on the level of investment between CHF-exposed municipalities and the control group. The local tax rates are also similar. There is no significant difference on the business tax rate or on the property tax rate on developed land incurred by establishments located in these municipalities. The property tax rate on undeveloped land is significant at 5% and slightly lower in CHF-exposed municipalities (60.30 vs. 65.92). It mostly concerns

however the agricultural sector. The empirical strategy accounts for this potential difference by including progressively these variables as controls.

CHF-exposed municipalities are therefore similar to non-CHF exposed municipalities on observable variables – apart their level of debt and their number of inhabitants. It is reassuring for the identification strategy as similar treatment and control groups are more likely to display parallel trends in the outcomes of interest.

### 3.2 Information shock vs. Debt shock on local public debt

In Section 2, the 2011 disclosure appears as an information shock on local public debt. It implies that the change in the debt burden of CHF-exposed municipalities should be similar over time to the change in debt burden of non-CHF-exposed municipalities *until* the strong appreciation of the Swiss Franc exchange rate in 2015. In other words, it would mean that the CHF-exposure does not imply an *actual* increase in the debt burden of municipalities, compared to other exposures.

To test whether or not this interpretation is valid, I regress the following equation:

$$Y_{m,t} = \alpha + \sum_{k=2003}^{2019} \beta_k (\mathbb{1}_{t=k} \times \mathbb{1}_{treated_m=1}) + \delta_t + \theta_m + \epsilon_{m,t} \quad (1.1)$$

Where municipalities are indexed by  $m$  and year by  $t$ .  $Y_{m,t}$  either stands for debt stock or annual debt repayment, both divided by legal population.  $\mathbb{1}_{t=k}$  is a dummy variable equal to 1 for year  $k$ .  $\mathbb{1}_{treated_m=1}$  is a dummy variable equal to 1 for CHF-exposed municipalities (treatment group) and 0 for municipalities with other exposure (control group).  $\delta_t$  and  $\theta_m$  are time and municipality fixed effects, respectively. The inclusion of municipality fixed effects enables to control for any time-invariant unobserved factors. The inclusion of year fixed effects captures all changes that affect in the same way treated and non-treated municipalities. Standard errors are clustered at the municipality level. All coefficients are normalized relatively to 2002 (i.e., the starting year of the dataset).

Figure 1.5 plots the coefficients of the leads-and-lags regression for the debt stock per capita. Vertical lines feature the 95-percent-confidence intervals. Years 2011 and 2015 are represented by red-dotted-vertical lines. The debt stock per capita of CHF-exposed municipalities slightly increases over time but the difference is not significant at 5% until the sudden increase in 2015. It remains significantly higher afterwards. Interestingly, there is no significant difference in 2011, suggesting that the 2011 disclosure remains an information shock.

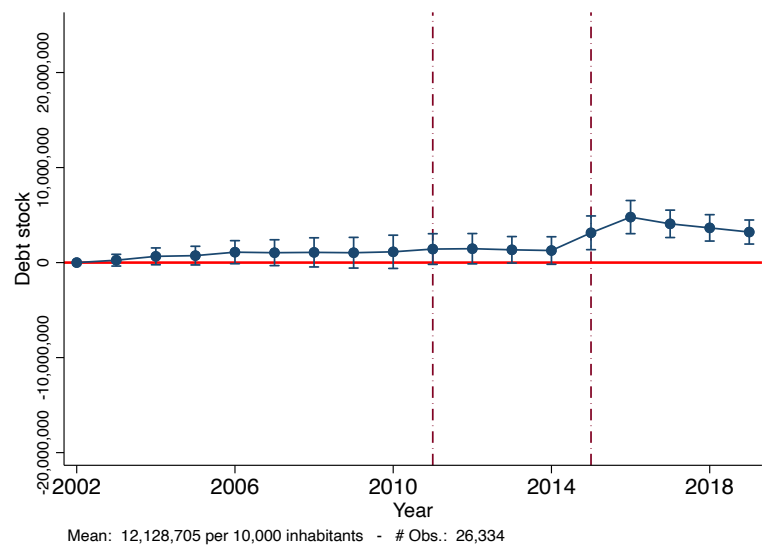
Table 1.2: T-test - CHF-exposed Municipalities vs. Other exposures

<b>CHF-exposed Municipalities vs. Not</b>					
	Av. w/o CHF (1)	N (1)	Av. w/ CHF (2)	N (2)	Diff.
<b>Loan characteristics</b>					
# Loans	1.68	1,245	3.07	218	1.39***
Contracting year	2005.98	1,245	2005.48	218	-0.50***
Sh. Excess i.	0.02	1,245	0.03	218	0.01***
<b>Plant characteristics</b>					
# Plants	1,363.62	1,245	1,402.85	218	39.23
Plant creation	146.45	1,245	153.63	218	7.18
Plant creation (w/o Agri. or Indi.)	20.21	1,245	20.58	218	0.37
Plant closure	104.19	1,245	109.35	218	5.15
Plant closure (w/o Agri. or Indi.)	14.45	1,245	14.92	218	0.47
# Employees (w/o Agri. or Ind)	4,022.87	1,245	4,554.51	218	531.65**
Total gross wages (pc)	6,980.56	1,245	7,541.11	218	560.54
# h. worked (pc)	416.91	1,245	441.63	218	24.73
<b>Population characteristics</b>					
Higher education	0.24	1,245	0.25	218	0.01
Owners	0.61	1,245	0.53	218	-0.08***
Unemployment.	0.11	1,245	0.12	218	0.01***
Population	14,362	1,245	26,738	218	12,376.89***
<b>Municipal budgets</b>					
Debt stock	11,871,854	1,245	17,317,964	218	5,446,109.78***
Annual repayment	1,438,125	1,245	1,983,972	218	545,846.27***
Investment	3,606,761	1,245	3,843,595	218	236,834.62
Prop. $\tau$ (undev.)	65.92	1,245	60.30	218	-5.62**
Prop. $\tau$ (dev.)	39.36	1,245	39.64	218	0.28
Business $\tau$	26.42	1,245	27.10	218	0.68*

Note: Toxic Loan characteristics are displayed by the journal *Libération*. Plant characteristics come from the DADS and the SIRENE data. All variables (except total gross wages and hours worked) are featured for an average municipality of 10,000 inhabitants in 2011. The number of plants, plant creation and plant closure come from the SIRENE dataset and include the agricultural and public sectors, as well as individual entrepreneurs. The number of employees, and, plant creation or plant closure mentioning "w/o Agri. or Indi." are computed based on the DADS and exclude the agricultural and public sectors, as well as individual entrepreneurs. Population characteristics in 2011 are delivered by the Census. Debt stock, Annual repayment and Investment are computed for an average municipality of 10,000 inhabitants in 2011 - based on the DGFIP data. Property tax rate on developed land / on undeveloped land, and Business tax rate come from the REI data in 2011. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.



Figure 1.5: Municipal debt stock over time



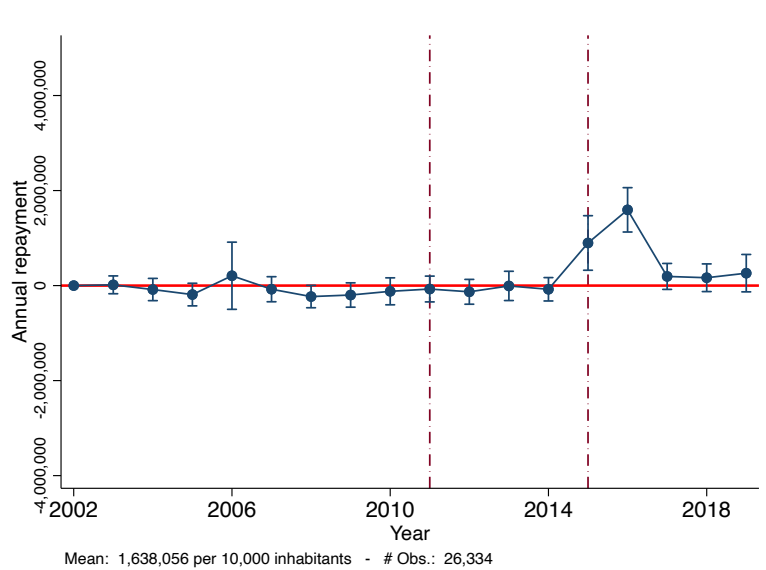
Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the municipal debt stock per 10,000 inhabitants (using legal population at time  $t$ ). The reference year is 2002.

The debt burden of municipalities can be also featured by the level of annual debt repayment (i.e., the interests that municipalities should repay annually). Figure 1.6 plots the coefficients of the leads-and-lags regression for annual debt repayment per capita. In line with Figure 1.5, there is no significant difference at 5% between CHF-exposed municipalities and non-CHF-exposed municipalities until 2015. In 2015, there is a sudden and strong increase in the annual debt repayment of CHF-exposed municipalities compared to municipalities with other exposures. The increase was not permanent as the relief fund created by the State partially alleviated the debt burden of CHF-exposed municipalities.

The 2011 disclosure can be therefore interpreted as an information shock signaling, among toxic-loan borrowers, the relatively high toxicity of the CHF exposure. Compared to other municipalities indebted with toxic loans, changes in the debt burden of CHF-exposed municipalities were not significantly higher. Several explanations could be at stake. First, many municipalities were partially protected against the strong appreciation of the Swiss Franc exchange rate in 2008 as most options were not in the money at that time.<sup>4</sup> Second, Dexia bank disclosed the ex-post toxicity of the loans that they computed but several municipalities were apparently not aware in 2011 of the degree of ex-post toxicity of their loans and contested it (Cori and Le Gall 2013). Such anecdotal evidence should be taken with caution but it appears at least that some

<sup>4</sup>As Table 1.2 features, municipalities indebted with CHF contracted their structured loan a little bit earlier than non-CHF municipalities in 2005.

Figure 1.6: Annual debt repayment over time



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the annual debt repayment in a municipality per 10,000 inhabitants (using legal population at time  $t$ ). The reference year is 2002.

municipalities did not repay the extent of their debt before 2011. Finally, many municipalities renegotiate their loans to prevent the increase in their debt burden. Following the 2011 disclosure, at least one hundred municipalities even challenged their structured loans in court, suspending temporarily their repayment. In 2014, a law enacted the retroactive validity of the loans prevented municipalities to cancel their loans. In some sense, CHF-indebted municipalities were more exposed to the appreciation of the Swiss-Franc in 2015 than they were during the financial crisis.

### 3.3 Specifications and Identifications

#### Causal impact of a negative information shock on local public debt

I want to estimate the following specification for all municipalities in the main sample of analysis, between 2002 and 2014.

$$Y_{m,t} = \alpha + \beta(\mathbb{1}_{t>2011} \times \mathbb{1}_{treated_m=1}) + \delta_t + \theta_m + \epsilon_{m,t} \quad (1.2)$$

Where  $Y_{m,t}$  is the number of plant closures or the number of plant creations in municipality  $m$  at time  $t$ .  $\mathbb{1}_{t>2011}$  is a dummy variable equal to 1 for years after the 2011 disclosure, starting in 2012.  $\mathbb{1}_{treated_m=1}$  is a dummy variable equal to 1 for CHF-exposed municipalities (treatment group) and 0 for non-CHF exposed municipalities.  $\delta_t$  and  $\theta_m$  are respectively time and municipality fixed effects to capture i) for all time-invariant

unobserved factors, and ii) for all changes affecting in the same way the treatment and control groups.

Like [Tricaud \(2021\)](#), plant creation and plant closure are standardized to give the same weight to municipalities of different sizes. Each outcome is divided by the current population at time  $t$  and then multiply by 10,000. It represents the number of plant closures (resp. of plant creations) in an average municipality of 10,000 inhabitants. The identification assumption is that CHF-exposed municipalities and municipalities with other exposures would have evolved in the same way over time absent the disclosure of the degree of toxicity of their debt in 2011. Under this assumption,  $\beta$  captures any deviation from a parallel evolution between the treatment and control groups due to the 2011 disclosure.

**Selection into treatment.** The first concern would be that CHF-exposed municipalities would select themselves into treatment. It could be possible if municipalities were aware at the time of the contracts were signed of the higher ex-ante toxicity of their loans (i.e. of their higher level of riskiness). To alleviate this concern, I select only CHF-exposed municipalities that contracted all their loans on the CHF before the strong appreciation of the Swiss Franc in 2008. As previously seen in [Table 1.2](#), the treatment and control groups appear similar on their economic and socio-demographic characteristics. The main assumption is that the treatment and control groups experience parallel trends in the absence of the 2011 disclosure. While this assumption cannot be tested, I check for the presence of pre-trends by plotting the coefficients of the following leads-and-lags regression:

$$Y_{m,t} = \alpha + \sum_{k=2002}^{2019} \beta_k (\mathbb{1}_{t=k} \times \mathbb{1}_{treated_m=1}) + \delta_t + \theta_m + \epsilon_{m,t} \quad (1.3)$$

Where  $\mathbb{1}_{t=k}$  is a dummy variable equal to 1 for year  $k$ . All coefficients should be normalized relative to 2011. The presence of any pre-trends can be discarded if all coefficients before 2011 are not significant. To be sure that any differences in terms of debt burden of the municipalities do not affect the results, I check whether the causal estimates are robust to the progressive inclusion of time-varying controls (e.g. population, debt-stock per capita, municipal investment per capita and local tax rates).

**Control municipalities.** As mentioned earlier, control municipalities are certainly impacted by the 2011 disclosure as their loans were also labelled as toxic – even if lower levels of ex-post toxicity were reported and their profile were less covered in the media. Any negative economic impact of the 2011 disclosure on CHF-exposed municipalities should be therefore interpreted as a lower bound of our estimates. Testing at the plant

level, I rely on the DADS data to exclude the agricultural and public sectors as well as individual entrepreneurs. I then run the following regression using a balanced sample at the plant level:

$$\ln(Y_{p(m),t}) = \alpha + \sum_{k=2002}^{2014} \beta_k (\mathbf{1}_{t=k} \times \mathbf{1}_{treated_{p(m)}=1}) + \delta_t + \mu_{p(m)} + \mu_{t,Dep} + \epsilon_{p(m),t} \quad (1.4)$$

Where plants are indexed by  $p$  and year by  $t$ .  $Y_{p(m),t}$  stands for the number of hours worked, the number of employees or the wage bill of plant  $p$  located in municipality  $m$  at time  $t$ .  $\mathbf{1}_{t=k}$  is a dummy variable equal to 1 for year  $k$ .  $\mathbf{1}_{treated_{p(m)}=1}$  is a dummy variable equal to 1 for plants located in CHF-exposed municipalities (treatment group) and 0 for plants located in municipalities with other exposures (control group).  $\delta_t$  and  $\mu_{p(m)}$  are time and plant fixed effects, respectively. The inclusion of plant fixed effects enables to control for time-invariant unobserved factors at the plant and municipality level. The inclusion of year fixed effects captures all changes that affect in the same way plants located in CHF-exposed municipalities and plants located in municipalities with other exposures. I add department-year fixed effects to capture changes in local labor markets. All coefficients are normalized relatively to 2011. If all coefficients are not significant before 2011, I do not reject the null hypothesis that plants located in CHF-exposed municipalities follow similar trends than plants located in non-CHF exposed municipalities in the absence of the 2011 disclosure. I also conduct robustness tests, controlling for time-varying observable characteristics at the municipality level.

### **Causal impact of an adverse shock on local public debt**

To estimate the causal impact of the sudden increase in the unpeg of the Swiss Franc exchange rate, I rely on the empirical strategy developed by [Sauvagnat and Vallée \(2021\)](#). Using panel data, they instrument local government debt per capita with the quantity of CHF-linked loans interacted with an indicator variable for being after the unpeg of the Swiss Franc.

The main identification assumption is that absent the unpeg of the Euro/Swiss Franc exchange rate, CHF-exposed municipalities and non-CHF exposed municipalities would have incurred the same debt burden evolution. Threats to identification are: i) time-varying unobserved variables which are correlated with the exposure to the Swiss Franc and affect local economic activity, and, ii) other municipality-specific shocks in 2015 that affect CHF-exposed municipalities but are not correlated with exposure to the Swiss Franc. To alleviate these concerns, I control for time-varying pop-

ulation and include department-year fixed effects. I also check for the presence of any pre-trends difference in terms of debt stock per capita in municipalities which are relatively more indebted with CHF-structured loans. Finally, as mentioned previously, the unpeg of the Euro/Swiss-Franc exchange rate happened at a time where the toxic-loan scandal was less publicized in the media – implying that CHF-exposed municipalities were mainly impacted *via* their exposure to CHF-structured loans and not *via* their high-profile in the media.

**First Stage.** I regress debt stock per capita over the instrument for the period 2002 to 2019:

$$\left(\frac{D}{Pop}\right)_{m,t} = \alpha + \beta \left(\frac{CHF D}{Pop} \times \mathbb{1}_{t \geq 2015}\right) + \delta_t + \theta_m + \epsilon_{m,t} \quad (1.5)$$

Where  $\left(\frac{D}{Pop}\right)_{m,t}$  is the amount of debt stock in municipality  $m$  at time  $t$  divided by the number of inhabitants at time  $t$ .  $\frac{CHF D}{Pop}$  is the total amount of loans exposed to the Swiss Franc contracted by the municipality divided by the number of inhabitants at time  $t$ .  $\mathbb{1}_{t \geq 2015}$  is an indicator variable for being after the unpeg of the Swiss Franc exchange rate, starting in 2015.  $\delta_t$  and  $\theta_m$  are municipality and year fixed effects. To reject the existence of pre-trends before 2015, I also run the granular version of the instrumental variable strategy – by interacting CHF-exposed debt per capita with year dummies. Table 1.3 displays the first stage. First, the magnitudes are particularly large and look very similar to [Sauvagnat and Vallée \(2021\)](#) – even if our data samples are different. A €1,000 of CHF-linked loan per inhabitant is associated with a €542 increase in the debt burden per inhabitant. The results are robust to the number of inhabitants at time  $t$  and to the inclusion of department-year fixed effects. Moreover, trends are parallel, prior to the unpeg of the Euro/Swiss Franc exchange rate.

Table 1.3: First stage - CHF exposure and Municipal debt stock per capita

	Debt stock per capita					
	Baseline (Post x Treatment)			Granular		
CHF $D$ /POP x $1_{t \geq 2015}$	.542*** (.147)	.540*** (.147)	.565*** (.142)			
CHF $D$ /POP x 2003				.301 (.240)	.298 (.240)	.294 (.224)
CHF $D$ /POP x 2004				.485 (.324)	.483 (.324)	.480 (.309)
CHF $D$ /POP x 2005				.526 (.374)	.523 (.375)	.523 (.357)
CHF $D$ /POP x 2006				.642 (.464)	.640 (.465)	.605 (.469)
CHF $D$ /POP x 2007				.658 (.493)	.656 (.494)	.648 (.497)
CHF $D$ /POP x 2008				.584 (.540)	.581 (.540)	.566 (.535)
CHF $D$ /POP x 2009				.470 (.519)	.468 (.520)	.469 (.509)
CHF $D$ /POP x 2010				.566 (.592)	.563 (.592)	.569 (.577)
CHF $D$ /POP x 2011				.730 (.498)	.727 (.499)	.710 (.497)
CHF $D$ /POP x 2012				.690 (.498)	.687 (.498)	.670 (.491)
CHF $D$ /POP x 2013				.646 (.418)	.643 (.418)	.623 (.399)
CHF $D$ /POP x 2014				.535 (.456)	.531 (.456)	.491 (.411)
CHF $D$ /POP x 2015				.968** (.489)	.964** (.489)	.969** (.438)
CHF $D$ /POP x 2016				1.360*** (.465)	1.357*** (.465)	1.371*** (.407)
CHF $D$ /POP x 2017				1.127*** (.412)	1.123*** (.412)	1.137*** (.382)
CHF $D$ /POP x 2018				.977** (.406)	.973** (.406)	.991*** (.375)
CHF $D$ /POP x 2019				.926*** (.342)	.922*** (.342)	.936*** (.330)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	.034	.034	.044	.041	.041	.05

Note: The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

## 4 Negative press coverage on public debt and its limited impact

### 4.1 Plant creation and Plant closure

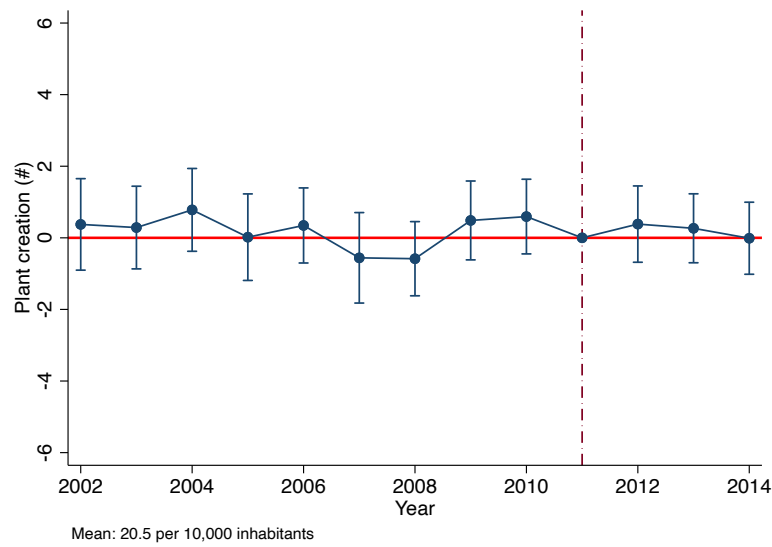
I study whether or not a negative information shock on public debt is sufficient to affect local economic activity in CHF-exposed municipalities. The outcomes are the number of new plants created and the number of plants closed per 10,000 inhabitants – excluding the agricultural and public sectors as well as individual entrepreneurs.

The underlying intuition is that negative press coverage on the degree of toxicity of public debt could impact local economic activity. Plants could forecast higher local business taxation and/or less municipal spending in CHF-exposed municipalities, which may deter establishment entry or increase plant closures. Such results would be in line with the literature investigating the negative impact of higher local taxation on firm entry (Papke 1991; Rathelot and Sillard 2008; Da Rin, Di Giacomo, and Sembenelli 2011), on firm investment (Cummins, Hassett, and Hubbard 1996), on economic growth (Duranton, Gobillon, and Overman 2011), and on employment and income (Ljungqvist and Smolyansky 2014).

Figure 1.7 and Figure 1.8 plot the coefficients of the leads-and-lags regression, respectively for plant creation and plant closure. The vertical lines represent the 95-percent-confidence intervals. First, all coefficients before 2011 are closed to 0 and non-significant for both outcomes. The respective F-stats for the joint significance of coefficients before 2011 are non-significant (p-values equal to 0.657 and 0.564). Second, I do not observe any significant impact of the 2011 disclosure on plant creation and plant closure. It suggests that negative press coverage on local public debt is not sufficient to trigger a decrease in plant creation or an increase in plant closure, at least in this setting. Appendix Tables 1.6 and 1.7 show that this lack of effect is robust to the progressive inclusion of time-varying controls at the municipality level – such as legal population, debt stock, municipal investment per capita and local tax rates (i.e., business tax and property taxes on developed and undeveloped land, which directly affect plants).

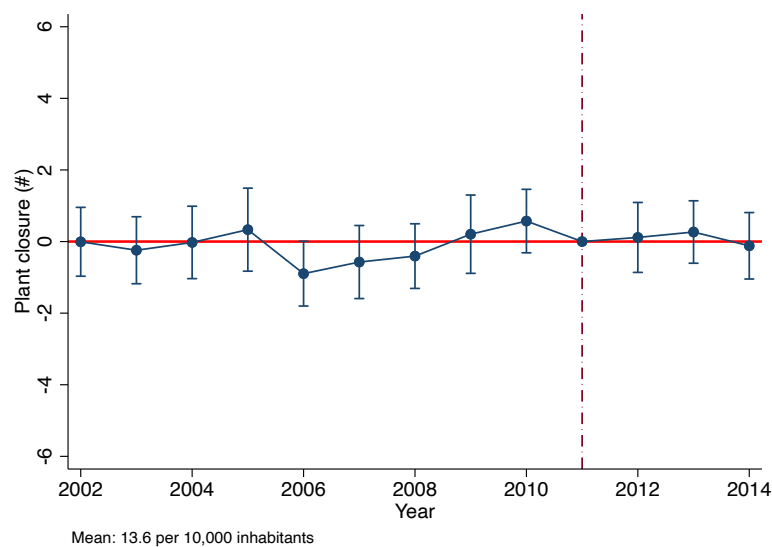
**Creation, Closure and Size of the plant.** Plants could react differently to the 2011 disclosure according to their size – with larger plants potentially more informed than smaller ones. Appendix Figures 1.14 to 1.17 plot the coefficients of the leads-and-lags regression for plant creation and plant closure by the size of the establishments. Micro-

Figure 1.7: Plant creation



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of new establishments created at time  $t$  per 10,000 inhabitants (using legal population at time  $t$ ). The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.8: Plant closure



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of establishments closed at time  $t$  per 10,000 inhabitants (using legal population at time  $t$ ). The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

plants (i.e., with less than 10 employees) represent around 85% of the sample. While parallel trends of the outcomes are still featured before 2011, there is no heterogeneity along the size of the plants.



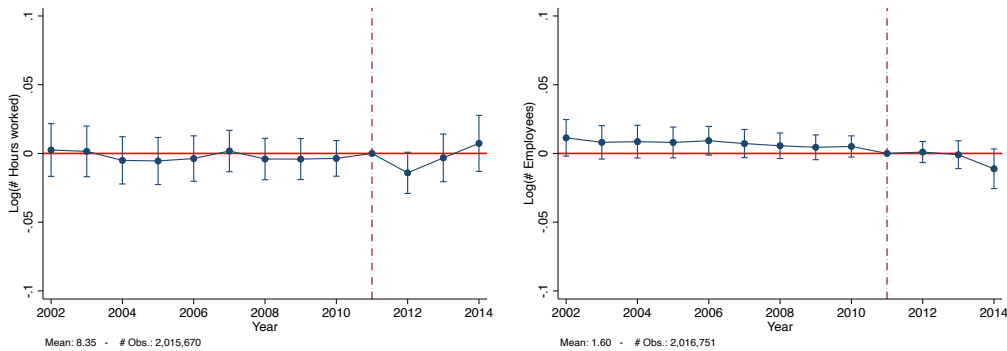
## 4.2 Hours worked, Number of employees and Total wages

There is no evidence suggesting that the 2011 disclosure had an impact on plant creation or on plant closure. However, existing plants could adjust their extensive or their intensive margin in response to negative press coverage on local public debt.

Figures 1.9 to 1.11 plot the coefficients of the leads-and-lags regressions at the plant level of the following outcomes (expressed in terms of logarithms): the annual number of hours worked, the number of employees, gross and net wage bills, hourly gross wage and hourly net wage. First, all regressions feature parallel trends in the outcomes of interest as all coefficients are non-significant at 5% before 2011. Second, plants do not adjust via the extensive margin after the 2011 information shock on local public debt. In other words, changes in the number of employees remain non-significant after 2011. However, there is a temporary and weak decrease in the number of hours worked, in gross wage bills and, in net wage bills following the 2011 disclosure. Plants located in CHF-exposed municipalities decrease their number of hours worked and their net wage bill in 2012 by 1.4%, respectively significant at 10% and 5%. They also decrease their gross wage bill by 1.5% in 2012 - the coefficient being significant at 5%. Hourly wages are unchanged but this adjustment on the intensive margin are particularly robust. Appendix Tables 1.8 to 1.10 show that common trends and the magnitude of the coefficients are robust to the progressive inclusion of time-varying controls at the municipality level.

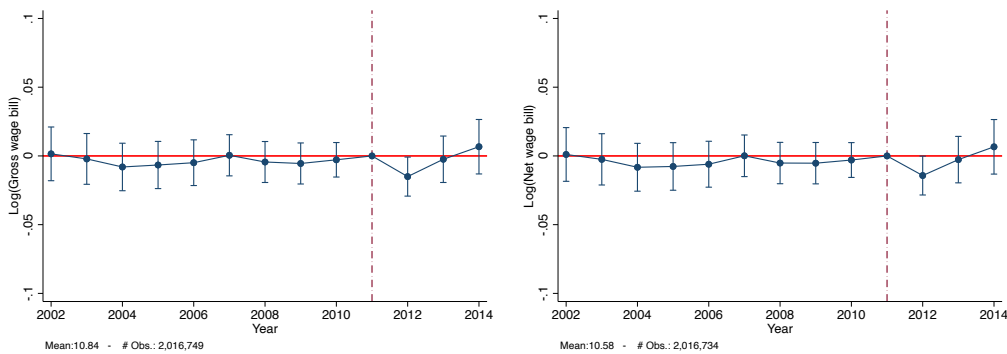
Therefore, municipalities temporarily adjust their intensive margin after the 2011 disclosure keeping unchanged their extensive margin. This result is in line with [Bulligan, Guglielminetti, and Viviano \(2019\)](#) who find that European firms are more likely to adjust their intensive margin compared to their American counterparts. A negative information shock on local public debt is thus sufficient to trigger adjustments on the intensive margin at the plant level. There is no actual increase in the level of local public debt but plants temporarily forecast a future increase in municipal debt burden due to the information shock, leading them to slight adjustments on their intensive margin.

Figure 1.9: Number of hours worked and Number of employees



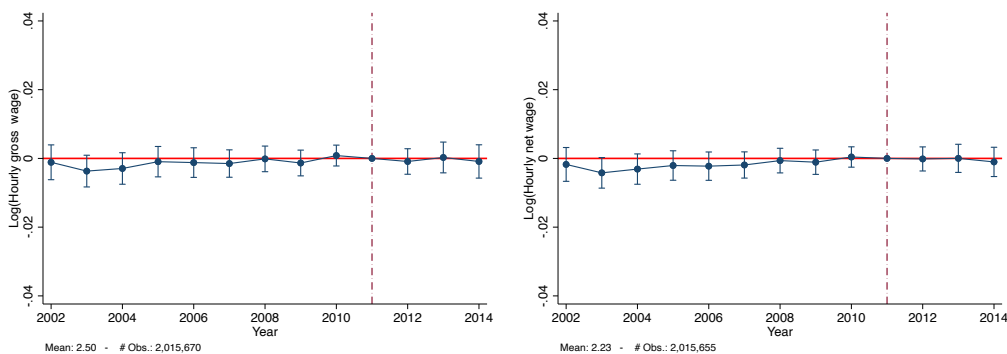
Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the plant level. The outcomes are the logarithm of the number of hours worked (on the left) and of the number of employees (on the right) at time  $t$ . The regressions exclude the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.10: Gross Wage Bill and Net Wage Bill



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the plant level. The outcomes are the logarithm of gross wage bill (on the left) and of net wage bill (on the right) at time  $t$ . The regressions exclude the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.11: Hourly Gross Wage and Hourly Net Wage



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the plant level. The outcomes are the logarithm of hourly gross wage (on the left) and of hourly net wage (on the right) at time  $t$ . The regressions exclude the agricultural and public sectors as well as individual entrepreneurs.

## 5 Rise in local public debt and its economic impact

### 5.1 Public debt shock and Plant closure

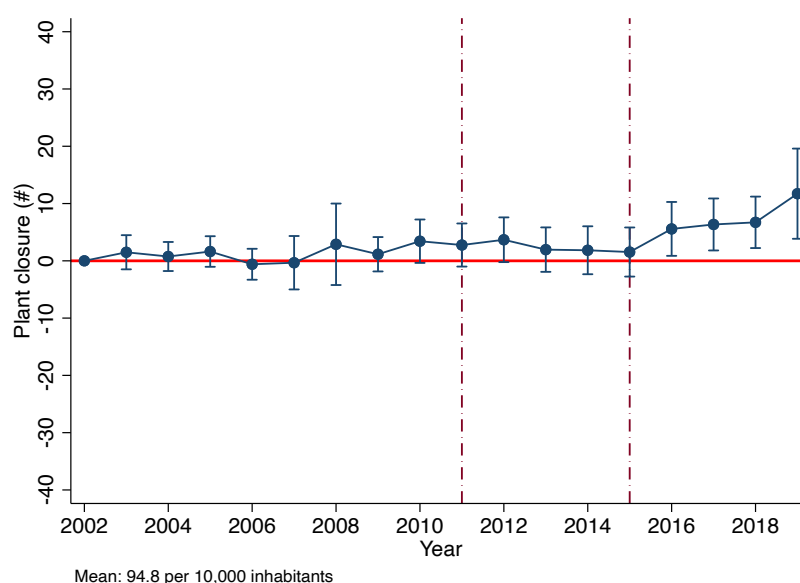
In this section, I test whether or not an actual increase in local public debt affects economic activity. To do so, I use as an exogenous shock the unpeg of the Euro/Swiss Franc exchange rate in 2015 – which have led to a permanent increase in the debt stock of CHF-exposed municipalities (Section 3.2).

Unfortunately, social security data at the plant level are not available after 2015. I therefore rely on the SIRENE dataset that contains all plant creations and closures, but without any information on the legal status or on the activity sector of the plant. The number of new establishments created may not be then particularly relevant as I would not be able to disentangle plant creation by individual entrepreneurs among them. I look instead at the number of definitive closures per 10,000 inhabitants, including the agricultural and public sector as well as individual entrepreneurs.

In Section 4, I do not find any impact of the 2011 disclosure on plant closure. As a result, I first use a difference-in-difference setting to estimate the impact of the CHF unpeg on plant closures in CHF-indebted municipalities. Figure 1.12 plots the coefficients of the leads-and-lags regression at the municipality level, choosing 2002 as the year of reference. First, there is a parallel trend in plant closures until 2015 between CHF-exposed municipalities and non-CHF-exposed municipalities. It confirms the lack of impact of the 2011 disclosure on plant closure, even if the agricultural sector, the public sector and individual entrepreneurs are now included among the sample. Second, there is a strong and significant increase in the number of plant closures starting in 2016. This effect appears persistent over time.

Table 1.4 shows the formal estimate. On average, the number of plant closures increased by 6 per year per 10,000 inhabitants after 2015 in CHF-exposed municipalities compared to the control group. The effect is highly significant and robust to the inclusion of controls. On average, there are 99.3 plant closures per year per 10,000 inhabitants in CHF-exposed municipalities. It means that the unpeg of the Swiss Franc exchange rate led to a 6% increase in the number of plant closures per 10,000 inhabitants.

Figure 1.12: An observed increase in plant closures after 2015



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of establishments closed at time  $t$  per 10,000 inhabitants. The regression includes the agricultural and public sectors, and individual entrepreneurs - due to data limitation. The reference year is 2002.

Table 1.4: The Unpeg of the Swiss Franc and The Rise of plant closures

	# Plant closures per 10,000 inhabitants		
	(1)	(2)	(3)
$\mathbb{1}_{CHF} \times \mathbb{1}_{>2015}$	6.006*** (1.621)	6.054*** (1.631)	4.655*** (1.665)
Legal pop.		-.0004 (.0004)	-.0009** (.0004)
Municipality FE	Y	Y	Y
Year FE	Y	Y	Y
Dep. x Year FE	N	N	Y
N	26,334	26,334	26,334
R2	.332	.332	.448

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

**Debt and Plant closure.** I then estimate the causal impact of the increase in local public debt on plant closures, that happened following the CHF unpeg. To do so, I rely on the Instrumental Variable strategy defined in Section 3. Table 1.5 displays the second-stage estimation. An increase in the municipal debt stock per capita leads to a significant increase in the number of plant closures per 10,000 inhabitants – both using the baseline instrumental variable or the granular regression in the first stage. The obtained coefficients are significant at 5% and robust to the inclusion of the number of inhabitants and of department-year fixed effects. On average, an increase by €100 in local public debt per capita is associated with 2.5 additional plant closures per 10,000 inhabitants. As there are 94.8 plant closures per year on average, it means that an increase by €100 in local public debt per capita leads to a rise of plant closures by 2.8%.

Table 1.5: CHF exposure and Plant closures

	# Plant closures per 10,000 inhabitants					
	Baseline (Post x Treatment)			Granular		
Debt stock (pc)	.025** (.012)	.024** (.012)	.024** (.011)	.014** (.007)	.014** (.007)	.017** (.007)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	.183	.186	.275	.259	.262	.33

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

## 5.2 Mechanisms

The observed increase in plant closures could be explained by a current decrease in municipal investment or a current rise in local taxation.

Appendix Tables 1.11 to 1.14 display the second stage of the IV regressions for municipal investment per capita, municipal business tax rate, municipal property tax rate on developed land and municipal property tax rate on undeveloped land. I do not find any significant impact of debt stock on each of these outcomes. Regardless of the econometric specifications, the coefficients are negative but not significant for municipal investment per capita, suggesting that the results are not driven by a decrease in

municipal investment.<sup>5</sup> Moreover, there is no evidence of adjustments via local taxation. It suggests that CHF-exposed municipalities are reluctant to increase their local taxation or decrease their municipal investment after the appreciation of the Swiss-Franc. As seen in Section 3.2, municipalities do their best to smooth the impact of the CHF unpeg by postponing their debt repayments – and alleviate in that sense the aftermath on local economic activity.

Actual changes in local taxation and in municipal investment cannot explain the observed increase in plant closures. However, plants forecast that a persistent rise in local public debt will lead at some point to an increase in local taxation or to a decrease in municipal investment (Barro 1979), prompting the definitive closure of some establishments in treated municipalities.

## 6 Conclusion

This paper provides first evidence on the effects of local public debt shocks on economic activity of highly indebted local governments. Using the Toxic Loan scandal that impacted French municipalities, I am able to disentangle the impact of an information shock on public debt from the effect of an actual debt increase on local economic activity.

Using a difference-in-difference strategy, I first find that an adverse information shock revealing the degree of toxicity of local public debt is sufficient to trigger an impact on local economic activity. Plants located in treated municipalities experience a slight decrease in the total number of hours worked and in annual wage bills by 1.4% - leaving the extensive margin unchanged. The effect is not persistent over time as the information shock is not correlated with an increase in local public debt burden.

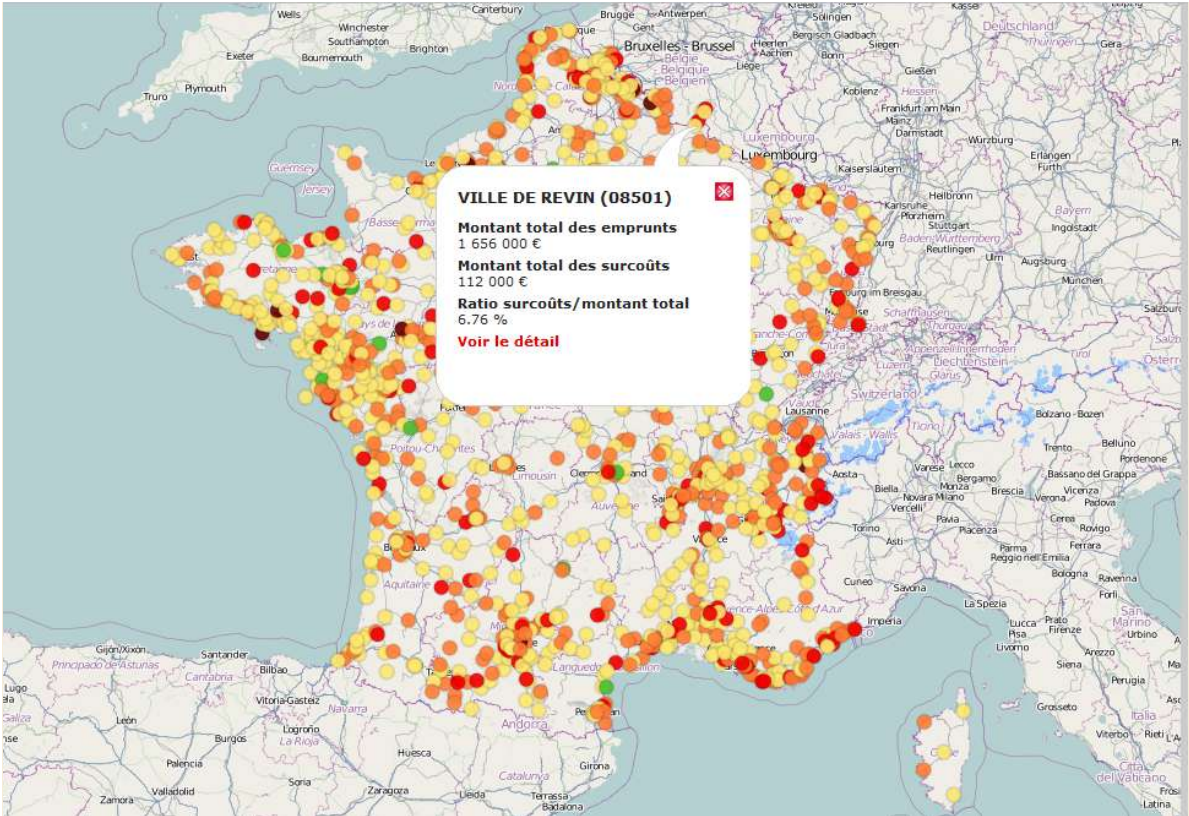
Combining a difference-in-difference identification with an instrumental variable strategy, I then show that a rise of public debt burden has an adverse persistent impact on local economic activity, when it happens in highly-indebted municipalities. An increase by €100 in local public debt stock per capita leads to a rise of plant closures by 2.8%. This increase in plant closures happened even when municipalities are able to postpone their debt repayments and to leave unchanged, at least in the short term, their local taxation and their municipal investment. These findings imply that plants are well aware of local public debt and consider any signal of its future evolution to adapt their economic activity.

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<sup>5</sup>Note that Sauvagnat and Vallée (2021) observe a significant decrease in municipal investment following the unpeg of the Euro-Swiss Franc exchange rate, using another dataset.

# Appendix A - The Toxic Loan scandal disclosure and the Unpeg of the Swiss Franc

Figure 1.13: Interactive Map of French Municipalities exposed to Toxic Loans, released by the journal *Libération*



Note: This interactive map was displayed on *Libération* website, on September 20, 2011. Each dot features a municipality indebted with Toxic Loan(s). By clicking on one dot, we obtain the name of the municipality as well as detailed information on loan contracts, Credit:@rdenne-mag

# Appendix B - Negative press coverage on Public Debt and its limited impact

Table 1.6: The 2011 disclosure and Plant creation - Robustness Table

	Plant creation per 10,000 inhabitants				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}_{CHF} \times 2002$	.375 (.651)	.314 (.654)	.362 (.650)	.472 (.653)	.707 (.675)
$\mathbb{1}_{CHF} \times 2003$	.287 (.589)	.224 (.589)	.263 (.593)	.348 (.593)	.724 (.612)
$\mathbb{1}_{CHF} \times 2004$	.781 (.589)	.718 (.589)	.744 (.592)	.819 (.590)	.984 (.601)
$\mathbb{1}_{CHF} \times 2005$	.018 (.616)	-.044 (.615)	-.021 (.618)	.032 (.618)	.413 (.639)
$\mathbb{1}_{CHF} \times 2006$	.346 (.534)	.284 (.533)	.295 (.533)	.358 (.527)	.619 (.596)
$\mathbb{1}_{CHF} \times 2007$	-.558 (.644)	-.626 (.643)	-.613 (.641)	-.561 (.636)	-.460 (.642)
$\mathbb{1}_{CHF} \times 2008$	-.583 (.528)	-.649 (.525)	-.637 (.525)	-.592 (.524)	-.476 (.562)
$\mathbb{1}_{CHF} \times 2009$	.485 (.562)	.491 (.561)	.503 (.562)	.550 (.564)	.687 (.610)
$\mathbb{1}_{CHF} \times 2010$	.594 (.532)	.604 (.532)	.614 (.533)	.656 (.534)	.758 (.603)
$\mathbb{1}_{CHF} \times 2012$	.384 (.543)	.375 (.543)	.374 (.544)	.377 (.544)	.440 (.552)
$\mathbb{1}_{CHF} \times 2013$	.266 (.491)	.257 (.491)	.260 (.491)	.267 (.491)	.414 (.545)
$\mathbb{1}_{CHF} \times 2014$	-.011 (.513)	-.013 (.513)	-.008 (.512)	-.0007 (.513)	-.220 (.582)
Legal pop.		-.0002*** (.00006)	-.0002*** (.00006)	-.0002*** (.00006)	-.0002*** (.00008)
Debt stock (pc)			.0003 (.0003)	.0003 (.0003)	.0003 (.0003)
Prop. $\tau$ (dev.)				.021 (.039)	.032 (.053)
Prop. $\tau$ (undev.)				.004 (.008)	-.013 (.016)
Busi. $\tau$				-.149*** (.056)	-.108* (.065)
Muni. Invest (pc)				-.00008 (.0005)	-.00007 (.0005)
Muni. FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Dep. x Year FE	N	N	N	N	Y
N	19019	19019	19019	19019	19019
R2	.05	.051	.052	.052	.112

Note: The sample period is 2002-2014. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.



Table 1.7: The 2011 disclosure and Plant closure - Robustness Table

	Plant closure per 10,000 inhabitants				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}_{CHF} \times 2002$	-.007 (.490)	-.041 (.489)	-.088 (.491)	-.039 (.494)	.001 (.532)
$\mathbb{1}_{CHF} \times 2003$	-.243 (.477)	-.278 (.477)	-.317 (.480)	-.272 (.490)	-.553 (.521)
$\mathbb{1}_{CHF} \times 2004$	-.025 (.515)	-.060 (.515)	-.086 (.517)	-.046 (.518)	.081 (.527)
$\mathbb{1}_{CHF} \times 2005$	.332 (.591)	.297 (.591)	.274 (.588)	.313 (.589)	.501 (.581)
$\mathbb{1}_{CHF} \times 2006$	-.897* (.461)	-.931** (.460)	-.943** (.461)	-.879* (.461)	-.720 (.487)
$\mathbb{1}_{CHF} \times 2007$	-.572 (.520)	-.610 (.520)	-.623 (.523)	-.571 (.521)	-.416 (.524)
$\mathbb{1}_{CHF} \times 2008$	-.407 (.460)	-.443 (.460)	-.456 (.461)	-.443 (.462)	-.117 (.500)
$\mathbb{1}_{CHF} \times 2009$	.205 (.558)	.208 (.557)	.195 (.559)	.205 (.563)	-.108 (.561)
$\mathbb{1}_{CHF} \times 2010$	.572 (.452)	.578 (.452)	.568 (.451)	.589 (.455)	.741 (.467)
$\mathbb{1}_{CHF} \times 2012$	.115 (.498)	.110 (.498)	.111 (.498)	.113 (.498)	-.037 (.506)
$\mathbb{1}_{CHF} \times 2013$	.266 (.444)	.261 (.445)	.259 (.444)	.275 (.439)	.264 (.460)
$\mathbb{1}_{CHF} \times 2014$	-.119 (.473)	-.120 (.473)	-.125 (.474)	-.111 (.473)	-.302 (.470)
Legal pop.		-.0001*** (.00003)	-.0001*** (.00003)	-.0001*** (.00003)	-.0001*** (.00004)
Debt stock (pc)			-.0003 (.0003)	-.0003 (.0003)	-.0003 (.0003)
Prop. $\tau$ (dev.)				.036 (.028)	.043 (.040)
Prop. $\tau$ (undev.)				.004 (.006)	-.002 (.012)
Busi. $\tau$				-.048 (.033)	-.027 (.038)
Mun. Invest (pc)				-.0007** (.0003)	-.0007** (.0003)
Muni. FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Dep. x Year FE	N	N	N	N	Y
N	19019	19019	19019	19019	19019
R2	.108	.108	.109	.11	.186

Note: The sample period is 2002-2014. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Table 1.8: The 2011 disclosure and the Number of Hours worked - Robustness Table

	Log(# Hours worked)			
	(1)	(2)	(3)	(4)
$\mathbb{1}_{CHF} \times 2002$	.002 (.010)	.003 (.010)	.003 (.010)	.003 (.010)
$\mathbb{1}_{CHF} \times 2003$	.001 (.009)	.002 (.009)	.002 (.009)	.002 (.009)
$\mathbb{1}_{CHF} \times 2004$	-.005 (.009)	-.005 (.009)	-.005 (.009)	-.004 (.009)
$\mathbb{1}_{CHF} \times 2005$	-.005 (.009)	-.005 (.009)	-.005 (.009)	-.004 (.009)
$\mathbb{1}_{CHF} \times 2006$	-.004 (.008)	-.004 (.008)	-.003 (.009)	-.003 (.008)
$\mathbb{1}_{CHF} \times 2007$	.002 (.008)	.002 (.008)	.002 (.008)	.003 (.008)
$\mathbb{1}_{CHF} \times 2008$	-.004 (.008)	-.004 (.008)	-.004 (.008)	-.003 (.008)
$\mathbb{1}_{CHF} \times 2009$	-.004 (.008)	-.004 (.008)	-.004 (.008)	-.003 (.008)
$\mathbb{1}_{CHF} \times 2010$	-.004 (.007)	-.003 (.007)	-.003 (.007)	-.003 (.007)
$\mathbb{1}_{CHF} \times 2012$	-.014* (.008)	-.014* (.008)	-.014* (.008)	-.014* (.008)
$\mathbb{1}_{CHF} \times 2013$	-.003 (.009)	-.003 (.009)	-.003 (.009)	-.003 (.009)
$\mathbb{1}_{CHF} \times 2014$	.007 (.010)	.007 (.010)	.007 (.010)	.007 (.010)
Legal pop.		-6.17e-07*** (2.11e-07)	-6.16e-07*** (2.11e-07)	-5.88e-07*** (2.06e-07)
Debt stock (pc)			5.50e-07 (2.08e-06)	3.18e-07 (2.10e-06)
Prop. $\tau$ (dev.)				-.001 (.001)
Prop. $\tau$ (undev.)				.0003 (.0004)
Busi. $\tau$				-.0002 (.001)
Mun. Invest (pc)				4.18e-06 (3.76e-06)
Plant FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Dep. x Year FE	Y	Y	Y	Y
N	2015670	2015670	2015670	2015670
R2	.018	.018	.018	.018

Note: The sample period is 2002-2014. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Table 1.9: The 2011 disclosure and Gross Wage Bill - Robustness Table

	Log(Gross Wage Bill)			
	(1)	(2)	(3)	(4)
$\mathbb{1}_{CHF} \times 2002$	.002 (.010)	.002 (.010)	.002 (.010)	.002 (.010)
$\mathbb{1}_{CHF} \times 2003$	-.002 (.009)	-.002 (.009)	-.002 (.009)	-.001 (.009)
$\mathbb{1}_{CHF} \times 2004$	-.008 (.009)	-.008 (.009)	-.008 (.009)	-.007 (.009)
$\mathbb{1}_{CHF} \times 2005$	-.007 (.009)	-.006 (.009)	-.006 (.009)	-.006 (.009)
$\mathbb{1}_{CHF} \times 2006$	-.005 (.008)	-.005 (.009)	-.005 (.009)	-.004 (.008)
$\mathbb{1}_{CHF} \times 2007$	.0005 (.008)	.0005 (.008)	.0006 (.008)	.001 (.008)
$\mathbb{1}_{CHF} \times 2008$	-.004 (.008)	-.004 (.008)	-.004 (.008)	-.004 (.008)
$\mathbb{1}_{CHF} \times 2009$	-.005 (.008)	-.005 (.008)	-.005 (.008)	-.004 (.008)
$\mathbb{1}_{CHF} \times 2010$	-.003 (.006)	-.003 (.006)	-.002 (.006)	-.002 (.006)
$\mathbb{1}_{CHF} \times 2012$	-.015** (.007)	-.015** (.007)	-.015** (.007)	-.015** (.007)
$\mathbb{1}_{CHF} \times 2013$	-.002 (.009)	-.002 (.009)	-.002 (.009)	-.002 (.009)
$\mathbb{1}_{CHF} \times 2014$	.007 (.010)	.007 (.010)	.007 (.010)	.007 (.010)
Legal pop.		-5.50e-07*** (1.94e-07)	-5.50e-07*** (1.94e-07)	-5.35e-07*** (1.94e-07)
Debt stock (pc)			2.65e-07 (2.26e-06)	1.14e-08 (2.24e-06)
Prop. $\tau$ (dev.)				-.0008 (.001)
Prop. $\tau$ (undev.)				.0003 (.0004)
Busi. $\tau$				.00002 (.001)
Mun. Invest. (pc)				3.04e-06 (3.53e-06)
Plant FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Dep. x Year FE	Y	Y	Y	Y
N	2016749	2016749	2016749	2016749
R2	.003	.003	.003	.003

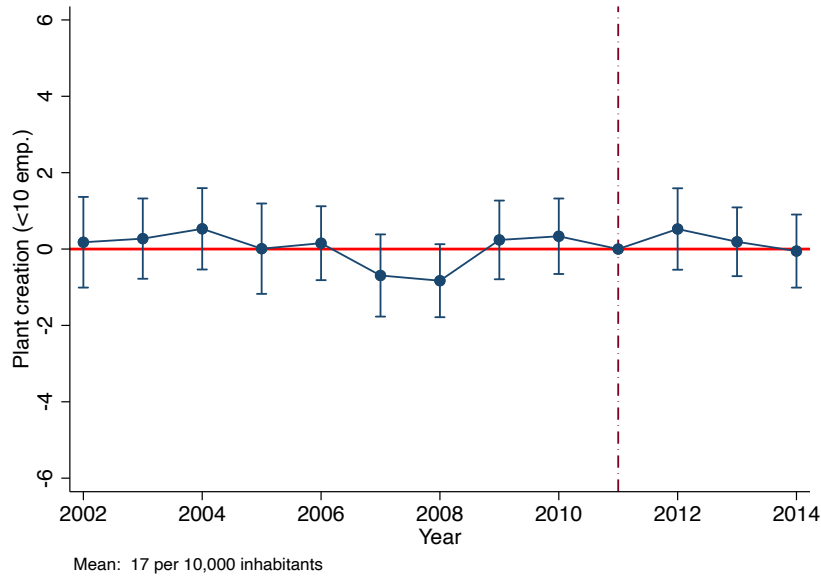
Note: The sample period is 2002-2014. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Table 1.10: The 2011 disclosure and Net Wage Bill - Robustness Table

	Log(Net Wage Bill)			
	(1)	(2)	(3)	(4)
$\mathbb{1}_{CHF} \times 2002$	.001 (.010)	.001 (.010)	.001 (.010)	.002 (.010)
$\mathbb{1}_{CHF} \times 2003$	-.002 (.010)	-.002 (.010)	-.002 (.010)	-.002 (.009)
$\mathbb{1}_{CHF} \times 2004$	-.008 (.009)	-.008 (.009)	-.008 (.009)	-.007 (.009)
$\mathbb{1}_{CHF} \times 2005$	-.008 (.009)	-.008 (.009)	-.007 (.009)	-.007 (.009)
$\mathbb{1}_{CHF} \times 2006$	-.006 (.009)	-.006 (.009)	-.006 (.009)	-.005 (.008)
$\mathbb{1}_{CHF} \times 2007$	.00009 (.008)	.0002 (.008)	.0003 (.008)	.001 (.008)
$\mathbb{1}_{CHF} \times 2008$	-.005 (.008)	-.005 (.008)	-.005 (.008)	-.004 (.008)
$\mathbb{1}_{CHF} \times 2009$	-.005 (.008)	-.005 (.008)	-.005 (.008)	-.004 (.008)
$\mathbb{1}_{CHF} \times 2010$	-.003 (.006)	-.003 (.006)	-.003 (.006)	-.002 (.006)
$\mathbb{1}_{CHF} \times 2012$	-.014** (.007)	-.014** (.007)	-.014** (.007)	-.014** (.007)
$\mathbb{1}_{CHF} \times 2013$	-.003 (.009)	-.003 (.009)	-.003 (.009)	-.003 (.009)
$\mathbb{1}_{CHF} \times 2014$	.007 (.010)	.007 (.010)	.007 (.010)	.007 (.010)
Legal pop.		-5.75e-07*** (1.97e-07)	-5.75e-07*** (1.97e-07)	-5.63e-07*** (1.98e-07)
Debt stock (pc)			6.91e-07 (2.32e-06)	4.00e-07 (2.30e-06)
Prop. $\tau$ (dev.)				-.0008 (.001)
Prop. $\tau$ (undev.)				.0003 (.0004)
Busi. $\tau$				.00005 (.001)
Mun. Invest. (pc)				3.18e-06 (3.56e-06)
Plant FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Dep. x Year FE	Y	Y	Y	Y
N	2016734	2016734	2016734	2016734
R2	.003	.003	.003	.003

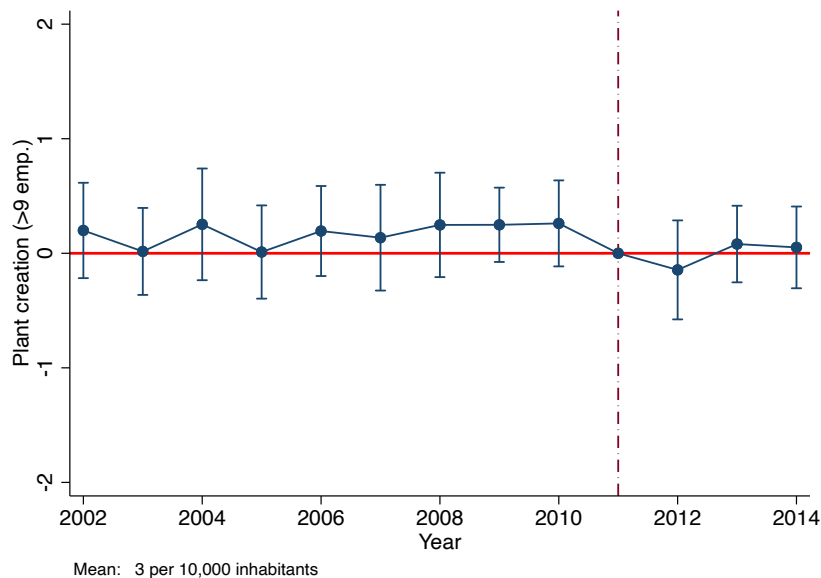
Note: The sample period is 2002-2014. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Figure 1.14: Micro-plant creation (<10 employees)



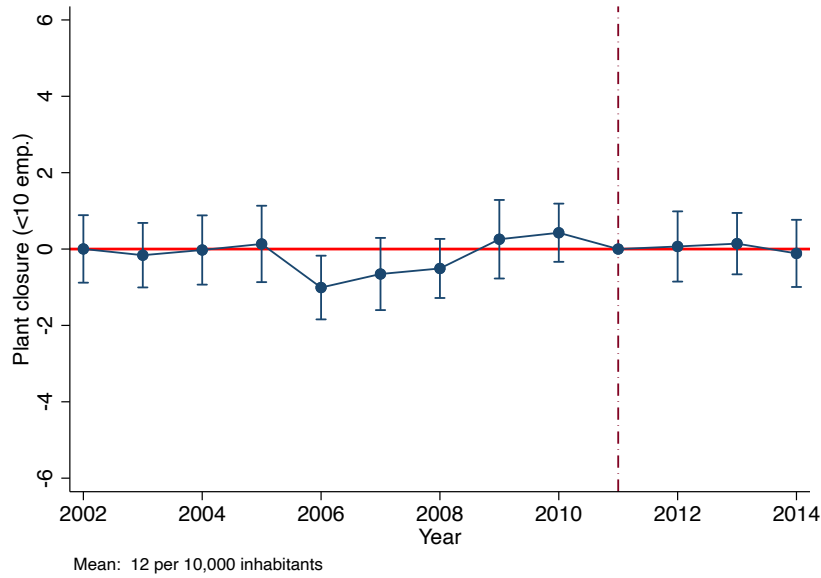
Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of micro-plants created at time  $t$  per 10,000 inhabitants (using legal population at time  $t$ ). Micro-plants are plants with less than 10 employees. The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.15: Plant creation (over 10 employees)



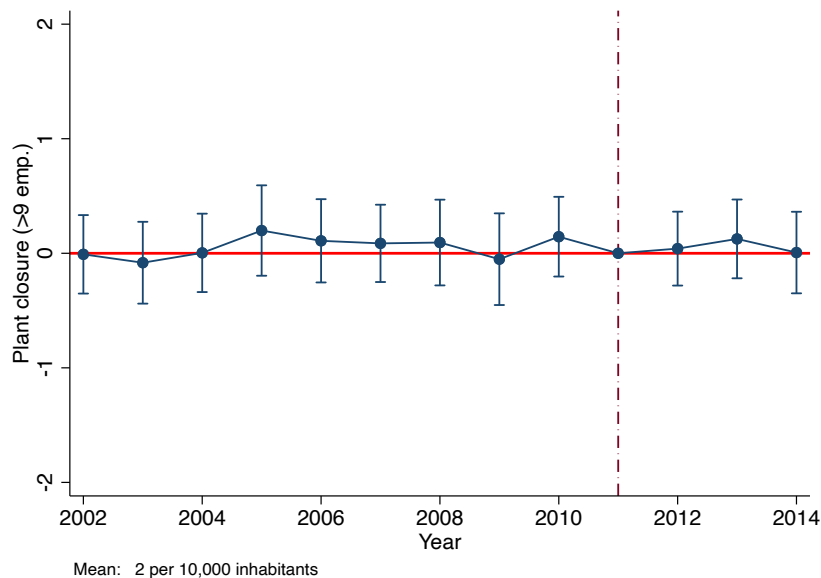
Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of plants over 10 employees created at time  $t$ , per 10,000 inhabitants (using legal population at time  $t$ ). The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.16: Micro-plant closure (<10 employees)



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of micro-plants closed at time  $t$  per 10,000 inhabitants (using legal population at time  $t$ ). Micro-plants are plants with less than 10 employees. The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

Figure 1.17: Plant closure (over 10 employees)



Note: The graph plots the estimates and the 95% confidence intervals from the leads-and-lags regression at the municipal level. The outcome is the number of plants over 10 employees closed at time  $t$ , per 10,000 inhabitants (using legal population at time  $t$ ). The regression excludes the agricultural and public sectors as well as individual entrepreneurs.

## Appendix C - Rise in local public debt and its economic impact

Table 1.11: CHF exposure and Municipal investment per capita

	Municipal investment per capita					
	Baseline (Post x Treatment)			Granular		
Debt stock (pc)	-0.142 (.313)	-0.143 (.314)	-0.146 (.275)	-0.094 (.246)	-0.094 (.247)	-0.101 (.222)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	-0.144	-0.145	-0.143	-0.093	-0.094	-0.096

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Table 1.12: CHF exposure and Municipal Business tax rate

	Municipal Business tax rate					
	Baseline (Post x Treatment)			Granular		
Debt stock (pc)	-.0007 (.002)	-.0008 (.002)	-.0008 (.002)	.0002 (.001)	.0001 (.001)	-.00008 (.001)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	.048	.048	.156	.055	.056	.164
F	48.135	45.665	232089.9	48.329	45.855	1299062

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

Table 1.13: CHF exposure and Property tax rate on developed land

	Property tax rate on developed land					
	Baseline (Post x Treatment)			Granular		
Debt stock (pc)	.0004 (.0005)	.0005 (.0005)	.0007 (.0004)	.0002 (.0004)	.0002 (.0004)	.0005 (.0004)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	.284	.285	.33	.285	.287	.337

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.



Table 1.14: CHF exposure and Property tax rate on undeveloped land

	Property tax rate on undeveloped land					
	Baseline (Post x Treatment)			Granular		
Debt stock (pc)	.0009 (.002)	.001 (.002)	.0009 (.002)	.0005 (.001)	.0005 (.001)	.0006 (.001)
Municipality FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Population	N	Y	Y	N	Y	Y
Departement x Year FE	N	N	Y	N	N	Y
N	26,334	26,334	26,334	26,334	26,334	26,334
Adj. $R^2$	.09	.09	.125	.089	.089	.125

Note: The sample includes municipalities which contracted Toxic Loans on the Swiss-Franc exchange rate before 2008 and municipalities exposed to other structured products with *Dexia* bank. The sample period is 2002-2019. Standard errors are clustered at the municipal level. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10%, respectively.

# Chapter 2

## Toxic Loans and the Rise of Populist Candidacies

*With Gianmarco Daniele and Paul Vertier  
(Lead Author)*

### Abstract<sup>1</sup>

The role of financial crises in boosting populism has been well documented. Yet the specific mechanisms through which this occurs remain elusive. This paper studies how populist candidacies were fueled by a public financial scandal, triggered by market volatility and financial deregulation. Using an instrumental variable strategy, we exploit the leak of a list of French municipalities which contracted “toxic” loans prior to the crisis as a source of identification. During the subsequent municipal elections, we show that i) populist parties were the main political parties experiencing an increase in vote share, while the incumbent’s political party was electorally punished, ii) both far-right and far-left populist candidacies were more likely in municipalities affected by the scandal, leading to a rise in electoral competition, iii) for the populist far-right, these results were stronger in economically fragile municipalities and in cities with a higher growth of the immigrant population. Importantly, the findings are not driven by the economic aftermath of the scandal and suggest that public finance mismanagement disclosure contributes by itself to the rise of populism during financial crises.

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# 1 Introduction

Do financial scandals foster the rise of populist candidacies? Over the last decades, populism has become more and more prevalent, spreading outside Latin American boundaries and reaching old democracies (like the US, France, or the UK). In particular, the aftermath of the 2008 financial crisis saw the emergence of new leaders and coalitions defending authoritarian ideas against democracy, globalization, minorities and immigration.<sup>2</sup> Their "thin-centered" ideology is defined as populist as they promote a clear divide between two antagonist groups: the "corrupt elite" and the "pure people", favoring the will of the latter above all (Mudde 2004).

While the importance of the 2008 financial crisis has been acknowledged in explaining this growing trend towards populist voting, the mechanisms and the entry of populist candidacies have been underexplored.<sup>3</sup> In this paper, we study how public financial scandals induced by financial deregulation and market volatility lead to the entry of populist candidacies. To the best of our knowledge, this paper is the first to causally identify the impact of public financial scandals on the rise of populism and in particular, on the entry of populist candidacies. To do so, we use as a natural experiment the disclosure in 2011 by a French national newspaper (*Libération*) of the "Toxic Loan scandal". Between 1996 and 2011, more than 1,586 French municipalities contracted 3,016 structured loans with the bank Dexia. These structured loans had fixed interest rates for the first years (on average between 2 and 7 years), before turning to variable interest rates indexed on external indicators (such as foreign exchange rates or spreads of interest rates). Due to the nature of their underlying assets and the lack of insurance coverage for municipalities, these structured products were classified by the Gissler charter as toxic for local governments. The turmoil of the financial crisis induced sharp variations of the external assets on which the structured loans were indexed, therefore affecting their variable part.<sup>4</sup> Although these variations were arguably unrelated to the specific financial situation of each municipality, it triggered exceptionally high overheads on many structured loans. The total initial credit amount

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<sup>2</sup>Such as Victor Orban in Hungary; the Tea Party and the election of Donald Trump in the US; Law in Justice in Poland; the Independent Greeks and SYRIZA in Greece; AfD in Germany; Front National in France; and Lega Nord in Italy

<sup>3</sup>As summarized by Guriev and Papaioannou (2020), "pinpointing the exact mechanism is still an open question" and there is so far "an open avenue of research on the strategy of populist parties and on the supply of populism more generally".

<sup>4</sup>The most striking example is the Swiss Franc, on which nearly 10% of Dexia structured loans were indexed and which played the role of a safe haven before the financial crisis. While its parity with the Euro had been stable for more than a decade, its value went up steadily from around 1EUR=1.5CHF to about 1EUR=1.2CHF between mid-2008 and late 2011.

was already large - about 8.94 billion Euros – but the overhead ratios, defined as the excess interests divided by the initial credit amount, were sometimes astounding: half of them were above 9.1%, 25% were over 13.3%, with a maximum of 114%.

These revelations are of particular interest for two reasons. First, the scandal constitutes a salient institutional shock revealing several aspects of public finance mismanagement. Contrary to the literature showing that mortgages and household debt led to populist voting ([Antoniades and Calomiris 2018](#); [Gyongyosi and Verner 2020b](#)), the toxic loan scandal concerns public institutions instead of citizens' portfolio. Mayors were put in the spotlight. They were accused of being involved in one of the biggest European scandals of the 2008 financial crisis ([Piffaretti 2012](#)). They were blamed for taking ill-considered risks by adopting structured products based on foreign capital markets. They faced strong criticisms on their involvement in glamorous cultural events paid by the bank to promote their products ([Cori and Le Gall 2013](#)). Although some mayors may have acted in good faith, they were in the awkward position of having to publicly defend their contracts with the bank in the press. The scandal had then all the ingredients to appeal to the populist rhetoric – the responsibility of elites, the collusion between public officials and the bank, the danger of foreign capital markets and the fear of fiscal austerity. Second, the French revelations were of particular interest to properly identify the impact of public financial scandals on the rise of populism. The disclosure does indeed contain spatial and temporal heterogeneity. Geographic areas were differently exposed to the revelation. Some French municipalities were clearly mentioned in the *Libération* newspaper while others were not. The disclosure of the scandal also happened at one point in time, right in the middle of the municipal electoral term (i.e, between March 2008 and March 2014). We therefore use this event to analyze whether French municipalities, which were affected by Dexia toxic loan saw a rise in populist voting and an entry in populist candidacies in 2014 compared to municipalities which were not.

While this shock was arguably not anticipated by local incumbents, simple OLS estimates are likely to be biased as municipalities contracting structured loans *with Dexia* might differ on unobserved characteristics. For instance, these municipalities are more likely to be urban, poorer and with a fragile state of public finance. This endogeneity issue prompts us to seek an instrument satisfying two conditions. First, it should predict the adoption of structured loans *to Dexia*, as opposed to the non-adoption of structured loans or the adoption of structured loans provided by other banks. Second, conditionally on other observed factors, it should not be directly correlated to the entry of extreme candidacies or their vote shares. This instrument is provided to

us by the history of the relationship between Dexia bank and French municipalities. Dexia was created in 1996 as a merger of the French and Belgian banks specialized in credits to local governments (respectively *Crédit Local de France* - hereafter *CLF* and *Crédit Communal de Belgique* - hereafter *CCB*). In 1994, many local governments became shareholders of the *CLF*, among which 362 municipalities. As we show, municipalities located close to the shareholder municipalities were much more likely to subsequently adopt toxic loans. The presence of a Dexia toxic loan is therefore instrumented by the geographical distance to the closest shareholder municipality - excluding the latter from the estimation. This instrument builds upon an established literature showing the importance of distance for credit adoption (Degryse and Ongena 2005; Bharath et al. 2009), and upon the idea, documented by qualitative evidence, that shareholder municipalities had strong historical ties with the *CLF* and were more likely to adopt structured loans. Our exclusion restriction is likely to be warranted, since our instrument relies on mayors' decisions made two electoral terms before the largest increase in structured loan contracting (2001-2008), and 17 years before the unexpected leak by *Libération*. We include county fixed effects in our regressions and add a large variety of controls (such as the urban status of municipalities, historical municipal budgets, incumbent and population characteristics). We also confirm the validity of our main results using a fixed-effect identification strategy.

Our results are fourfold. First, we show that the municipalities impacted by the scandal experienced a large increase in vote share for populist parties, for both the populist far-right and the populist far-left. Note that populist parties were the only political orientation benefiting from the scandal. Neither the mainstream left, nor the mainstream right, nor the greens saw their vote share increase in these municipalities. This rise in populist voting only occurred at the expense of the incumbent's political party, which experienced a 20 ppt decrease in vote share. At French local elections, the incumbency advantage remains strong and populist parties stay relatively small. Nevertheless, these electoral results suggest that public financial scandals lead to a rise in populist voting at the expense of the mainstream political class in power.

Second, we find that the electoral results are mainly driven by the entry of populist parties in these municipalities. In municipalities which contracted Dexia toxic loans, the likelihood of having a populist candidacy increases six times for the populist far-right and five times for the populist far-left. Due to data limitation, we cannot assert on the entire sample that the populist candidates were running for the first time. Yet we know that a large share of populist candidates was neither in office nor former municipal councilor between 2001 and 2013 in the municipalities which contracted toxic

loans (51% for the populist far-left party and 89% for the populist far-right). Moreover, among the municipalities that we follow over time, we notice a larger relative increase in populist candidacies in municipalities affected by toxic loans. No similar results are found for the mainstream political class, including for small political parties like the Greens. These results confirm that populist candidacies particularly entered in municipalities impacted by the scandal. By doing so, they contribute to the rise in electoral competition (i.e. in the number of candidacies).

Third, we observe that the populist far-right party enters in municipalities involved in the public financial scandal, *especially if* these municipalities are historically disadvantaged or have recently experienced migration inflows. The entry of far-right candidacies is indeed particularly reinforced in municipalities with low median income or high unemployment before the 2008 financial crisis and the potential economic aftermath of toxic loans. We find similar results looking at taxation and at municipal expenditure. The higher municipal tax revenues (or municipal tax rates) in the early 2000s are, the more likely populist far-right candidates are to enter in 2014. On the contrary, the higher municipal equipment expenditure in 2000 is, the less likely they are to run for election. Low median income, high unemployment, high taxation and low expenditure on municipal infrastructure before the financial crisis are strongly correlated with their value in 2014. They exacerbate the entry of far-right candidacies in municipalities affected by the scandal as they raise social discontent and increase the likelihood of success of outsiders and/or decrease their entry cost. As populist far-right rhetoric is strongly opposed to migration, we find that the effect of the treatment was even higher where the share of foreign-born citizens had been increasing between 2008 and 2014. Overall, these results confirm that the right-wing populist wave can be reinforced by local economic and social conditions.

Finally, we show that public financial scandals play a role per se in the rise of populism. In the literature on populism and financial crises, one main challenge is to disentangle the impact on populism of *actual* adverse economic shocks from the aftermath of media uproar. In the last section, we argue that public financial scandals can fuel populism, even when they have no impact on household living standards. During the last electoral term, municipalities which contracted toxic loans did not experience more firm closure, more unemployment or more taxation than the municipalities which did not. Yet we could still assert that the rise of populism is explained by the rational expectation of actual future cost incurred by households. This assumption does not seem confirmed as the degree of ex-post toxicity of the loans do not play a

role on the rise of populism.<sup>5</sup> These findings are therefore more likely to reflect a generalized hostile reaction towards mainstream politicians than a reaction to the *actual* economic consequences of such decisions. We find instead evidence that the media uproar of the scandal channeled populist appeal. In articles mentioning the names “toxic loans” and “mayors”, the keywords include the words “local taxation”, “citizens’ initiatives”, “municipal elections” and “local officials”. It suggests that citizens organize themselves to deal with the aftermath of the scandal, including the potential rise in taxation. Such a message favors the populist agenda as it highlights the loss of confidence in the elite, the divide between the elite and the people, and the fear of the future. As populist candidates are more likely to run for election in municipalities covered by the scandal, they enjoy a higher relative press coverage during the electoral campaign – in contrast with the incumbent. Through the analysis of local media, our results explain how a public financial scandal fuels the rise of populism by enhancing the populist rhetoric at time of financial crises. It sheds light on the importance of better understanding the mechanisms between financial crises and populism.

This paper speaks to several strands of the literature. First, it relates to the literature exploring the emergence of extreme and populist votes. Political scientists have been investigating this matter for a long time. They have stated that events discrediting the elites are particularly important to trigger the emergence of such political movements (see for example [Panizza \(2005\)](#)). The recent waves of populism across Europe and the United States have led economists to study such phenomena more closely. On the empirical side, two sets of studies can be mentioned. The first one points to cultural factors, referring to cultural backlash of previously dominant strata of society ([Inglehart and Norris 2016](#); [Mutz 2018](#); [Colantone and Stanig 2018a](#)), or to hostility towards migrants ([Becker, Fetzer et al. 2016](#); [Hangartner et al. 2017](#); [Dustmann, Vasiljeva, and Damm 2016](#); [Viskanic 2017](#); [Edo et al. 2018](#); [Dustmann and Damm 2019](#)). The second one focuses on the role played by economic conditions, whether it relates to openness to trade ([Dippel, Gold, and Hebllich 2015](#); [Dorn et al. 2016](#); [Malgouyres 2017](#); [Colantone and Stanig 2018b](#)), unemployment shocks ([Algan et al. 2017](#); [Lechler 2019](#)), or fiscal cuts ([Becker, Fetzer, and Novy 2017](#)).<sup>6</sup> Relatedly, some studies highlight the specific role of financial crises on the rise of extreme votes. [Algan et al. \(2017\)](#) find a

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<sup>5</sup>The degree of toxicity is instrumented by the presence of a contract indexed on the Swiss Franc. The exclusion restriction is that, conditionally on contracting toxic loan(s), the variations in the Swiss Franc were not anticipated when the contract was signed (as argued by [Bartolone and Gorges \(2011\)](#), [Cour des Comptes \(2013\)](#), [Seban and Vasseur \(2014\)](#)), and did not directly affect the electoral competition other than through their effect on the toxicity of the loan itself. Using this methodology, we do not find that the degree of ex-post toxicity impact populist voting and populist entry.

<sup>6</sup>Upon a theoretical point of view, [Acemoglu, Robinson, and Torvik \(2013\)](#) argue that voters demand weaker checks and balances on politicians, as it makes it more difficult to bribe politicians by increasing political rent. [Acemoglu, Egorov, and Sonin \(2013\)](#) model populist policies as signals sent by politicians

strong relationship between increases in unemployment and voting for populist parties during the Great Recession. Similarly, [de Bromhead, Eichengreen, and O'Rourke \(2013\)](#) and [Funke, Schularick, and Trebesch \(2016\)](#) show that financial crises lead to increased polarization and higher support for extreme-right parties. In contrast to these studies, we do not test the overall political effects of the financial crisis. Instead we are interested in a specific mechanism, i.e. public financial scandals, which contributes to explain *how* financial crisis trickled down to politics. In this paper, we specifically tackle this dimension, studying populist candidate entry in French local elections. Finally, this paper more generally contributes to our understanding of the consequences of public finance mismanagement. Previous studies have focused on corruption or mismanagement scandals to determine to what extent corrupt politicians are likely to be reelected ([Ferraz and Finan 2008](#); [Hirano and Snyder Jr 2012](#); [Nannicini et al. 2013](#)), whether corruption sways voters away from the booths ([Giommoni 2017](#)) or whether corruption induces a change in candidate quality and party labeling ([Cavalcanti et al. 2016](#); [Daniele et al. 2017](#)). However, to the best of our knowledge, we are among the first to assess the impact of a public-finance mismanagement scandal on the entry of populist politicians.

The remainder of the paper is as follows. Section 2 underlines the institutional setting, describes the data and provides descriptive statistics. Section 3 describes the estimation strategy. Section 4 reports the electoral results, as well as robustness and additional tests. Section 5 studies the potential mechanism. Section 6 concludes.

## 2 Institutional Setting

### 2.1 Dexia bank and Toxic loans

Dexia bank was created in 1996 as the result of the merger between the French and Belgian banks specialized in credits to local governments: the *Crédit Local de France* (hereafter *CLF*) and the *Crédit Communal de Belgique* (hereafter *CCB*). Specifically, the *CLF* was created in 1987 as a successor of a long-standing French public institution (the *Caisse d'Aide à l'Équipement des Collectivités Locales*) established in 1967. First public, the *CLF* entered the stock market in 1991 and was rapidly privatized in 1993. In 1994, local governments were allowed to become shareholders. 437 did so on a voluntary basis, among which 362 municipalities.

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to inform voters they are honest and not tied to special interests. [Di Tella and Rotemberg \(2016\)](#) consider populist votes as a reaction to disloyal leaders, which makes voters turn to less competent ones.



Dexia then became a major source of funding for the French public sector. According to a report from the [Cour des Comptes \(2011\)](#), as of 2010, 32% of the debt of the French public sector was held by Dexia. Among the loans granted by Dexia to local governments, there was a high share of structured derivatives: 70% of all structured loans granted in France to municipalities were indeed delivered by Dexia ([Bartolone and Gorges 2011](#)). The contracts were usually divided into two periods of time. For some initial years, the interest rate was fixed and lower than market rates. Then for a very long period of time (up to fifty years), the interest rate was indexed on the variation in underlying financial assets. In most cases, the volatility induced by the 2008-2009 financial crisis led to a large increase in interest rates. As shown by [Pérignon and Vallée \(2017\)](#), the spike only occurred after the 2008 financial crisis. In 2009, structured loans were classified by the Gissler Chart based on their level of risk for local governments as they were not insured against it. Some of them were even named as toxic due to the potential volatility of the underlying assets and the complexity of the interest formula. The amount of structured derivatives in the budget of local governments was as high as 30 billion Euros, with 10 billions of highly risky loans ([Cour des Comptes 2011](#)).

Appendix Figure 2.3 plots the number of contracted structured loans and the number of concerned municipalities over time. These amounts steadily increased reaching a peak in 2006-2007, before decreasing after the beginning of the financial crisis and coming back to zero in 2011 when the scandal was disclosed.

## 2.2 The scandal disclosure by *Liberation*

In September 2011, while negotiations on a bail-out of Dexia were being held, the national newspaper *Libération*<sup>7</sup> released on its website a confidential file from Dexia, detailing all the high-risk structured loans it granted to local governments. We collected the data released by *Libération* for French municipalities, gathering information on 3,016 risky loans contracted by 1,586 municipalities (i.e., 16% of the municipalities above 1,000 inhabitants). Appendix Figure 2.4 represents the basic information contained on this map, namely the total overhead ratio (i.e. the ratio between the excess interests and the initial amounts of all the loans contracted).<sup>8</sup> In its interactive version,

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<sup>7</sup>With a national print of more than 150,000 copies for about one million of readers, making it the 4<sup>th</sup> most read general newspaper in France in 2011.

<sup>8</sup>The original version can be found [here](#).

this map also reports information on the borrowed amount, the number of loans, the contract date, the end date of the contract and the counterpart bank.<sup>9</sup>

Several pieces of evidence suggest that it is very unlikely that the taxpayers were aware of the issue concerning their municipality before *Libération* released the information in 2011. First, [Pérignon and Vallée \(2017\)](#) argue that the French legislation does not impose municipalities to report their use of derivatives. Second, as pointed out by [Tirole \(2017\)](#), the incumbent mayors would have no interest in disclosing the long-term risks of such derivatives if the initial aim was to maintain a balanced budget, while financing more investments. Third, before September 2011, there were also virtually no Google requests for the French translation of "Toxic Loans" (Appendix Figure 2.5). In September 2011, a massive spike of requests occurred, which rapidly decreased to a level steadily higher than before. Similarly, while Google searches for Dexia increased during the financial crisis, the peak of Google searches for this bank in France took place at the time of the revelation by *Libération*. Therefore, it seems convincing that taxpayers were mostly unaware of these loans before the *Libération* leak.

The Toxic Loan story was a high-profile scandal, with a long-standing media coverage. Between September 2011 and the first round of the 2014 municipal election, the scandal made the headlines in national and local newspapers, in TV shows, in television reports and on Internet. Still today, there are 105,000 French web pages on toxic loans. Appendix Figure 2.6 reports the number of press articles mentioning the word "toxic loans" per day over time. More than 75 press articles include the word "toxic loans" the day the information was released. The toxic loan scandal was then regularly highlighted in the press. In January 2014 (i.e., three months before the election), a decision was rendered by the French Constitutional Council against a retroactive law in favor of Dexia. This event sparked renewed interest in the scandal. In the aftermath, television reports on toxic loans were rebroadcasted, including a special TV program (named *Envoyé Spécial*) which attracts 4 million viewers each week.

Most of the time, the scandal was portrayed as the result of excess capitalism and lack of financial regulation. The links between Dexia and French mayors were unveiled. As the French journalists [Cori and Le Gall \(2013\)](#) remind, some French mayors were in close relationship with the bank. They were invited at dinner parties and at social events by Dexia. Such festive events were good opportunities to sign the loan agreements and to renew interest in the financial products proposed by the bank. At

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<sup>9</sup>As Dexia was covered for each of these loans, the main counterpart banks were the Bank of America, Barclays, BNP Paribas, Credit Suisse, Deutsche Bank, Dexia Bank Belgium, Goldman Sachs, HSBC, JP Morgan, the Royal Bank of Canada and UBS.

that time, Dexia was particularly keen to support associations of elected officials and to become minority shareholder of local semi-public companies specialized in garbage collection and district heating. Some mayors even attended the Executive Board of Dexia. To do so, they were highly well-paid as they received more than 20,000 Euros to attend the four annual sessions. At a time where the global economic crisis strongly affected French citizens, these revelations sparked outrage against the banking system and public officials. Mayors were accused of poor decision making and incompetence by populist candidates during the electoral campaign. Both the populist far-left and the populist far-right publicly blamed responsible mayors.<sup>10</sup> Overall, the toxic loan scandal was perceived as a public financial scandal revealing the drifts of financial capitalism and globalization.

### 2.3 In the aftermath of the scandal

Following these revelations, some municipalities decided to challenge their structured loans in court.<sup>11</sup> The first sentences were generally in favor of municipalities and allowed them to cancel their loans, arguing that the contract did not indicate the overall effective interest rate (Pérignon and Vallée 2017). However, later ones deemed municipalities informed enough to be aware of the potential risks associated to these loans.<sup>12</sup> On July 29<sup>th</sup> 2014, a law was voted enacting the retroactive validity of the contracts, even if the effective interest rate was absent or inaccurate.<sup>13</sup> At the same time, a special relief fund was created by the State, endowed with 1.5 billion Euros in 2014 and then 3 billion Euros in 2015, when the Swiss Franc spiked up again.<sup>14</sup> In 2015, 676 municipalities had applied for help from the fund,<sup>15</sup> which imposed to restructure municipal debt through an average refund of 50% (and up to 75%) of the early loan repayment fees, in exchange for municipalities abandoning judicial litigation.<sup>16</sup> After the bail-out of Dexia, the bank did not have the right anymore to lend to local public entities (or only under very restrictive conditions). In 2013, a new entity was created to provide

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<sup>10</sup>For instance, before the 2015 county elections, the former populist far-right Vice President wrote: *"This dramatic situation is due to the local barons of the UMPS [the mainstream political class], who are governing [...] The taxpayers' money vanished because of the headlong rush of this caste of amateurs."* A similar statement is reported by a populist far-left candidate at the 2014 municipal election in the city of Antony: *"The incumbent can always pretend that everything is all for the best in the best of all worlds [...] The executive UMP-UDI [mainstream right] at best lacked critical thinking, and at worse willfully took risks. [...] Is it the role of a local government to gamble with everybody's money?"*

Source: [See the former Front National Vice President's website](#)

<sup>11</sup>While we do not observe the exact number of such litigation, about a hundred were counted a few days before the municipal elections. Source: [Le Monde newspaper](#)

<sup>12</sup>Source: [Newspaper La Gazette des Communes](#)

<sup>13</sup>Source: Official website *"Vie publique"*

<sup>14</sup>Source: [Newspaper "La Gazette des Communes"](#)

<sup>15</sup>Source: [Deposits and Consignments Fund](#)

<sup>16</sup>Source: [Official website on Local governments](#)

loans to municipalities, the SFILL-CAFFIL, joint between the State (75%), the Deposits and Consignments Fund (20%) and the *Banque Postale* (5%).<sup>17</sup>

## 2.4 French Municipal Elections and Populist political parties

France has more than 36,000 municipalities, the majority of them having a population below 500 inhabitants. Every six years, municipal elections are held on the same day for every municipality. The latest election years are 1977, 1983, 1989, 1995, 2001, 2008 and 2014.<sup>18</sup> At the municipality level, the electoral system depends on the size of the municipality.

Since 2014, any city with more than 1,000 inhabitants has been indeed subjected to a runoff proportional list ballot.<sup>19</sup> Citizens have to vote for a list without any way to cross-out candidates on an individual basis. If a list obtains the absolute majority at the first round, no second round is held. Otherwise, all the lists which received more than 10% of the votes in the first round can go to the second round.<sup>20</sup> The ballot is proportional with a bonus for the majority list: a list obtaining the absolute majority gets indeed half of the offered seats, and the remaining seats are proportionally shared among all the lists with more than 5% of the seats. The three biggest cities in France (Paris, Lyon and Marseille) have this runoff system at the *arrondissement* level but not at the *city* level. Therefore, we choose to exclude them from the sample. In cities with less than 1,000 inhabitants, the system has been a two-round majoritarian plurinominal system since 2014. Candidates run within lists but voters can modify them by adding or suppressing their names or even can combine the lists they want. As a consequence, votes are counted by candidates. Any candidate obtaining the absolute majority of valid votes obtains a seat in the municipal council (if the number of votes received is greater than 25% of the number of registered voters). The remaining seats are shared in the second round. Candidates obtaining the greatest share of the votes are then elected.

Note that in both cases, voters elect only municipal councilors who in turn elect the mayor. For cities with more than 1,000 inhabitants, the order on the list is not arbitrary: the top of each list is not only seen as potential municipal councilor but also as candidate for the office of mayor. That is the reason why the word candidate refers here to the head of the party list and can be used interchangeably. At the end, the mayor is the head of the list which gets the highest number of seats. For the rest of our

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<sup>17</sup>Source: Newspaper "*La Gazette des Communes*"

<sup>18</sup>The 2007 municipal elections were postponed to 2008 as the presidential election was also held in 2007.

<sup>19</sup>Before 2014, only cities with more than 3,500 shared this type of ballot.

<sup>20</sup>The lists which gathered more than 5% of the votes can merge with the other lists.

analysis, we will focus on municipalities over 1,000 inhabitants as they share the same voting system, in which votes are counted by lists and not by candidates, and whereby political affiliation is always mentioned.

According to The Populist website<sup>21</sup> founded by several scientific institutes, there are three populist parties in France: one from the far left and two from the far right. At the 2014 municipal election, the populist far-left was represented by Jean Luc Mélenchon's political groups. In 2009, Jean-Luc Mélenchon and Marc Dolez, two left-wing parliamentarians, founded the Left Party which gathered the sensibilities of the anti-liberal left. Jean-Luc Mélenchon is an outspoken critic of the neoliberalism, of the globalization and of the European Union. He is a proponent of post-capitalism and Marxist theories. His ideology strongly relies on the social divide between the poor and the elite and fits particularly well into the populist rhetoric. In 2012, the Left Party formed a political coalition with members of the French Communist Party in order to join forces against the far right at presidential election. This coalition was named the Left Front and was still in place in the 2014 election. In the rest of the article, we thus define populist far-left candidates as candidates either affiliated with the Left Party or with the Left Front. The other far-right populist parties are the *National Front*, represented by the Le Pen family and *Republic arise* (known today as *Debout la France*), which was founded by Nicolas Dupont-Aignan. The *National Front* is the main far-right political party in France. It promotes a nationalist populist ideology, with a recurring focus on immigration and Islamism. It has been particularly hostile to the political establishment and is a proponent of a radical change in politics. In contrast, *Debout la France* is a small political party created in 2008. It was first classified as a right-wing political party before being linked with the extreme right. In 2017, Nicolas Dupont-Aignan was even named as future prime minister by Marine Le Pen. Yet at the 2014 municipal election, its political ideology was still in transition and less populist than it is today. Its number of candidacies was also particularly small (less than 135) and not all candidates were required to be officially affiliated. As a result, we consider in our main specification the populist far-right as being represented by the *National Front* and test the robustness of our results by including *Republic arise* and other small far-right political groups.

## 2.5 Data description

To measure the impact of Dexia toxic loans on the 2014 municipal elections, we first combine the *Libération* newspaper dataset with electoral data on municipalities. Electoral data for municipalities over 1,000 inhabitants are provided by the *Ministry of*

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<sup>21</sup>[Link : The Populist website](#)

*Interior*. They contain variables such as the number of party lists and their political affiliation. To build the instrumental variable, we use an exhaustive list of the CLF shareholder municipalities, which entered the capital of former Dexia bank in 1994. Data were taken from the publication in the *Official Gazettes* of December 16<sup>th</sup> 1994 and were then matched with GIS data from the *National Institute of Geographic and Forest Information*.

To control for different city covariates, we use several administrative datasets at the municipality level, such as the Census, the municipal budget data and the *National Registry of Representatives*. Firstly, we control for population characteristics using the 2011 Census Data.<sup>22</sup> Such data include shares of each socio-professional category, age structure of the population, level of education, structure of the local housing market (vacant housing, main residencies, share of landlords and social housing), type of municipality (rural/urban), share of foreign-born inhabitants and its winsorized growth rate between 2008 and 2013 (winsorized at the 1% and 99% level). As median income could be affected by the aftermath of the scandal, we add the 2001 median income, delivered by the *National Institute of Statistics and Economic Studies*. Secondly, we consider the 2000 budgetary variables using data from the *Ministry of the Economy*. It enables to avoid capturing the economic impact of toxic loans on municipal budgets. Control data include capital expenditure, the total amount of local taxation, debt stock and overall budget result, all winsorized at the 1% and 99% levels and expressed per inhabitant.<sup>23</sup> Thirdly, we control for the characteristics of incumbent mayors using the *National Registry of Representatives*, provided by the *Ministry of Interior*. It delivers information for each elected mayor about her gender, age, party and socio-professional category.

Finally, to disentangle the mechanisms, we combined several data sources on local taxation, firm closure and local newspapers. To look at the economic aftermath of the scandal, we use data on municipal tax rates delivered by the *Ministry of the Economy* through the *Inventory of local taxation*. We also look at firm closure thanks to the *Official Bulletin of Civil and Commercial Announcements* (BODACC). Last, we investigate media coverage. Thanks to the *Factiva* data, we have access to national and local newspapers published between the disclosure of the scandal and the first round of the 2014

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<sup>22</sup>Since 2004, municipalities with less than 10,000 inhabitants are covered by an exhaustive census survey done every five years. For bigger municipalities, census remains on an annual basis but is not exhaustive anymore (i.e. surveys are restricted to 8 % of the population). Therefore, the 2011 Census Data cover all French municipalities surveyed between 2009 and 2013.

<sup>23</sup>The overall budget result gives an overview of the budget of French municipalities. More specifically, it is equal to the operating accounting result minus financing requirement. The budget of French municipalities is indeed divided into two sections: an operating one (for all the operational aspects of the municipality) and an investment one (for all the change in the asset value of the municipality).

municipal election. In particular, we first collect French articles mentioning the name “toxic loans”, to understand the media coverage of the scandal. Then, we retrieve the number of articles for each candidate at the 2014 municipal elections. It enable us to compute the relative press coverage enjoyed by each candidate in its municipality after the scandal disclosure (and during the municipal campaign). To do so, we divide the total number of articles mentioning one candidate with the total number of articles mentioning a candidate within the municipality.

## 2.6 Descriptive Statistics

### Quantity and amounts of structured loans

Table 2.1 summarizes the main characteristics of the loans in our dataset. As the total number of loans corresponds to 8.94 billion Euros, it represents a sizable share of the debt amount of French municipalities (59.9 billion Euros in 2011). The average loan size is 2.96 million Euros, with a maximum of 77.9 million Euros. In 2011, the overhead ratio is on average of 11.8%, with a median of 9.1% and a maximum of 114%. Among those municipalities, 47% contracted more than one structured loan to Dexia.

Table 2.1: Characteristics of contracted loans

	Mean	SD	Min	Max	Q1	Median	Q3	Total
Amount	2,964,836	3,928+06	13,000	7.79e+07	543,000	2,059,000	3,73+06	8.94e+09
Overhead ratio	0.118	0.104	-0.180	1.142	0.061	0.091	0.133	
<i>N</i>	3016							

### Structured products and underlying assets

While media coverage frequently mentioned the Euro-Swiss Franc exchange rate, portfolios were more diversified at that time and many structured products were indexed on different underlying assets. In fact, only about 10% of the contracted loans were based on the Swiss Franc exchange rate while more than 50 % were linked to the Euro Interbank Offered Rate. As shown by Appendix Table 2.7, four types of underlying assets can be pointed out: inflation rates, interbank offered rates, exchange rates and Constant Maturity Swap spreads.<sup>24</sup>

### Characteristics of municipalities with structured loans

<sup>24</sup>These underlying assets are not directly mentioned in the database. However, thanks to administrative records, we deduce them from the names of the 135 standard contracts.

To highlight differences between municipalities which adopted structured loans and those which did not, we conduct several t-tests. The two samples are on average quite different (Appendix Tables 2.8, 2.9, 2.10). First, treated municipalities appear more as urban ones. Their population is clearly larger while the housing market seems more constrained, with a lower proportion of homeowners and a higher proportion of tenants. Second, mayors differ between the two samples. Mayors in charge of municipalities with Dexia toxic loans are more likely to be managers or professionals. They also tend to come more from the moderate left or from the extreme left than their counterparts<sup>25</sup>. Third, municipalities which took toxic loans face more economic and financial issues than the others: unemployment rate is larger and median income is lower. Their financial position is more fragile: even if intoxicated municipalities have larger budgets, their debt is higher, both in terms of stock and annual repayments.<sup>26</sup>

Among municipalities which contracted toxic loans, we also find mixed evidence of selection into the degree of toxicity. On the one hand, mayors and population characteristics do not substantially differ when we focus on the degree of toxicity (Appendix Tables 2.11 and 2.12). On the other hand, operating revenues, operating expenses per capita, debt stock and annual repayments are larger for highly intoxicated municipalities (Appendix Table 2.13).<sup>27</sup> Selection into the degree of toxicity would not be totally surprising. While ex-post toxicity was driven by the financial crisis, and even though the ex-post risk was unlikely to be fully taken into account by municipalities, riskier loans might have had ex-ante lower interest rates during the first years due to the risk premium, thus leading to a selection effect.

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<sup>25</sup>Note that this last point does not contradict our hypothesis that voters would reward populist political lists to punish mainstream parties involved in the scandal. In municipalities with Dexia toxic loans, a large part of the mayors in charge in 2013 come from moderate right and moderate left (45.3% and 41.5% respectively) while only 6.3% were from the extreme left. Still we control for the political orientation of the incumbent in our regressions.

<sup>26</sup>Those figures are from 2013 so fragile financial position may be partly due to toxic loans. However, in terms of variation, both operating expenses and investment expenditures grow to a lesser extent between 2008 and 2013 in those municipalities (Appendix Table 2.14). In 2000, debt is higher in municipalities impacted by the scandal, both in terms of stock (+499 Euros) and annuity (+53 Euros).

<sup>27</sup>Note that similarly, investment revenues and expenditures grow to a lesser extent between 2008 and 2013 for municipalities which were ex-post highly intoxicated (Appendix Table 2.15).



## 3 Empirical strategy

### 3.1 Endogeneity issues

Even though the sharp increase in interest rates was unlikely to be anticipated neither by taxpayers, nor by local administrations, nor by Dexia itself (Bartolone and Gorges 2011; Cour des Comptes 2013; Seban and Vasseur 2014), municipalities adopting structured loans remain different from municipalities which did not, both in terms of observable (see Section 2.6) and unobservable characteristics. At least two main reasons are at stake.

First, part of structured-loan contracting might be due to strategic motives. As we observe in the data, French municipalities which chose such products often face financial issues and/or heavy investment projects. In that respect, lower fixed interest rates at an early stage might have appeared interesting to help them being temporarily released from financial stranglehold. It does not mean however that contracting structured products was entirely driven by real financial needs. Pérignon and Vallée (2017) and Tirole (2017) argue that since such derivatives momentarily help to decrease tax rates and debt burden, they were particularly interesting for reelection purposes. It may have been indeed the case for the 2008 municipal elections (Pérignon and Vallée 2017).<sup>28</sup> Such motives might bias naive estimations in several ways, depending on whether strategic behaviors are positively or negatively linked with the emergence of extreme candidacies.

Second, we only observe structured loans contracted to Dexia. Naive estimators may be biased if the loans proposed by Dexia are more appealing to some municipalities than others or if Dexia specifically targeted certain municipalities. Considering the history of Dexia and the adopted strategy of the bank to expand, this last point appears to be confirmed. As Cori and Le Gall (2013) described it, staff bonuses were indexed on the sales of structured products to French municipalities and in the mid-2000, target figures were also put in place to incentive their employees. Therefore, brokers were keen to get in touch with French municipalities and have selected them according to their size, their historical ties and their financial position (Cori and Le Gall 2013).

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<sup>28</sup>Note that while the number of adopted structured loans steadily increased between 1996 and 2006-2007, there are however no clear political cycles on the average amount per contract. Strategic behaviors might exist but they remain a limited part of the story.

### 3.2 Instrumental variable strategy

In order to circumvent potential biases, we instrument toxic loan contracting by distance to the closest 1994 shareholder municipality (i.e., the closest municipality which entered the former Dexia bank capital - the “CLF”). This builds upon the fact that distance is an important determinant of credit adoption (Degryse and Ongena 2005; Bharath et al. 2009). Municipalities with historically tighter links with Dexia were indeed more likely to become Dexia shareholders.<sup>29</sup>

Appendix Figures 2.7 and 2.8 show that municipalities which became shareholders in 1994 were likely to adopt toxic loans earlier and to contract large share of them among their annual debt stock, in the early 2000s.<sup>30</sup> In particular, Appendix Figure 2.7 plots the kernel distributions of the earliest starting year of contracts for the 1994 municipal shareholders and for the other involved municipalities. We notice that a large share of shareholder municipalities contracted toxic loans very early and that the median year is clearly smaller among them (2004 vs 2005). This result is in line with Dexia business strategy. In the late 1990s and early 2000s, their business plan was to efficiently sell structured products to local governments (Cori and Le Gall 2013). To find more clients, they first choose municipalities with the closest historical ties (i.e., the 1994 shareholder municipalities), before selling more products to neighboring municipalities.

Figure 2.1 shows the location of municipalities involved in the scandal and compares it to the distance to the closest shareholder municipality (computed on a 5km×5km grid). It appears graphically that many treated municipalities were located within short-range of municipalities which entered the CLF capital in 1994.

Importantly, the exclusion restriction is that distance does not affect the electoral outcomes of 2014 other than through its effect on toxic loan contracting. This hypothesis is likely to be warranted for three reasons. First, the 362 cities which entered the CLF capital are not only urban, economic or cultural centers. They are located all over the territory and many among them are small to medium sized.<sup>31</sup> Therefore, it is unlikely that our instrumental variable captures an effect of distance to important centers,

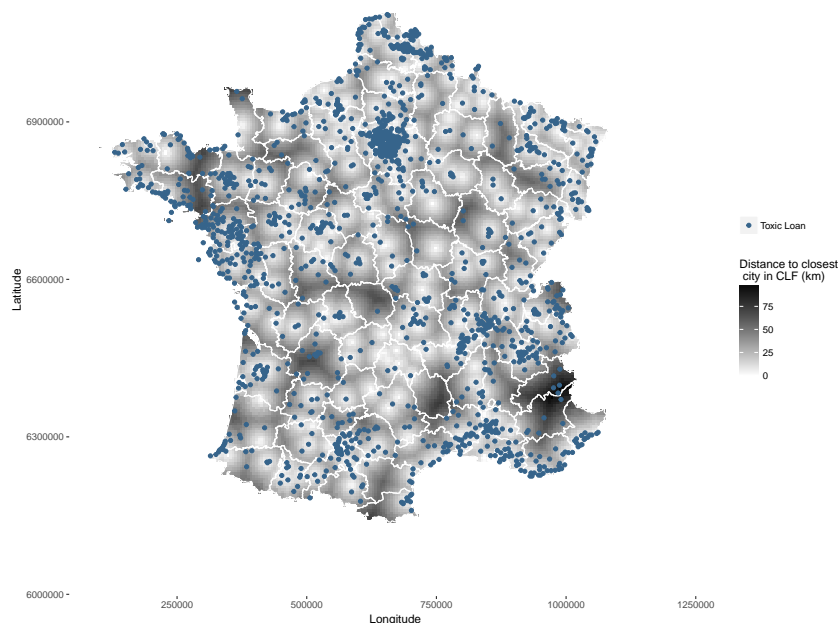
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<sup>29</sup>This point is consistent with Cori and Le Gall (2013) and with anecdotal evidence testifying the strong links between French municipalities and the CLF. For example, Lenglet and Touly (2016) argued that “the case of many officials in small municipalities illustrates, in our opinion, the danger of trust linkages that mayors and aldermen secured for years with Dexia. Indeed, this bank [...] partly stems from [...] a public establishment of the Deposits and Consignments Funds. Obviously, this moral capital served to mislead officials”. Source: Newspaper “Capital”

<sup>30</sup>Unfortunately, data on debt stock are only available since 2000

<sup>31</sup>The first quartile of their distribution remains particularly small as it is equal to 8137 inhabitants. Shareholder municipalities and municipalities which contracted toxic loans are not significantly differ-

Figure 2.1: Distance to closest city in CLF and adoption of Toxic Loan



which may be itself correlated to the rise of populist movements.<sup>32</sup> Second, since we focus on municipalities which were not shareholders, we only take into consideration the role of distance. We thus leave aside potential endogeneity arising from the fact that municipalities which entered the CLF might have unobserved characteristics explaining both this decision and the 2014 electoral outcomes. For instance, this may be the case if the 1994 mayor, whose identity is unobserved by us, had been reelected until 2014. Third, municipalities entered the former capital in 1994, thus well before the main wave of toxic-loan contracting. The latter indeed occurred between 2001 and 2011. It is therefore unlikely that the distance affects anything except the probability of having toxic loan. Nonetheless, we include a large set of controls in our specifications - including department fixed effects, urban status of the municipality, 2000 municipal budgets and incumbent and population characteristics (Section 2.6). Our results are not particularly sensitive to their inclusion (Section 4).

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ent on many aspects, including the total amount of toxic loans and the excess interests per capita they have to repay.

<sup>32</sup>Note that in Pérignon and Vallée (2017) however, the instrument may be linked with distance to urban centers. They indeed use distance to the closest Dexia branch, but the 24 Dexia branches were essentially located in regional capital cities.

### 3.3 Main specification

We estimate the impact of Dexia toxic loan(s) on electoral entry, abstention and vote shares for the 2014 municipal election, using an instrumental variable strategy in municipalities over 1,000 inhabitants . Our main specification is the following:

$$Y_i = \alpha + \beta T_i + \gamma X_i + \epsilon_i \quad (2.1)$$

where  $Y_i$  is an outcome variable in municipality  $i$ ,  $T_i$  is a dummy equal to one if municipality  $i$  is listed as having a toxic loan in the *Libération* database and zero otherwise and  $X_i$  is a set of covariates. We then exploit the binary nature of our instrumental variable by using the Probit-2SLS method proposed by [Wooldridge \(2002\)](#) and [Wooldridge \(2010\)](#). It consists in running a 2-SLS estimation where the instrument is the predicted value of the treatment variable. The latter is taken from a Probit model where the treatment variable is regressed on our measure of distance to the closest 1994 shareholder municipality.<sup>33</sup> Formally our first stage is written as follows:

$$T_i = \alpha' + \beta' \hat{T}_i + \gamma' X_i + \epsilon'_i \quad (2.2)$$

where  $T_i$  is the treatment variable (i.e. municipality  $i$  having at least one toxic loan) and  $\hat{T}_i$  is the predicted value of  $T_i$  taken from the following Probit model:

$$Pr(T_i) = \Phi(\log(Dist_{CLF_i}), X_i) \quad (2.3)$$

where  $\log(Dist_{CLF_i})$  is the log distance of municipality  $i$  to the closest municipality which entered the CLF capital.

#### Probit stage and Strength of our instrument

The strength of our instrument is assessed in [Table 2.2](#). Controlling or not by observable characteristics, we find that municipalities which are close to shareholder municipalities are much more likely to contract toxic loan(s). The coefficient on the distance is highly significant. Our instrument remains strong and unchanged, using the Probit-

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<sup>33</sup>This estimation is based on the *ivtreatreg* package from STATA. Note that we do not implement in the first stage a probit model as it would introduce nonlinearity and would not produce consistent estimates ([Wooldridge \(2010\)](#) in section 15.7.3). On the contrary, [Wooldridge \(2002\)](#) and [Wooldridge \(2010\)](#) prefer the Probit-2SLS procedure when facing a binary treatment as it is more efficient. In our case, using the standard-2SLS, many predicted values for the dummy  $T_i$  are negative due to large geographical distance. Our preferred specifications are thus conducted through Probit-2SLS.

2SLS (Columns 1 and 2) or the Standard-2SLS (Columns 3) settings. Note that the F-Stat is of 14.87, so largely above 10.<sup>34</sup>

Table 2.2: IV Regression (Probit Stage)

$\mathbb{1}_{Toxic}$	(1)	(2)	(3)
Log of distance to closest CLF city	-.158*** (.029)	-.145*** (.036)	-.021*** (.006)
Marginal effect	-.030*** (.005)	-.020*** (.005)	
<i>Department FE</i>	Y	Y	Y
<i>Urban Status</i>	Y	Y	Y
<i>2000 Municipal budgets</i>	N	Y	Y
<i>Incumbent Characteristics</i>	N	Y	Y
<i>Population Characteristics</i>	N	Y	Y
N	9181	9181	9181
Chi2	1296.96	2832.18	N.A
P>Chi2	0.000	0.000	N.A
Cragg-Donald Wald F	N.A	N.A	14.865

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

## Placebo test

To confirm that our instrumental variable was *actually* capturing Dexia business strategy, we finally conduct a placebo test on our probit stage. Among our sample of municipalities above 1,000 inhabitants, we randomly draw a thousand times 365 pseudo-shareholder municipalities without replacement. Each time, we compute the distance between a municipality and the closest selected pseudo-shareholder municipality. After excluding all pseudo-shareholders of our sample, we normally conduct our Probit-Stage, including all our control variables. Through this procedure, we obtain 1000 p-values. The median of their distribution is equal to 0.240 and belongs to a 95% confidence interval between 0.2089 and 0.2672. Therefore, the geographical distance between random municipalities and the other municipalities does not significantly predict the adoption of toxic loans. It is reassuring as it confirms that our instrument variable indeed captures Dexia business strategy.

<sup>34</sup>In the Appendix, we further document this first stage by showing that the estimated coefficients of the Probit Stage are hardly sensitive to the set of included control variables. (Appendix Table 2.16).

## 4 Results

### 4.1 Electoral Results

In this section, we test whether the 2011 scandal disclosure has a significant impact on the 2014 municipal election. Our hypotheses are the following. First, in line with previous studies (Chong et al. 2011; Kostadinova 2009; Costas-Pérez 2013; Guiso et al. 2017), we assume that the leak of Dexia toxic loans went hand in hand with a decrease in turnout. Second, as public financial scandals fit into the anti-elite rhetoric, we assume a decrease in vote share for the incumbent and an increase in vote share for populist parties. The electoral outcomes of French municipalities yield several challenges. Even if toxic loans pushed more populist lists to run for office, they represent a small share of candidacies. Focusing only on cities with populist parties would thus excessively reduce the sample. Some mayors moreover do not run for an additional term in office: here again, restricting the sample to cities where an incumbent mayor re-runs for office would be at the cost of reducing our sample. To address these issues, we adopt two strategies which can help providing valuable information on electoral results. We first test whether the revelation induced lower vote shares in favor of party lists being from the same political affiliation as the incumbent mayor.<sup>35</sup> We then look at vote shares received by each political block. In both cases, we assign a value of zero to vote shares if no list runs under a specific political affiliation.

The OLS results cannot be interpreted as causal estimates as they are likely to be positively or negatively biased. We thus use our instrumental variable strategy to circumvent this issue. Table 2.3 and Appendix Table 2.17 present our findings on turnout and vote shares, both in the IV and in the OLS settings. First, in both specifications, turnout is decreasing. Yet the coefficient is only slightly significant in the IV specification. Second, the incumbent's political party is electorally punished in municipalities with toxic loans. The effect is negative and weakly significant in the OLS but negative and highly significant in the IV specification. Overall, in municipalities affected by the scandal, vote shares for candidates from the same political affiliation as the incumbent are strongly reduced by 20 percentage points. As shown in Appendix Figure 2.9, it means that the vote share for the incumbent's political party decreases by 33%. Third, both the populist far-right (Pop-XR) and the populist far-left (Pop-XL) obtain better electoral scores in municipalities impacted by the scandal. Their respective increase in

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<sup>35</sup>We define political affiliation as being either Extreme-Left, Moderate-Left, Moderate-Right or Extreme-Right.

vote share is particularly large: 3.35ppt for the populist far-right (i.e., an increase by 7.5 times) and 11.53ppt for the populist far-left (i.e., an increase by 5.5 times). Compared to the incumbent’s political party, the vote shares of populist parties remain small, even in municipalities affected by the scandal. The incumbency advantage is particularly strong at French municipal elections: the incumbent’s political party receives on average 59.4 percent of the vote in municipalities without toxic loans.<sup>36</sup> Nevertheless, municipalities affected by the scandal experience a large and robust increase in populist voting. Appendix Table 2.18 consistently shows correlation between our instrumental variable and our electoral results. Appendix Tables 2.19 to 2.25 confirm that our results are neither particularly sensible to the inclusion of our control variables nor to the choice of Standard-2SLS models (albeit with weaker results for the populist far-left).

Table 2.3: Turnout and Electoral Results - Probit-2SLS specification

	Turn.	Sh inc. p.	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	-.017* (.009)	-19.988*** (4.677)	4.042*** (1.326)	3.534*** (.746)	3.345*** (.729)	.509 (1.036)	11.532*** (3.097)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Incum. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	8078	9181	9181	9181	9181	9181
R2	.371	.203	.269	.172	.172	.244	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Importantly, populist parties are the only political parties experiencing a relative increase in vote shares (Appendix Table 2.26). These findings are in line with the recent literature on the strong emergence of populist parties in the aftermath of financial crises (Guriev and Papaioannou 2020). It confirms that public financial scandals driven by the financial crisis specifically fuel populism.

<sup>36</sup>In our sample, municipalities as small as 1,000 inhabitants are included.

## 4.2 Candidate Entry

We then explore whether our electoral results reflect changes in the electoral supply of political candidates. Precisely, the slight decrease in turnout and the rise of populist voting may mirror the mechanical increase in populist candidacies and the following rise in electoral competition.

Appendix Table 2.27 shows the results of the OLS estimations, where we respectively explain the number of candidacies, the probability that the incumbent mayor runs again and the presence of at least one extreme candidacy (X C.), one from the populist far-right (Pop-XR C.) and one from the populist far-left (Pop-XL C.). In municipalities with toxic loans, we find that the number of candidacies is higher by 0.24 (Column 1) and that the probability to observe at least one extreme candidacy is larger by 6 percentage points (Column 3) in municipalities affected by the scandal. In line with the electoral results, the probability for a populist candidate to run at the election is greater by 3.6ppt for the populist far-right (Column 5) and by 2.7ppt for the populist far-left (Column 7).

Looking at Table 2.4, we find similar results using the IV identification strategy. We find that the number of candidacies is higher by 0.9 in municipalities which contracted toxic loans (Column 1), suggesting overall a larger electoral competition. Appendix Figure 2.10 shows that the number of candidacies in municipalities affected by the scandal increases by 48%. The likelihood of observing an extreme candidacy is 26ppt higher (Column 3). The presence of the populist far-right (Column 5) and of the populist far-left (Column 7) is also more likely - with a respective increase by 16ppt for the populist far-right and by 12ppt for the populist far-left. These coefficients are particularly large (Appendix Figure 2.10) because populist parties are not well established in French local politics. Incumbents are as likely to run for their reelection in municipalities impacted by the scandal.

In Appendix Tables 2.28 to 2.34, we run several sensitivity analyses. We document that overall, while expanding the set of controls slightly diminishes our estimates, the results remain similar across all specifications. There are also quite robust to the Standard-2SLS setting, even if the results are weaker for the populist far-left.

Our results show that populist candidacy is enhanced by the disclosure of a public financial scandal. Due to data limitation, we cannot assert on the entire sample that the populist candidates were running for the first time. Municipal electoral results have been only digitalized and centralized since the 2001 election. Looking at the *Na-*



Table 2.4: Number of candidates and Likelihood of having an extreme candidate - Probit-2SLS specification

	Nb C.	Inc. C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.916*** (.150)	-.037 (.057)	.256*** (.049)	.163*** (.039)	.158*** (.038)	.191*** (.041)	.115*** (.031)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.406	.158	.307	.222	.223	.298	.164

Note: C. refers to candidacies. Nb C. is the number of candidates. Inc. C. is the likelihood of having the incumbent as candidate. X C. is the likelihood of having an extreme candidate. XR C. (resp. XL C.) is the likelihood of having an extreme-right (resp. extreme-left) candidate. Pop-XR C. (resp. Pop-XL C.) is the likelihood of having a populist extreme-right (resp. populist extreme-left) candidate.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

*tional Registry of Representatives*, we know that a large share of populist candidates was neither in office nor former municipal councilor between 2001 and 2013 in the municipalities which contracted toxic loans (51% for the populist far-left party and 89% for the populist far-right). We then compute the probability that a candidate runs at the election *and* had never been a mayor or a municipal councilor over the last two electoral terms. Table 2.5 and Appendix Table 2.35 show that our results on populist candidacies are consistent and that nothing similar is happening for the mainstream political class and for the Greens. It implies that public financial scandals particularly increase the likelihood of populist parties to enter in the political arena – either by increasing their chance of electoral success or by decreasing their entry cost in politics.

### 4.3 Heterogeneity results

Economic and social conditions are common explanations for the rise of populist parties (Algan et al. 2017; Becker, Fetzer, and Novy 2017) and could even reinforced the role played by public financial scandals on the rise of populism. Appendix Table 2.36

Table 2.5: Entry of Populist Candidates - Probit-2SLS specification

	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toric}$	.129*** (.036)	.126*** (.035)	.119*** (.031)	.053** (.023)
<i>Dep. FE</i>	Y	Y	Y	Y
<i>Urban status</i>	Y	Y	Y	Y
<i>2000 budgets</i>	Y	Y	Y	Y
<i>Inc. char.</i>	Y	Y	Y	Y
<i>Pop. char.</i>	Y	Y	Y	Y
N	9181	9181	9181	9181
R2	.206	.207	.221	.114

Note: C. refers to candidacies. XR C. (resp. XL C.) is the likelihood of having an extreme-right (resp. extreme-left) candidate. Pop-XR C.(resp. Pop-XL C.) is the likelihood of having a populist extreme-right (resp. populist extreme-left) candidate.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. *Urban status* is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

shows heterogeneous instrumental-variable estimates with simultaneous interactions between the treatment and the 2001 median household income, the 2000 amount of local tax revenues per capita and the 2000 capital expenditure per capita. We prefer using budgetary variables from the early 2000s as they cannot be impacted by the public financial scandal. Yet the correlations between the 2000 and the 2013 variables are particularly strong (98% for median income, 61% for equipment expenditure and 93% for local taxation) and can be used as a result to look at the cumulative impact of social and economic conditions on populism. Our results foremost indicate that the increase in the number of candidacies and in the likelihood of observing the populist far-right as candidate is reinforced in municipalities characterized by low median income, high local taxation per capita and low municipal equipment expenditure. These results are particularly robust. Looking at vote shares (Appendix Table 2.37), we find a similar cumulative impact of local socioeconomic conditions on the vote share for the far-right and for the populist far-right. Replacing the 2001 median income by the 1999 unemployment rate, as we do in Appendix Table 2.38, yields similarly consistent results : the populist far-right is even more likely to enter in municipalities with high unemployment rates. These findings are in line with Algan et al. (2017) who find a strong

relationship between unemployment and voting for populist parties. Appendix Tables 2.39 and 2.40 finally show that our results are robust when we consider local tax rates on households instead of local tax revenues.<sup>37</sup> In France, there are mainly two local taxes on households: the housing tax and the property tax on developed land. We find that a rise in housing tax rate or a rise in property tax rate on developed land (PDL) increases the effect on vote shares of the populist far-right and on the likelihood of having a far-right populist candidate.

Another root cause of populism lies in migration inflows (Dustmann, Vasiljeva, and Damm 2016; Hangartner et al. 2017). Immigration is usually addressed by populist political parties. In France, immigration is mainly feared by the populist far-right. In contrast, the rhetoric differs for the populist far-left as asylum rights are advocated. In Appendix Table 2.43, we interact the treatment with the immigrant share of the municipality in 2013, as well as the growth rate of this share during the last electoral term. We find that the municipalities impacted by the scandal face a larger entry of extreme candidacies (whether on the right or on the left) when migration inflows have been high during the last electoral term. Interestingly, in the absence of toxic loans, we find a weakly negative correlation between the growth rate of the immigrant share and the entry of such candidacies. These results call for two comments. On the one hand, they suggest that while immigration is a topic of particular interest for both extreme-right and extreme-left parties (albeit for opposite reasons), it is not enough to observe the presence of extreme candidacies locally - potentially because it is a dividing topic and the electoral uncertainty of exploiting migratory pressure is too high. On the other hand, being in a municipality with toxic loans might lower this uncertainty for extreme parties and make it easier for them to exploit migratory pressure. Overall, the combination of toxic loans and increasing immigration seems therefore to be a particularly polarizing one. Yet, immigrant shares play a different role. We indeed find that the impact on the probability of having a populist far-right candidacy is dampened when immigration share is high. For far-left candidacy, the interaction effect remains non-significant. For the populist far-right, the expected gains of running in a toxic-loan indebted municipality might be decreasing when the share of foreign-born inhabitants is already high, as an electorate located in a multicultural context might be less likely to vote for them.<sup>38</sup> In contrast, for a far-left populist candidacy, the expected gain is

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<sup>37</sup>In contrast with the housing tax and the property tax on developed land, the property tax on undeveloped land less concerns households. The interaction with the dummy on toxic loan is non-significant (Appendix Tables 2.41 and 2.42).

<sup>38</sup>In some cities, immigration can be particularly large and has indeed an impact on the electorate. More specifically, 25% of French municipalities have more than 6.2% of immigrants, with a maximum reached of 21%.

unlikely to be negatively affected by immigrant shares, probably because the far-left rhetoric is more immigrant-friendly.

Overall, these interaction effects suggest a positive feedback loop between the toxic loan scandal and the economic or social factors affecting the rise of populism in politics. While economic and social conditions are likely to play a role independently, the disclosure of public financial scandals amplified their effects.

#### 4.4 Robustness tests

In this section, we perform two robustness checks. First, we investigate whether there are any potential effects of toxic loans on the 2008 municipal elections (i.e. before the revelation of the scandal). Second, we test the robustness of our main results using a different identification strategy.

In Appendix Table 2.44, we show that the presence of toxic loan(s) did not significantly impact political entry in 2008. We then look in Appendix Table 2.45 at turnout and vote shares for the incumbent political block. While the coefficient for turnout is weakly significant, we do not find any effect on vote shares in favor of the incumbent political affiliation.<sup>39</sup> Note that the results presented here are not entirely comparable to the ones obtained from the main estimation since the sample we use is smaller. In 2008, only municipalities with more than 3,500 inhabitants were indeed subjected to a runoff proportional list ballot. This divides our sample size by four and provides us with larger standard errors. Even if the 2008 results are not entirely comparable, these results suggest that toxic loans were unlikely to impact the 2008 electoral race in the same way. Furthermore, the absence of consistent effects in 2008 may imply that what we observe in 2014 is unlikely to represent a form of reversal to the mean.

Second, as our main estimation relies on IV estimates, we complement our analysis with a difference-in-difference approach. Importantly this latter estimation provides similar findings. A limitation of the difference-in-difference is that we can only test the effects of toxic loans on the number of candidacies<sup>40</sup> and on their extreme political affiliation.<sup>41</sup> A second caveat is that data availability is limited to three electoral rounds:

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<sup>39</sup>This result differs from Pérignon and Vallée (2017). They indeed find that toxic loans increased the probability of election of the lists from the incumbent party in 2008. However, our results are not directly comparable as we are considering a more restrictive sample and our instrumental variable strategy differs.

<sup>40</sup>The results on the number of candidacies should be considered with caution, as in 2001 the Ministry of Interior did not record separately the results for different lists of the same political affiliation (as it did in 2008 and 2014).

<sup>41</sup>The populist far-left was absent from the 2001 election and we cannot perform analyses on separate extreme lists, as their number was even smaller in 2008 than in 2014.

2001, 2008 and 2014. This implies that we will test for common pre-trends only considering two periods before 2014. In this case, we directly compare cities holding toxic loans with all the other cities in the sample.

In Figure 2.2, we show that our results are not driven by any discrepancies in pre-trends. To do so, we look at the trends in the number of candidacies and in the likelihood of observing an extreme list. We compare the municipalities over 3,500 inhabitants which had contracted toxic loan(s) between 2001 and 2008 and those which did not. Looking at the outcome variables, we document that both types of municipalities share common trend between 2001 and 2008. Yet their evolution differs between 2008 and 2014, in the aftermath of the scandal disclosure. Compared to the control group, municipalities with toxic loans do experience an increase in electoral competition and an increase in extreme candidacies between 2008 and 2014. Figure 2.2 plots the raw values over time while Table 2.6 gives the point estimates for having toxic loan(s) in a diff-in-diff model where we control for time varying characteristics of the municipality, election fixed effects and municipality fixed effects (the effect being normalized to zero in 2001).

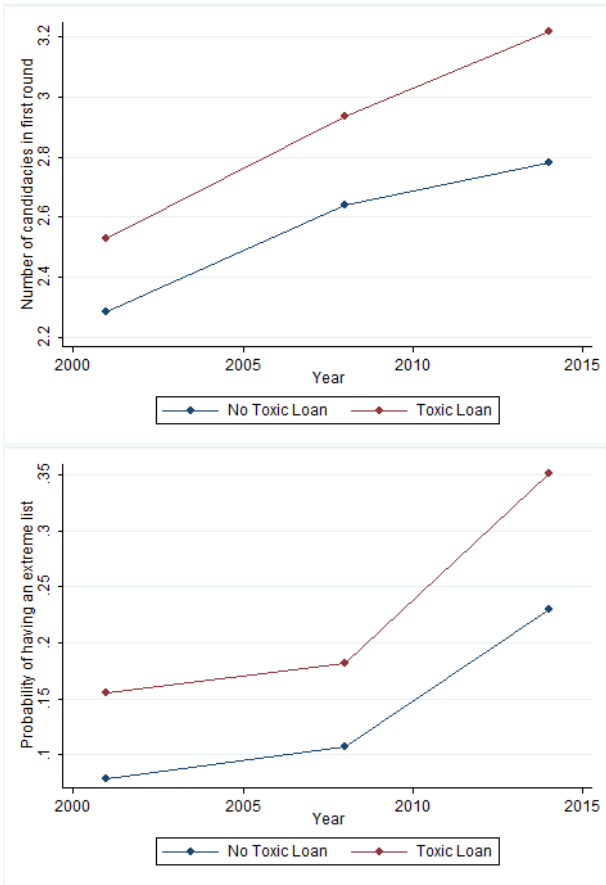


Figure 2.2: Rise in electoral competition and Entry of populist candidacies over time

Table 2.6: Fixed-Effect strategy on candidate entry

	Nb C. (1)	Nb C. (2)	X C. (3)	X C. (4)	R C. (5)	R C. (6)	L C. (7)	L C. (8)
2008	.358*** (.028)	.384*** (.093)	.029*** (.009)	.047 (.032)	-.009 (.011)	.015 (.034)	-.055*** (.009)	-.057* (.030)
2014	.497*** (.032)	.585*** (.134)	.150*** (.012)	.199*** (.049)	-.063*** (.012)	-.050 (.049)	-.098*** (.011)	-.106** (.042)
$\mathbb{1}_{Toxic}$	.050 (.056)	.035 (.056)	-.002 (.019)	-.002 (.019)	.017 (.018)	.020 (.018)	-.008 (.015)	-.009 (.015)
$\mathbb{1}_{Toxic} \times 2014$	.146** (.059)	.134** (.059)	.048** (.022)	.047** (.022)	.013 (.020)	.013 (.020)	.023 (.017)	.018 (.017)
Pop. char.	N	Y	N	Y	N	Y	N	Y
N	5691	5691	5691	5691	5691	5691	5691	5691
R2 adj	.114	.121	.084	.092	.011	.016	.035	.046
F	114.423	16.462	70.823	11.149	9.497	2.219	34.807	6.337

Note: C. refers to candidacies. Nb C. is the number of candidates. X C. is the likelihood of having an extreme candidate. R C. is the likelihood of having a moderate right candidate. L C. is the likelihood of having a moderate left candidate.

Control variables: Population characteristics are given by the 1999, the 2006 and 2011 censuses. The 1999 census was the last exhaustive census in France and the closest in time from the 2001 election. The 2006 census is the first census which was conducted through annual surveys. Collected between 2004 and 2008, the 2006 census enables to control for the population characteristics in the 2008 elections. The 2011 Census has been conducted through annual surveys between 2008 and 2013. It is used as controls for the 2014 elections. Controls include population, socio-professional categories, age distribution, level of education and housing market. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

## 5 Potential Mechanisms

Results so far show an increase in populism in municipalities affected by the scandal, both in terms of entry of populist candidacies and vote shares. In this last section, we seek to understand the mechanisms. Two channels may be at stake. First, the economic aftermath of the scandal could have led to the entry of populism. The economic channel has been well identified in the literature on populism and public financial scandals could affect in the same way populist voting and populist candidacies. Second, public financial scandals could impact *per se* populism by appealing to the populist ideology. Public financial scandals involve public officials and may fuel populist ideology by increasing the divide between the “corrupt elite” and the remaining citizens. To investigate it, we look in particular at the media uproar following the scandal.

## 5.1 The economic aftermath of the scandal

### Local taxation

Public finance mismanagement can lead to a rise in taxation via debt repayment. Considering the toxic loan scandal, we test whether there was any increase in local taxation during the last electoral mandate (i.e., between 2008 and 2013). Appendix Table 2.46 shows that municipalities affected by the scandal did not experience a relative increase in local tax revenues, in housing tax rate or in property tax rates (both for the property tax on developed land (PDL) and for the property tax on undeveloped land (PNDL)). In contrast, there is a significant decrease in local tax revenues and in local tax rates in municipalities which contracted toxic loans. There may be two reasons. First, following Pérignon and Vallée (2017), mayors could strategically decrease their tax rates in order to enhance their chance of reelection. Second, the toxic loan scandal could have no short-term economic impact on French municipalities as the contracts were challenged in court and debt restructured. These two reasons seem plausible and are difficult to disentangle. Nonetheless, we can affirm that the toxic loan scandal did not cause populism via a short-term rise in local taxation.

### Firm closure

Public financial scandals could directly impact local activity via a decrease in municipal subsidies or a decrease in public service employment. In this subsection, we look at two outcomes: the growth rate in firm closure during the last electoral mandate and the growth rate in unemployment. Appendix Table 2.47 shows that municipalities with toxic loans did not experience higher firm closure or higher unemployment growth during the last electoral mandate. It means that public financial scandals can contribute to populism *independently* from short-term adverse economic shocks.

### Degree of ex-post toxicity of the loan

Public financial scandals could still increase populism via the expectation of future cost incurred by households. To test this assumption, we look at the impact of the ex-post toxicity of the loan on the rise of populist candidacies and on the rise of populist voting. We interact the treatment variable with the overhead ratio of the loan (i.e. the excess interests paid by municipalities divided by the initial amount of the loan) or with the overhead debt ratio (i.e. the excess interests paid by municipalities divided by annual

repayment). Such variables are endogenous to the fact of contracting toxic loan(s). We instrument them by the presence of at least one structured loan indexed on the Swiss Franc exchange rate. The rationale behind this instrument is that, upon contraction of toxic loans, the Swiss Franc was considered as particularly stable and safe because its exchange rate had varied in a narrow bandwidth over the 2000 decade. Between the mid-2008 and the mid-2011, its value had yet increased sharply, triggering a high overhead ratio (and a high overhead debt ratio). Conditionally on contracting toxic loan(s), this sharp variation induced by the financial crisis was therefore unlikely to be anticipated, making the exclusion restriction warranted.

We thus run a specific 2-SLS regression to instrument both the presence of toxic loan(s) (through the log distance to the closest municipality in the CLF capital) and conditionally on it, the overhead ratio (through having a loan based on CHF). More specifically, we instrument our two variables of interest by their predicted values obtained from a Heckman two-step bivariate sample-selection model. In this framework, the predicted value of the treatment variable (i.e. having a toxic loan) is delivered by the same Probit stage as our main identification strategy. The treatment intensity (i.e. the ex-post toxicity) is obtained from an OLS regression of the overhead ratio on a dummy variable (having or not at least one toxic loan indexed on CHF), on additional covariates and on a Mills' ratio of the probit stage.<sup>42</sup>

Appendix Table 2.48 shows the coefficients of the Probit and OLS stages of this estimation for our two different measures of toxicity: the overhead ratio and the overhead debt ratio. In both cases, we find that the presence of at least one toxic loan indexed on the Swiss Franc sizably increases the toxicity of the loan, which makes it a relevant instrument. Using this double instrumental variable strategy, we do not find any effect of the ex-post toxicity of the loans on the likelihood of having a populist candidate and on her vote shares. Appendix Table 2.49 shows that the measured effects of toxic loans are similar to our main effects for an average value of the overhead ratio. They do not differ when the overhead ratio deviates from its average value.<sup>43</sup> The degree of ex-post toxicity of the loans does not play a role therefore on the rise of populism. These findings are more likely to reflect a generalized hostile reaction towards mainstream politicians than a reaction to the long-term actual economic consequences of such decisions. Public financial scandals can thus contribute to populism *without* affecting short and long-term economic conditions.

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<sup>42</sup>We implement this methodology using the *ctreatreg* package of STATA.

<sup>43</sup>In Appendix, we show in Table 2.51 that taking the overhead debt ratio as a measure of toxicity yields a similar absence of heterogeneity.



## 5.2 Information, Press coverage and Populist rhetoric

### Information access

In this last section, we test whether public financial scandals appeal to the populist ideology via media coverage. First, we explore any difference in treatment effects among municipalities with weak access to high-speed Internet connection. Our hypothesis is that in such municipalities, the revelation about toxic loans was likely to be discovered by less citizens, thus weakening the incentives for populist lists to enter. Since we do not observe the speed of Internet connection at the municipality level in 2011, we proxy the quality of Internet access in 2011 by the share of premises eligible to an Internet speed of at least 3Mb/s in 2016. Such an Internet speed represented the average Internet speed in France in 2011<sup>44</sup> and can be therefore considered as low by the standards of 2016 (where the average Internet speed was of about 10Mb/s). A municipality with high shares of premises ineligible to such a speed in 2016 was thus likely to have slow Internet connection in 2011. In Appendix Table 2.50, we interact the presence of toxic loan(s) with this measure of Internet quality while including all our set of controls. We find that toxic loans have a positive effect on far-right populist candidacies in municipalities with low Internet connection and that this effect is larger when Internet quality increases. This suggests that the populist far-right is more likely to enter where the information is easily accessible and shared within the whole population.<sup>45</sup>

### Press coverage and Populist rhetoric

Second, we test whether the disclosure of public finance mismanagement fuels *per se* the populist rhetoric. To do so, we collect all the press articles published between September 2011 and March 2014 which either mention the words "Toxic Loans" and "Mayors" or the words "Toxic loans". In articles including the words "Toxic loans" and "Mayors", the *Factiva* platform delivers several automatic keywords on the content of the articles, like "local taxation", "citizens' initiatives", "municipal elections" and "local officials". These words suggest that citizens should organize themselves to deal with the aftermath of the scandal, including the potential rise in taxation. Such a message favors the populist agenda and highlights the rise of political opponents against the incumbent. We then retrieve the number of articles mentioning local political actors

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<sup>44</sup>According to a study from Akamai technology. Data on access to high-speed Internet connection at the municipal level were provided by the *Observatoire France Très Haut Débit*.

Source: [Website](#)

<sup>45</sup>Coefficients for the interaction between the dummy variable "having toxic loan(s)" and the Internet quality are large. However, it is only due to the fact that the share of premises eligible to an Internet speed of at least 3Mb/s ranges from 0 to 1 and thus is not expressed in percentage.

on “Toxic Loans” and identify whether the names mentioned were corresponding to mayors or to opponent candidates. Appendix Table 2.52 shows that the majority of the local press on “Toxic Loans” mentions the opposition and is not exclusively focused on the mayor.

As local news on “Toxic Loans” are too scarce to point out any further evidence, we decide to collect the number of press articles mentioning each candidate at the 2014 election in the aftermath of the scandal. As outcome variable, we divide the number of press articles mentioning a candidate by the total number of press articles mentioning candidates in the municipality. Our outcome can be interpreted as a measure of relative press coverage in the aftermath of the scandal. Appendix Table 2.53 shows the effect of toxic loans on the relative press coverage of the incumbent, on the populist far-right and on the populist far-left. On the one hand, we notice that the incumbent enjoys relatively less media coverage in municipalities affected by the scandal. It confirms the descriptive evidence found in Appendix Table 2.52. On the other hand, we observe that the relative press coverage of populist candidates is increasing in municipalities with toxic loans. This result is in line with the entry of populist candidacy. The more populist candidates enter, the more likely they are to challenge the dominant position of the incumbent in the media. Overall, public financial scandals contribute to populism by fueling criticisms against the elite and by easing the entry of populist candidacies in the political *and* in the media arenas.

## 6 Conclusion

In this paper, we explore the link between financial crises and the rise of populism by highlighting a new channel: the disclosure of public financial scandals, fueled by market volatility. Using the leak of Dexia toxic loans by the national newspaper *Libération* in September 2011, we find that affected municipalities had a tougher electoral competition in the subsequent 2014 municipal elections and were more likely to experience populist candidacies. Importantly, we show that this effect was amplified for the populist far-right in municipalities with more fragile economic conditions (lower income or higher unemployment) and where public finance issues were more salient to the taxpayers (i.e. in cities with higher taxation per inhabitant). We document that the economic aftermath of the financial scandal does not seem to play a role: neither via taxation nor via the ex-post toxicity of the loan nor via firm closure and unemployment.

Our results suggest that public financial scandals fuel populist rhetoric, regardless of the degree of ex-post toxicity of the loans, and increase the chance of electoral success for populist parties - especially in places with cumulative co-factors. In turn, public financial scandals have an impact on electoral results, decreasing vote shares of candidacies from the same political affiliation as the incumbent and increasing vote shares of populist parties.

Consequently, this paper emphasizes that the impact of public financial scandals on the rise of populism should not be neglected. Instead, they have the potential to divide society and to reshape the political landscape by easing the entry of populist candidacies. On a policy perspective, it appears particularly relevant to restore confidence in democratic institutions at time of financial crisis. This paper calls for more research on the impact of financial scandals, in general, on the rise of populism and particularly, on the way they undermine trust in political institutions.

## Appendix A - Descriptive statistics

Figure 2.3: Number of municipalities and structured loans contracted with Dexia over time

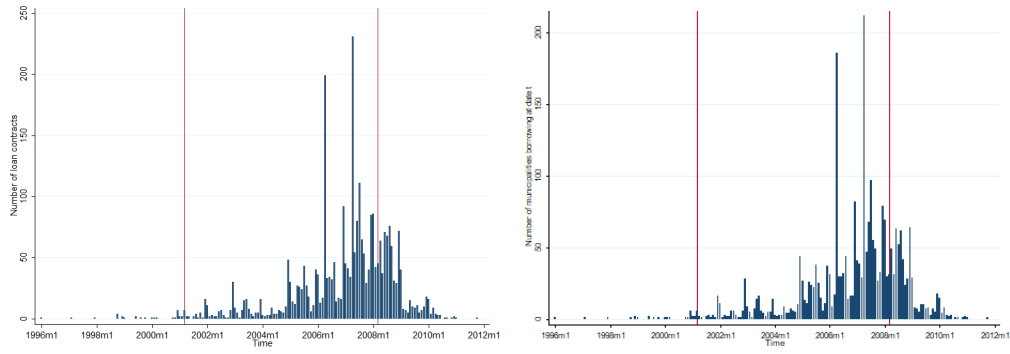


Figure 2.4: Toxic Loans and their Overhead Ratio

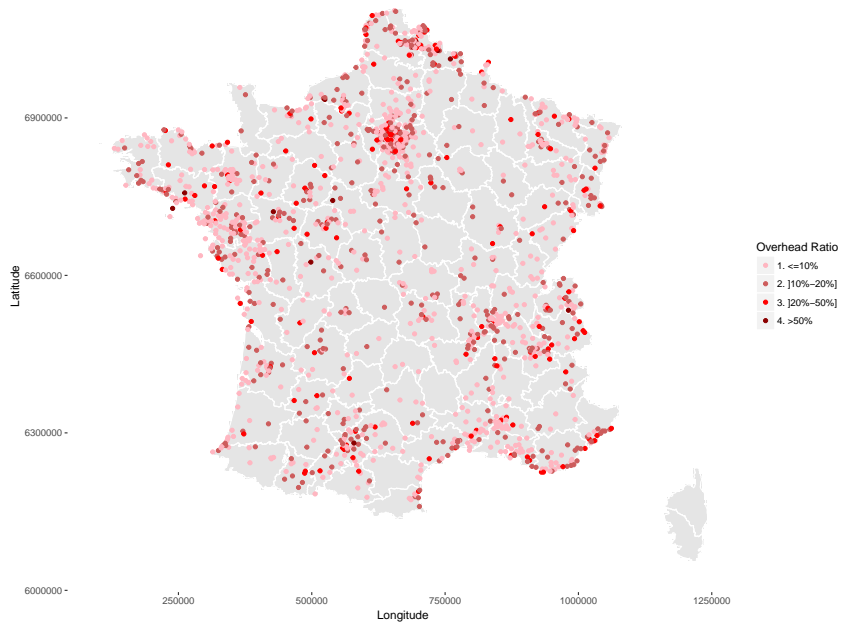


Figure 2.5: Google Trends for "*Toxic Loans*" and "*Dexia*"

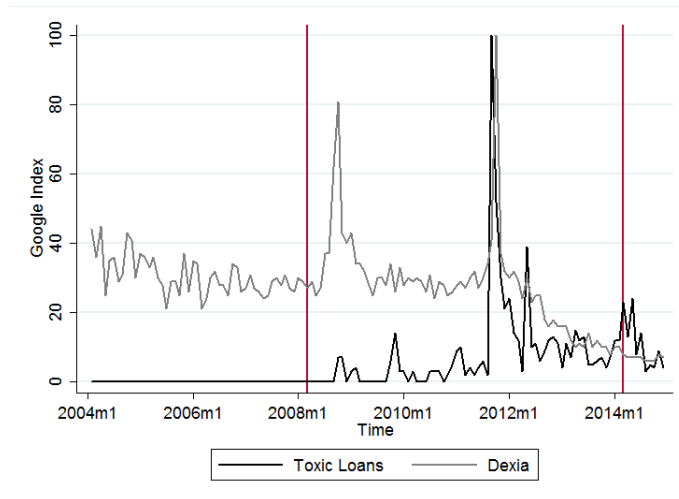


Figure 2.6: Number of press articles published on "*Toxic Loans*" over time

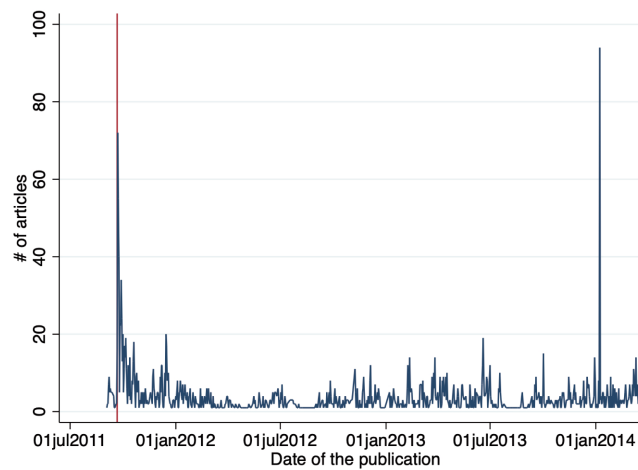


Table 2.7: Number of loans and municipalities concerned for each financial asset

	<b>UNDERLYING ASSETS</b>	<b>PREVALENCE</b>	<b>SHARES</b>	
<b>INFLATION</b>	INFLATION France	Nb of loans	15	0,51
		Nb of municipalities	15	0,94
	INFLATION EURO	Nb of loans	7	0,24
		Nb of municipalities	5	0,32
	INFLATION France-INFLATION EURO	Nb of loans	11	0,37
		Nb of municipalities	11	0,69
INFLATION US	Nb of loans	3	0,1	
	Nb of municipalities	3	0,19	
<b>INTERBANK OFF. RATE</b>	EURIBOR	Nb of loans	1676	57,10
		Nb of municipalities	1182	74,5
	EURIBOR-TEC 10	Nb of loans	24	0,82
		Nb of municipalities	23	1,45
	LIBOR CHF	Nb of loans	10	0,34
		Nb of municipalities	10	0,63
	LIBOR USD	Nb of loans	231	7,87
		Nb of municipalities	199	12,54
STIBOR SEK	Nb of loans	12	0,40	
	Nb of municipalities	12	0,76	
WIBOR PLN	Nb of loans	1	0,03	
	Nb of municipalities	1	0,06	
<b>EXCHANGE RATE</b>	EUR CHF	Nb of loans	222	7,56
		Nb of municipalities	203	12,80
	EUR GBP	Nb of loans	9	0,31
		Nb of municipalities	9	0,57
	EUR USD	Nb of loans	1	0,03
		Nb of municipalities	1	0,06
	EUR USD-EUR CHF	Nb of loans	32	1,11
		Nb of municipalities	32	2,02
	GBP CHF	Nb of loans	1	0,03
		Nb of municipalities	1	0,06
USD CHF	Nb of loans	30	1,02	
	Nb of municipalities	30	1,89	
USD JPY	Nb of loans	38	1,29	
	Nb of municipalities	32	2,01	
<b>CMS spread</b>	CMS EUR 30-CMS EUR 2	Nb of loans	426	14,51
		Nb of municipalities	389	24,53
	CMS GBP 10-CMS GBP 2	Nb of loans	67	2,28
		Nb of municipalities	66	4,16
	CMS GBP 10-CMS EUR 10	Nb of loans	70	2,38
		Nb of municipalities	69	4,35
	CMS EUR 10-CMS EUR 2	Nb of loans	5	0,17
		Nb of municipalities	5	0,32
CMS GBP 10-CMS CHF 10	Nb of loans	4	0,14	
	Nb of municipalities	4	0,25	
-CMS EUR 30	Nb of loans	3	0,1	
	Nb of municipalities	3	0,19	

Table 2.8: T-tests (Mayoral characteristics): No toxic loans/ Toxic loans

	No tox. loans	N1	Tox. loans	N2	Diff.	SE.
<b>Gender &amp; Age</b>						
Male	0.887	7892	0.892	1468	-0.005	0.009
Age	62.249	7892	61.318	1468	0.931***	0.237
<b>Socio-professional category</b>						
Agriculture	0.053	7879	0.018	1468	0.035***	0.006
Industry/Trade	0.055	7879	0.050	1468	0.005	0.006
Private-sector	0.125	7879	0.124	1468	0.001	0.009
Professionals	0.066	7879	0.110	1468	-0.043***	0.007
Teaching	0.055	7879	0.078	1468	-0.023***	0.007
Official	0.060	7879	0.073	1468	-0.013*	0.007
Public-sector	0.024	7879	0.029	1468	-0.005	0.004
Various	0.050	7879	0.093	1468	-0.043***	0.007
Retired	0.511	7879	0.426	1468	0.086***	0.014
<b>Political party</b>						
Extreme-right	0.001	7892	0.000	1468	0.001	0.001
Moderate-Right	0.506	7892	0.453	1468	0.053***	0.014
Center	0.055	7892	0.049	1468	0.006	0.006
Moderate-Left	0.348	7884	0.415	1468	-0.067***	0.014
Extreme-Left	0.029	7892	0.063	1468	-0.034***	0.005
Diverse	0.056	7892	0.012	1468	0.044***	0.006
Separatist	0.001	7892	0.001	1468	0.000	0.001

Data: Registre National des Elus (Year 2013)

Table 2.9: T-tests (Census): No toxic loans/ Toxic loans

	No tox. loans	N1	Tox. loans	N2	Diff.	Std. Error	Obs.
<b>Housing</b>							
Main residence	0.863	7899	0.857	1468	0.005	0.003	9367
Sec. residence	0.068	7899	0.072	1468	-0.004	0.003	9367
Vacant residence	0.069	7899	0.071	1468	-0.002*	0.001	9367
Homeowners	0.684	7899	0.535	1468	0.149***	0.004	9367
Tenants	0.232	7899	0.321	1468	-0.088***	0.003	9367
HLM	0.063	7899	0.124	1468	-0.061***	0.002	9367
<b>SPC</b>							
Farmers	0.013	7899	0.005	1468	0.008***	0.000	9367
Craftsmen/Shopkeepers	0.039	7899	0.034	1468	0.005***	0.000	9367
Professionals /managers	0.068	7899	0.075	1468	-0.007***	0.001	9367
Intermediary professions	0.141	7899	0.138	1468	0.003**	0.001	9367
Employees	0.164	7899	0.168	1468	-0.005***	0.001	9367
Blue-collar workers	0.151	7899	0.140	1468	0.010***	0.001	9367
Retired	0.289	7899	0.283	1468	0.006***	0.002	9367
Other	0.135	7899	0.155	1468	-0.020***	0.001	9367
<b>Population: Age</b>							
0-14	0.192	7899	0.185	1468	0.007***	0.001	9367
15-29	0.151	7899	0.172	1468	-0.021***	0.001	9367
30-44	0.199	7899	0.193	1468	0.006***	0.001	9367
45-59	0.212	7899	0.203	1468	0.009***	0.001	9367
60-74	0.153	7899	0.150	1468	0.003***	0.001	9367
75+	0.093	7899	0.097	1468	-0.005***	0.001	9367
<b>Economics</b>							
Unemployment	0.113	7899	0.150	1468	-0.037***	0.002	9367
Median income	20916.08	8047	20247.53	1518	668.553***	106.826	9565
<b>Education</b>							
No degree	0.163	7899	0.182	1468	-0.019***	0.002	9367
CEP	0.117	7899	0.108	1468	0.009***	0.001	9367
BEPC	0.060	7899	0.064	1468	-0.004***	0.000	9367
CAP-BEP	0.276	7899	0.251	1468	0.025***	0.001	9367
BAC	0.164	7899	0.163	1468	0.001	0.001	9367
BAC+2	0.125	7899	0.120	1468	0.004***	0.001	9367
> BAC+2	0.095	7899	0.111	1468	-0.016***	0.002	9367

Data: French census (Year 2011)



Table 2.10: T-tests (Budgetary outcomes per capita): No toxic loans / Toxic loans

	No tox. loans	N1	Tox. loans	N2	Diff.	Std. Error	Obs.
<b>Operating account</b>							
Operating revenues	895.911	7894	1343.438	1465	-447.527***	16.498	9359
Local taxation	365.330	7894	562.058	1465	-196.728***	8.729	9359
Operating expenses	737.419	7894	1183.056	1465	-445.637***	14.159	9359
<b>Investment account</b>							
Investment revenues	440.119	7894	531.325	1465	-91.206***	10.862	9359
Investment expend.	458.739	7894	552.444	1465	-93.705***	11.884	9359
Capital expend.	364.011	7894	401.816	1465	-37.805***	10.299	9359
Overall budget result	139.818	7894	139.683	1465	0.135	7.468	9359
<b>Debt</b>							
Debt stock	682.840	7894	1263.979	1465	-581.139***	21.254	9359
Debt repayment + interests	92.900	7894	152.410	1465	-59.509***	3.066	9359
<b>Population</b>							
Population	3391.394	8042	15405.88	1514	-12014.48***	366.7578	9556

Data: Municipalities' account - DGFIP (Year 2013)

Table 2.11: T-tests (Mayoral characteristics): Degree of toxicity

	Low risk	N1	High risk	N2	Diff.	Std. Error	Obs.
<b>Gender &amp; Age</b>							
Male	0.891	736	0.892	732	-0.001	0.016	1468
Age	59.045	692	59.376	689	-0.331	0.438	1381
<b>Socio-professional category</b>							
Agriculture	0.020	736	0.015	732	0.005	0.007	1468
Industry/Trade	0.049	736	0.051	732	-0.002	0.011	1468
Private-sector	0.132	736	0.116	732	0.016	0.017	1468
Liberal	0.114	736	0.105	732	0.009	0.016	1468
Teaching	0.069	736	0.087	732	-0.018	0.014	1468
Official	0.079	736	0.067	732	0.012	0.014	1468
Public-sector	0.026	736	0.031	732	-0.006	0.009	1468
Various	0.087	736	0.100	732	-0.013	0.015	1468
Retired	0.424	736	0.428	732	-0.004	0.026	1468
<b>Political party</b>							
Extreme-right	0.000	736	0.000	732	0.000	0.000	1468
Moderate-Right	0.470	736	0.436	732	0.034	0.026	1468
Center	0.034	736	0.064	732	-0.030***	0.011	1468
Moderate-Left	0.424	736	0.406	732	0.018	0.026	1468
Extreme-left	0.046	736	0.079	732	-0.033***	0.013	1468
Diverse	0.014	736	0.011	732	0.003	0.006	1468
Separatist	0.001	736	0.000	732	0.001	0.001	1468

Data: Registre National des Elus (Year 2013)

Table 2.12: T-tests (Census): Degree of toxicity

	Low risk	N1	High risk	N2	Diff.	Std. Error	Obs.
<b>Housing</b>							
Main residence	0.859	736	0.855	732	0.004	0.008	1468
Sec. residence	0.069	736	0.075	732	-0.006	0.008	1468
Vacant residence	0.072	736	0.069	732	0.003	0.002	1468
Homeowners	0.544	736	0.526	732	0.018**	0.009	1468
Tenants	0.318	736	0.323	732	-0.005	0.005	1468
HLM	0.118	736	0.130	732	-0.011***	0.004	1468
<b>Socio-professional category</b>							
Farmers	0.006	736	0.005	732	0.001***	0.000	1468
Craftsmen Shopkeepers Heads	0.034	736	0.035	732	-0.001	0.001	1468
Liberal prof./managers	0.074	736	0.076	732	-0.002	0.003	1468
Intermediary professions	0.137	736	0.139	732	-0.001	0.002	1468
Employees	0.166	736	0.170	732	-0.004**	0.002	1468
Blue-collar workers	0.142	736	0.139	732	0.003	0.003	1468
Retired	0.288	736	0.279	732	0.008**	0.004	1468
Other	0.153	736	0.158	732	-0.005**	0.002	1468
<b>Population: Age</b>							
0-14	0.184	736	0.186	732	-0.002	0.002	1468
15-29	0.172	736	0.172	732	-0.001	0.002	1468
30-44	0.192	736	0.194	732	-0.002	0.001	1468
45-59	0.203	736	0.204	732	-0.001	0.001	1468
60-74	0.151	736	0.149	732	0.002	0.002	1468
75+	0.099	736	0.096	732	0.003	0.002	1468
<b>Unemployment &amp; Income</b>							
Unemployment rate	0.148	736	0.152	732	-0.004	0.004	1468
Median income	20249.75	759	20245.31	759	4.437	211.996	1518
<b>Education</b>							
No degree	0.180	736	0.184	732	-0.004	0.004	1468
CEP	0.110	736	0.107	732	0.003	0.002	1468
BEPC	0.064	736	0.064	732	0.000	0.001	1468
CAP-BEP	0.253	736	0.250	732	0.003	0.003	1468
BAC	0.163	736	0.163	732	-0.001	0.001	1468
BAC+2	0.121	736	0.120	732	0.002	0.002	1468
> BAC+2	0.109	736	0.112	732	-0.003	0.004	1468

Data: French census (Year 2011)

Table 2.13: T-tests (Budgetary outcomes per capita): Degree of toxicity

	Low risk	N1	High risk	N2	Diff.	Std. Error	Obs.
<b>Operating account</b>							
Operating revenues	1265.693	734	1421.501	731	-155.808***	50.346	1465
Local taxation	533.482	734	590.752	731	-57.271**	24.626	1465
Operating expenses	1105.345	734	1261.086	731	-155.742***	42.779	1465
<b>Investment account</b>							
Investment revenues	515.560	734	547.154	731	-31.594	26.115	1465
Investment expend.	534.820	734	570.139	731	-35.319	27.601	1465
Capital expend.	387.998	734	415.690	731	-27.691	22.551	1465
Overall budget result	141.410	734	137.950	731	3.460	12.897	1465
<b>Debt</b>							
Debt stock	1073.945	734	1454.793	731	-380.848***	66.632	1465
Debt repayment + interests	140.885	734	163.981	731	-23.096***	8.445	1465
<b>Population</b>							
Population	14810.73	757	16001.03	1514	-1190.303	1323.963	1514

Data: Municipalities' account - DGFIP (Year 2013)

Table 2.14: T-tests (Budgetary outcomes - Change between 2008 and 2013): No toxic loans/  
Toxic loans

	No tox. loans	N1	Tox loans	N2	Diff.	Std. Error	Obs.
<b>Δ in operating account</b>							
Operating revenues	0.084	8040	0.090	1509	-0.007	0.005	9549
Local taxation	0.194	8038	0.197	1509	-0.003	0.009	9547
Operating expenses	0.097	8040	0.078	1509	0.018***	0.006	9549
<b>Δ in investment account</b>							
Investment revenues	0.489	8037	0.154	1509	0.335***	0.075	9546
Investment expend.	0.489	8040	0.198	1509	0.291***	0.047	9549
Capital expend.	0.884	8036	0.376	1509	0.508***	0.099	9545
Overall budget result	-0.212	8020	-0.524	1508	0.311	0.737	9528
<b>Δ in debt</b>							
Debt stock	2.022	7938	0.033	1509	1.988**	0.980	9447
Debt repayment + interests	0.284	7821	0.039	1507	0.246**	0.123	9328
<b>Population</b>							
Population	0.079	8040	0.042	1509	0.037	0.003	9549

Data: Municipalities' account - DGFIP (Variation between 2008 and 2013)

Table 2.15: T-tests (Budgetary outcomes - Change between 2008 and 2013): Degree of toxicity

	Low risk	N1	High risk	N2	Diff.	Std. Error	Obs.
<b>Δ in operating account</b>							
Operating revenues	0.091	732	0.089	729	0.001	0.008	1461
Local taxation	0.186	732	0.208	729	-0.022	0.016	1461
Operating expenses	0.078	732	0.078	729	0.000	0.008	1461
<b>Δ in investment account</b>							
Investment revenues	0.195	732	0.114	729	0.081*	0.048	1461
Investment expend.	0.246	732	0.150	729	0.096**	0.044	1461
Capital expend.	0.416	732	0.330	729	0.085	0.072	1461
Overall budget result	1.184	732	-2.222	728	3.407	2.660	1460
<b>Δ in debt</b>							
Debt stock	0.034	732	0.030	729	0.004	0.025	1461
Debt repayment + interests	0.033	731	0.047	728	-0.014	0.027	1459
<b>Population</b>							
Population	0.043	755	0.041	754	0.002	0.005	1509

Data: Municipalities' account - DGFIP (Variation between 2008 and 2013)

# Appendix B - Instrumental Variable

Figure 2.7: Earliest starting year of contracts

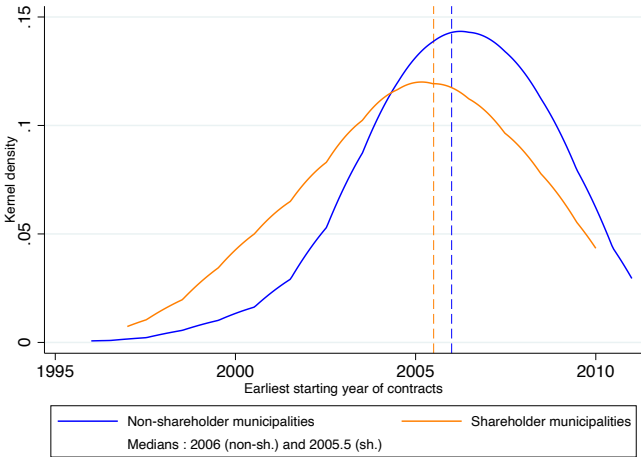


Figure 2.8: Share of emitted contracts in municipalities within the CLF capital

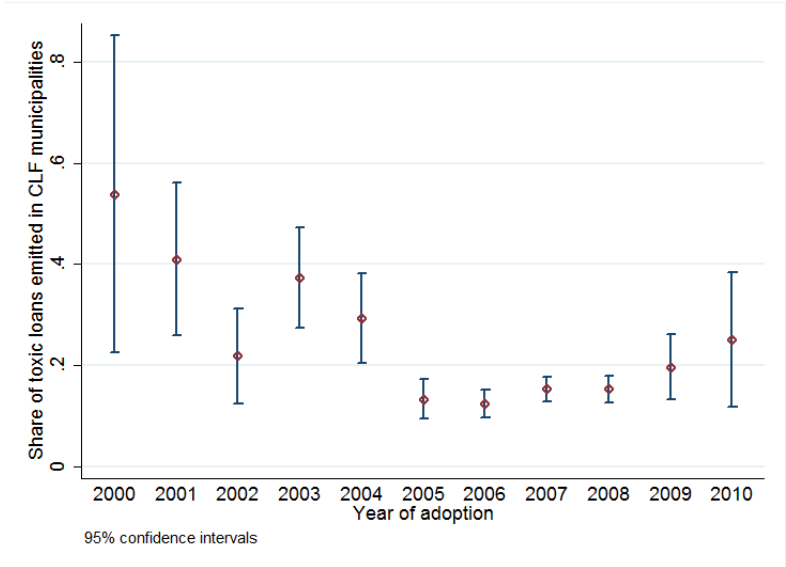


Table 2.16: IV Regression (Probit Stage)

$\mathbb{1}_{Tovic}$	(1)	(2)	(3)	(4)
Log of distance to closest CLF city	-.158*** (.029)	-.183*** (.032)	-.174*** (.033)	-.145*** (.036)
Marginal effect	-.030*** (.005)	-.028*** (.005)	-.026*** (.005)	-.020*** (.005)
Department FE	Y	Y	Y	Y
Urban Status	Y	Y	Y	Y
2000 Municipal budgets	N	Y	Y	Y
Incumbent Characteristics	N	N	Y	Y
Population Characteristics	N	N	N	Y
N	9181	9181	9181	9181
Chi2	1296.96	2476.32	2603.64	2832.18
P>Chi2	0.000	0.000	0.000	0.000

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



## Appendix C - Main results

Table 2.17: Turnout and Electoral Results - OLS Regressions

	Turn.	Sh inc.'s party	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	-.006*** (.002)	-2.174** (1.067)	1.127*** (.355)	.820*** (.198)	.816*** (.196)	.307 (.292)	2.729*** (.914)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Incum. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	8101	9181	9181	9181	9181	9181
R2	.372	.222	.278	.211	.207	.244	.183

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.18: Turnout and Electoral Results - Reduced form

	Turn.	Sh inc.'s p.	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(\text{Dist to CLF mun})$	.004*** (.001)	-1.151* (.648)	-.449*** (.159)	-.234*** (.074)	-.208*** (.073)	-.215 (.143)	-.288 (.358)
<i>Dep. FE</i>	Y	Y	Y	Y	Y	Y	Y
<i>Urban status</i>	Y	Y	Y	Y	Y	Y	Y
<i>2000 budgets</i>	Y	Y	Y	Y	Y	Y	Y
<i>Inc. char.</i>	Y	Y	Y	Y	Y	Y	Y
<i>Pop. char.</i>	Y	Y	Y	Y	Y	Y	Y
N	9181	8101	9181	9181	9181	9181	9181
R2	.372	.222	.277	.208	.205	.244	.181

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.19: Probit-2SLS Sensitivity Analysis - Turnout

	Turnout	Turnout	Turnout	Turnout
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	-.052*** (.020)	-.047*** (.010)	-.048*** (.009)	-.017* (.009)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.285	.295	.299	.371

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.20: Probit-2SLS Sensitivity Analysis - Share of the incumbent's political party

	Sh. inc.'s party	Sh. inc.'s party	Sh. inc.'s party	Sh. inc.'s party
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	-28.093*** (10.891)	-18.938*** (5.115)	-20.614*** (4.705)	-19.988*** (4.677)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	8078	8078	8078	8078
R2	.107	.142	.192	.203

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.21: Probit-2SLS Sensitivity Analysis - Vote share for the far-right

	Sh. XR (1)	Sh. XR (2)	Sh. XR (3)	Sh. XR (4)
$\mathbb{1}_{Toxic}$	3.052*** (1.021)	4.235*** (.659)	4.025*** (.626)	3.534*** (.746)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.101	.083	.095	.172

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.22: Probit-2SLS Sensitivity Analysis - Vote share for the populist far-right

	Sh. Pop-XR (1)	Sh. Pop-XR (2)	Sh. Pop-XR (3)	Sh. Pop-XR (4)
$\mathbb{1}_{Toxic}$	2.846*** (1.005)	4.052*** (.646)	3.796*** (.612)	3.345*** (.729)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.098	.082	.096	.172

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.23: Probit-2SLS Sensitivity Analysis - Vote share for the far left

	Sh. X Left (1)	Sh. X Left (2)	Sh. X Left (3)	Sh. X Left (4)
$\mathbb{1}_{Toxic}$	5.833*** (1.808)	2.486** (1.099)	1.712* (.981)	.509 (1.036)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.032	.061	.225	.244

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.24: Probit-2SLS Sensitivity Analysis - Vote share for the populist far-left

	Sh. Pop-XL (1)	Sh. Pop-XL (2)	Sh. Pop-XL (3)	Sh. Pop-XL (4)
$\mathbb{1}_{Toxic}$	22.695*** (5.537)	17.423*** (2.987)	17.697*** (2.921)	11.532*** (3.097)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.03	.072	.079	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.25: Turnout and Electoral Results - Standard-2SLS

	Turn.	Sh inc.'s p.	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	-2.203*** (.079)	65.427 (43.489)	21.278** (9.342)	11.083** (4.427)	9.875** (4.192)	10.195 (7.284)	13.636 (17.004)
<i>Dep. FE</i>	Y	Y	Y	Y	Y	Y	Y
<i>Urban status</i>	Y	Y	Y	Y	Y	Y	Y
<i>2000 budgets</i>	Y	Y	Y	Y	Y	Y	Y
<i>Incum. char</i>	Y	Y	Y	Y	Y	Y	Y
<i>Pop. char.</i>	Y	Y	Y	Y	Y	Y	Y
N	9181	8101	9181	9181	9181	9181	9181

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.26: Vote share for mainstream political parties - Probit-2SLS specification

	Sh. Left	Sh. Right	Sh. Green	Blank& Null
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	-5.516 (3.438)	-2.761 (3.878)	.379 (.330)	-5.112*** (1.139)
<i>Dep. FE</i>	Y	Y	Y	Y
<i>Urban status</i>	Y	Y	Y	Y
<i>2000 budgets</i>	N	Y	Y	Y
<i>Inc. char.</i>	N	N	Y	Y
<i>Pop. char.</i>	N	N	N	Y
N	9181	9181	9181	9181
R2	.436	.408	.078	.149

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.27: Number of candidates and Likelihood of having a populist candidate - OLS specification

	Nb Cand	Inc. Cand	X Cand	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Tovic}$	.241*** (.037)	-.003 (.015)	.060*** (.013)	.036*** (.010)	.036*** (.010)	.036*** (.011)	.027*** (.009)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.44	.159	.346	.254	.253	.333	.183

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.28: Number of candidates and Likelihood of having a populist candidate - Standard 2SLS

	Nb cand.	Inc. Cand	X Cand	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Tovic}$	2.582*** (.989)	-.158 (.383)	.752** (.296)	.461** (.213)	.416** (.205)	.276 (.205)	.136 (.170)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.29: Probit-2SLS Sensitivity Analysis - Number of Candidacies

	Nb. Cand (1)	Nb. Cand (2)	Nb. Cand (3)	Nb. Cand (4)
$\mathbb{1}_{Toxic}$	1.846*** (.297)	1.453*** (.147)	1.467*** (.141)	.916*** (.150)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.13	.213	.224	.406

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.30: Probit-2SLS Sensitivity Analysis - Incumbent as Candidate

	$\mathbb{1}_{Incumbent}$ (1)	$\mathbb{1}_{Incumbent}$ (2)	$\mathbb{1}_{Incumbent}$ (3)	$\mathbb{1}_{Incumbent}$ (4)
$\mathbb{1}_{Toxic}$	.053 (.128)	.049 (.062)	-.017 (.056)	-.037 (.057)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.033	.036	.156	.158

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.31: Probit-2SLS Sensitivity Analysis - The far right

	XR Cand	XR Cand	XR Cand	XR Cand
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.180*** (.056)	.231*** (.033)	.219*** (.031)	.163*** (.039)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.096	.082	.096	.222

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.32: Probit-2SLS Sensitivity Analysis - The populist far-right

	Pop-XR Cand	Pop-XR Cand	Pop-XR Cand	Pop-XR Cand
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.173*** (.055)	.225*** (.033)	.212*** (.031)	.158*** (.038)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.096	.081	.097	.223

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



Table 2.33: Probit-2SLS Sensitivity Analysis - The far left

	X-Left Cand	X-Left Cand	X-Left Cand	X-Left Cand
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.334*** (.067)	.294*** (.037)	.295*** (.036)	.191*** (.041)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.072	.105	.15	.298

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.34: Probit-2SLS Sensitivity Analysis - The populist far-left

	Pop-XL Cand	Pop-XL Cand	Pop-XL Cand	Pop-XL Cand
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.227*** (.055)	.174*** (.030)	.177*** (.029)	.115*** (.031)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	Y	Y
Inc. char.	N	N	Y	Y
Pop. char.	N	N	N	Y
N	9181	9181	9181	9181
R2	.03	.072	.079	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.35: Mainstream candidate entry - Probit-2SLS specification

	Left cand.	Center cand	Right cand	Green cand
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.022 (.049)	-.009 (.023)	.052 (.053)	.015 (.012)
<i>Dep. FE</i>	Y	Y	Y	Y
<i>Urban status</i>	Y	Y	Y	Y
<i>2000 budgets</i>	Y	Y	Y	Y
<i>Inc. char.</i>	Y	Y	Y	Y
<i>Pop. char.</i>	Y	Y	Y	Y
N	9181	9181	9181	9181
R2	.106	.054	.099	.04

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.36: Heterogeneity with median income and tax revenues - Number of candidates and Likelihood of having a populist candidate

	Nb. Cand	Inc. C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.813*** (.150)	-.008 (.057)	.176*** (.046)	.105*** (.036)	.103*** (.036)	.157*** (.039)	.079** (.033)
Med. inc.	-.009 (.010)	.0009 (.005)	-.004 (.003)	.010*** (.002)	.010*** (.002)	-.011*** (.002)	-.003* (.002)
$\mathbb{1}_{Toxic} \times$ Med inc	-.042** (.021)	.008 (.008)	-.024*** (.007)	-.020*** (.006)	-.019*** (.006)	-.013** (.006)	-.0005 (.006)
Tax rev.	.046*** (.012)	.007 (.006)	.002 (.003)	.0006 (.003)	.001 (.003)	-.002 (.003)	-.004 (.003)
$\mathbb{1}_{Toxic} \times$ Tax rev	.061 (.046)	-.014 (.015)	.047*** (.014)	.033*** (.012)	.031*** (.012)	.021 (.013)	.022* (.012)
Exp.	-.016 (.014)	.007 (.006)	.005 (.004)	.002 (.003)	.002 (.003)	.004 (.003)	-.0007 (.002)
$\mathbb{1}_{Toxic} \times$ Exp	-.076 (.056)	.001 (.019)	-.052*** (.014)	-.034*** (.012)	-.032*** (.012)	-.028** (.012)	-.020* (.011)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.413	.158	.325	.24	.24	.307	.172

Tax revenues and equipment expenditure, both defined per capita, are found in the 2000 municipal budget. Historical median income per capita was collected in 2001.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.37: Heterogeneity with median income and tax revenues - Turnout and Vote shares

	Turn.	Sh inc's p.	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Tovic}$	-.013 (.009)	-20.843*** (4.664)	3.019** (1.334)	2.469*** (.691)	2.400*** (.684)	.551 (1.120)	7.863** (3.316)
Med. inc.	-.003*** (.0009)	1.288*** (.428)	-.008 (.080)	.231*** (.041)	.218*** (.041)	-.239*** (.068)	-.337* (.191)
$\mathbb{1}_{Tovic} \times$ Med inc	.005*** (.001)	.924 (.571)	-.793*** (.211)	-.575*** (.116)	-.548*** (.113)	-.218 (.181)	-.053 (.585)
Tax rev.	.0003 (.001)	-.411 (.490)	.071 (.122)	-.011 (.052)	-.002 (.051)	.083 (.109)	-.375 (.253)
$\mathbb{1}_{Tovic} \times$ Tax rev	-.002 (.002)	.400 (1.239)	.624 (.445)	.627*** (.232)	.563** (.224)	-.003 (.397)	2.169* (1.168)
Exp.	.004*** (.001)	.645 (.533)	.258* (.156)	.067 (.057)	.062 (.056)	.192 (.144)	-.065 (.246)
$\mathbb{1}_{Tovic} \times$ Exp	.004 (.003)	1.113 (1.503)	-1.151** (.452)	-.882*** (.234)	-.855*** (.232)	-.269 (.384)	-2.027* (1.095)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	8078	9181	9181	9181	9181	9181
R2	.369	.202	.269	.187	.184	.242	.172

Tax revenues and equipment expenditure, both defined per capita, are found in the 2000 municipal budget. Historical median income per capita was collected in 2001.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.38: IV Regressions: Electoral entry and heterogeneous effects (Unemployment rate, Local taxation, Capital municipal expenditure)

	Nb. Cand	Inc. C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.685*** (.152)	.0002 (.062)	.128*** (.045)	.037 (.036)	.036 (.035)	.148*** (.039)	.075** (.034)
Unemp.	1.188*** (.321)	.357** (.165)	.190** (.096)	-.164** (.068)	-.156** (.067)	.293*** (.083)	.133* (.069)
$\mathbb{1}_{Toxic} \times$ Unemp.	2.677*** (.997)	-.503 (.357)	1.463*** (.338)	1.767*** (.297)	1.744*** (.295)	.504* (.294)	.144 (.252)
Tax rev.	.049*** (.012)	.007 (.006)	.003 (.003)	.004 (.003)	.004 (.003)	-.003 (.003)	-.004 (.003)
$\mathbb{1}_{Toxic} \times$ Tax rev.	.051 (.046)	-.010 (.015)	.042*** (.014)	.025** (.012)	.023** (.011)	.021 (.013)	.022* (.012)
Exp.	-.015 (.015)	.008 (.007)	.005 (.004)	.002 (.003)	.002 (.003)	.005 (.003)	-.0004 (.003)
$\mathbb{1}_{Toxic} \times$ Exp.	-.075 (.060)	-.004 (.020)	-.050*** (.016)	-.030** (.013)	-.029** (.013)	-.028** (.013)	-.021* (.012)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.422	.159	.331	.244	.243	.307	.174

Tax revenues and equipment expenditure, both defined per capita, are found in the 2000 municipal budget. Historical unemployment rate is delivered by the 1999 Census.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.39: Heterogeneity with median income and housing tax rates - Number of candidates and Likelihood of having an populist candidate

	Nb. Cand	Inc. C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.914*** (.148)	-.0005 (.058)	.213*** (.046)	.116*** (.037)	.109*** (.036)	.131*** (.039)	.086*** (.031)
Med. inc.	-.006 (.010)	.002 (.005)	-.004* (.003)	.010*** (.002)	.009*** (.002)	-.011*** (.002)	-.004** (.002)
$\mathbb{1}_{Toxic} \times$ Med. inc.	-.030 (.021)	.008 (.008)	-.019*** (.007)	-.017*** (.005)	-.016*** (.005)	-.010 (.006)	.003 (.006)
Housing $\tau$	.015*** (.003)	-.0003 (.002)	.002** (.001)	.0004 (.0007)	.0005 (.0007)	.0008 (.0009)	.0001 (.0008)
$\mathbb{1}_{Toxic} \times$ Housing $\tau$	-.001 (.014)	-.002 (.005)	.013*** (.004)	.012*** (.004)	.012*** (.004)	.015*** (.004)	.008* (.004)
Exp.	-.022* (.013)	.009 (.006)	-.001 (.004)	-.002 (.003)	-.002 (.003)	.0006 (.003)	-.003 (.002)
$\mathbb{1}_{Toxic} \times$ Exp.	-.015 (.034)	-.008 (.014)	-.011 (.009)	-.006 (.008)	-.006 (.008)	-.006 (.006)	-.003 (.006)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.407	.158	.317	.233	.233	.314	.172

Data on equipment expenditure per capita are found in the 2000 municipal budget. Historical median income per capita was collected in 2001. Housing tax rate is given by the 2002 fiscal record. Note that 2002 is the first year the record has been made publicly available.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.40: Heterogeneity median income and property tax rates on developed land - Number of candidates and Likelihood of having a populist candidate

	Nb. Cand	Inc. C.	X C.	XR C.	P-XR C.	XL C.	P-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.932*** (.164)	-.023 (.061)	.211*** (.050)	.127*** (.040)	.118*** (.040)	.154*** (.041)	.093*** (.032)
Med Inc.	-.006 (.010)	.002 (.005)	-.004* (.003)	.010*** (.002)	.009*** (.002)	-.011*** (.002)	-.004** (.002)
$\mathbb{1}_{Toxic} \times$ Med Inc.	-.027 (.021)	.007 (.008)	-.015** (.007)	-.015*** (.005)	-.014*** (.005)	-.006 (.006)	.004 (.006)
Property $\tau$ (DL)	.008*** (.002)	.001 (.001)	.003*** (.0006)	.0003 (.0005)	.0003 (.0005)	.002*** (.0006)	.0006 (.0005)
$\mathbb{1}_{Toxic} \times$ Property $\tau$ (DL)	-.002 (.010)	.0002 (.003)	.007** (.003)	.005* (.003)	.005** (.003)	.006** (.003)	.003 (.003)
Exp.	-.023* (.013)	.009 (.006)	-.0007 (.004)	-.001 (.003)	-.001 (.003)	.001 (.003)	-.003 (.002)
$\mathbb{1}_{Toxic} \times$ Exp.	-.017 (.036)	-.007 (.015)	-.012 (.009)	-.010 (.009)	-.010 (.009)	-.006 (.007)	-.002 (.006)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.405	.159	.321	.234	.235	.311	.171

Data on equipment expenditure per capita are found in the 2000 municipal budget. Historical median income per capita was collected in 2001. Property tax rate on builded land is given by the 2002 fiscal record. Note that 2002 is the first year the record has been made publicly available.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.41: Heterogeneity median income and property tax rates on undeveloped land - Number of candidates and Likelihood of having an extreme candidate

	Nb. C	Inc. C	X C	XR C	P-XR C	XL C	P-XL C
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.961*** (.156)	-.018 (.057)	.255*** (.052)	.156*** (.041)	.151*** (.040)	.183*** (.042)	.095*** (.031)
Med Inc.	-.006 (.010)	.002 (.005)	-.005* (.003)	.009*** (.002)	.009*** (.002)	-.011*** (.002)	-.004** (.002)
$\mathbb{1}_{Toxic} \times$ Med Inc.	-.035* (.021)	.006 (.008)	-.021*** (.007)	-.017*** (.006)	-.017*** (.006)	-.012** (.006)	.001 (.006)
Prop. $\tau$ (NBL)	.002*** (.0007)	.0002 (.0003)	.0006*** (.0002)	.00003 (.0002)	.00003 (.0002)	.0005*** (.0002)	.0001 (.0002)
$\mathbb{1}_{Toxic} \times$ Prop. $\tau$ (NBL)	-.002 (.002)	-.0004 (.0008)	.0004 (.0008)	.0003 (.0007)	.0004 (.0007)	.0008 (.0007)	.002** (.0007)
Exp.	-.025* (.013)	.008 (.006)	-.001 (.004)	-.001 (.003)	-.001 (.003)	.001 (.003)	-.004 (.002)
$\mathbb{1}_{Toxic} \times$ Exp.	-.014 (.038)	-.008 (.015)	-.015 (.010)	-.011 (.009)	-.011 (.009)	-.010 (.007)	-.004 (.006)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.402	.158	.308	.225	.225	.303	.168

Data on equipment expenditure per capita are found in the 2000 municipal budget. Historical median income per capita was collected in 2001. Property tax rate on non-built land is given by the 2002 fiscal record. Note that 2002 is the first year the record has been made publicly available.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



Table 2.42: Heterogeneity with median Income and property tax rate on undeveloped land - Turnout and Electoral Results

	Turn.	Sh inc.'s p.	Sh X	Sh XR	Sh P-XR	Sh XL	Sh P-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	-.018* (.009)	-19.061*** (4.553)	4.204*** (1.322)	3.329*** (.739)	3.151*** (.723)	.875 (1.025)	9.520*** (3.074)
Med. inc	-.003*** (.0009)	1.266*** (.425)	-.011 (.080)	.211*** (.039)	.200*** (.039)	-.222*** (.068)	-.441** (.191)
$\mathbb{1}_{Toxic} \times$ Med. inc	.005*** (.001)	.797 (.552)	-.795*** (.207)	-.526*** (.111)	-.506*** (.109)	-.269 (.173)	.099 (.582)
Prop $\tau$ (NBL)	.00003 (.00006)	.004 (.030)	.030*** (.008)	-.0003 (.003)	-.0004 (.003)	.030*** (.007)	.013 (.015)
$\mathbb{1}_{Toxic} \times$ Prop $\tau$ (NBL)	-.0001 (.0001)	-.071 (.058)	.013 (.020)	.019 (.013)	.021 (.013)	-.006 (.016)	.150** (.066)
Exp.	.004*** (.001)	.718 (.495)	.173 (.145)	-.016 (.050)	-.015 (.050)	.189 (.136)	-.356 (.224)
$\mathbb{1}_{Toxic} \times$ Exp.	.002 (.002)	.828 (1.096)	-.555* (.301)	-.407** (.159)	-.422*** (.158)	-.148 (.269)	-.393 (.648)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	8078	9181	9181	9181	9181	9181
R2	.369	.204	.268	.174	.173	.245	.168

Data on equipment expenditure per capita are found in the 2000 municipal budget. Historical median income per capita was collected in 2001. Property tax rate on non-built land is given by the 2002 fiscal record. Note that 2002 is the first year the record has been made publicly available.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, share of the immigrant population and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.43: Heterogeneity with Migration rate - Number of candidates and Likelihood of having an extreme candidate (with controls)

	Nb C.	Inc. C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.842*** (.143)	-.025 (.058)	.225*** (.045)	.172*** (.037)	.168*** (.036)	.152*** (.037)	.092*** (.029)
Migr. rate	-.083 (.551)	.096 (.281)	.204 (.161)	.043 (.116)	.034 (.114)	.227 (.142)	.072 (.116)
$\mathbb{1}_{Toxic} \times \text{Migr. rate}$	1.408 (2.090)	.867 (.691)	-1.223* (.634)	-2.287*** (.513)	-2.402*** (.511)	-.150 (.622)	.143 (.612)
Migr. $\Delta$	.132* (.071)	.030 (.041)	-.025 (.017)	-.026** (.012)	-.025** (.012)	-.021 (.014)	-.006 (.012)
$\mathbb{1}_{Toxic} \times \text{Migr. } \Delta$	.346 (.533)	-.376* (.196)	.680*** (.171)	.590*** (.137)	.598*** (.137)	.445*** (.154)	.202 (.144)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.41	.158	.306	.213	.213	.3	.168

Migration rate is computed from the 2011 Census. Growth rate of the immigrant population correspond to the evolution of the migration rate between the 2006 and 2011 Census. Note that the 2006 Census was conducted between 2004 and 2008 while the 2011 Census was conducted between 2008 and 2013.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market and the 2001 median income value. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.44: Falsification Test - Entry of Candidates in 2008

	$\mathbb{1}_{Toxic}$	Nb Cand	Inc Cand	X Cand	Pop-XR Cand	XL Cand
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}_{Toxic}$		.039 (.728)	-.024 (.272)	.155 (.213)	-.153 (.106)	.241 (.213)
ln(Dist. to CLF cities)	-.117** (.054)					
Dep. FE	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y
N	2138	2138	2138	2138	2138	2138

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2006 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value and the share of the immigrant population. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.45: Falsification Test - Electoral Results in 2008

	$\mathbb{1}_{Toxic}$	Turn.	Sh. inc's party	Sh. Pop-XR	Sh XL	Sh R	Sh L
	(1)	(2)	(3)	(4)	(5)	(6)	
$\mathbb{1}_{Toxic}$		-.094** (.046)	-3.342 (14.738)	-1.239 (.907)	.805 (5.981)	2.156 (13.633)	6.640 (14.294)
ln(Dist. to CLF cities)	-.117** (.054)						
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	2138	2138	1938	2138	2138	2138	2138

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2006 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value and the share of the immigrant population. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.46: Toxic loans and Rise in taxation -Probit/2SLS

	$\Delta\tau$ rev.	$\Delta\tau$ rev.	$\Delta\tau_{Hous.}$	$\Delta\tau_{Hous.}$	$\Delta\tau_{PDL}$	$\Delta\tau_{PDL}$	$\Delta\tau_{PNDL}$	$\Delta\tau_{PNDL}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbb{1}_{Toxic}$	-.029 (.058)	-.015 (.031)	-.628*** (.122)	-.157** (.065)	.003 (.034)	-.026 (.021)	-.095*** (.033)	-.052*** (.019)
Dep. FE	Y	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y	Y
2000 budgets	N	Y	N	Y	N	Y	N	Y
Inc. char.	N	Y	N	Y	N	Y	N	Y
Pop. char.	N	Y	N	Y	N	Y	N	Y
N	9175	9175	9179	9179	9179	9179	9178	9178
R2	.073	.135	.003	.142	.021	.048	.	.048

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.47: Toxic loans and Employment - Probit/2SLS

	$\Delta$ Firm closure	$\Delta$ Firm closure	$\Delta$ Unemployment	$\Delta$ Unemployment
	(1)	(2)	(3)	(4)
$\mathbb{1}_{Toxic}$	.300 (.300)	-.054 (.160)	-.002 (.087)	-.066* (.036)
Dep. FE	Y	Y	Y	Y
Urban status	Y	Y	Y	Y
2000 budgets	N	Y	N	Y
Inc. char.	N	Y	N	Y
Pop. char.	N	Y	N	Y
N	8281	8281	9181	9181
R2	.055	.071	.046	.142

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.48: IV Regressions: Intensity of treatment - Heckman two-step bivariate sample-selection model (with controls)

	$\mathbb{1}_{Toxic}$	Overhead ratio	$\mathbb{1}_{Toxic}$	Overhead debt ratio
	(1)	(2)	(3)	(4)
Log of distance to closest CLF city	-.147*** (.036)		-.148*** (.036)	
$\mathbb{1}_{CHF \ Toxic \ loan}$		.147*** (.006)		.690*** (.029)
Dep. FE		Y		Y
Urban status		Y		Y
Hist. budgets		Y		Y
Inc. char.		Y		Y
Pop. char.		Y		Y
N		9187		9186
Wald Chi 2		1063.47		998.04
P > Chi 2		.000		.000

The overhead ratio is the total overhead (due to the increased in the interest rate) divided by the initial amount of the loan. The overhead debt ratio is the total overhead divided by annual replacements. These variables (i.e. the intensity of treatment) are instrumented by the presence of structured loan(s) based on the Swiss Franc exchange rate.

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.49: IV Regressions: Electoral supply and continuous treatment (Overhead ratio)

	Nb Cand	X C.	Inc C.	Sh inc's p.	Sh Pop-XR	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}_{Toxic}$	1.130*** (.165)	.285*** (.048)	.004 (.085)	-24.331*** (6.983)	3.251*** (.705)	12.966*** (3.398)
$\mathbb{1}_{Toxic}$ X Overhead ratio	-1.523** (.615)	-.211 (.178)	-.250 (.318)	40.569 (25.215)	1.015 (2.634)	-10.733 (12.696)
Dep. FE	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y
Hist. budgets	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y
N	9187	9187	9187	8104	9187	9187
F	41.87	28.667	10.883	15.126	14.656	12.536

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.50: Candidate entry and the information channel

	Nb Cand	Inc C.	X C.	XR C.	Pop-XR C.	XL C.	Pop-XL C.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.868*** (.158)	-.044 (.057)	.231*** (.049)	.144*** (.038)	.139*** (.037)	.178*** (.041)	.116*** (.031)
Share 3Mb+	-.070* (.041)	-.035 (.023)	-.017* (.010)	-.010 (.007)	-.007 (.006)	-.011 (.008)	-.002 (.006)
$\mathbb{1}_{Toxic}$ x Share 3Mb+	.458 (.531)	.024 (.141)	.294** (.131)	.226** (.100)	.223** (.099)	.134 (.117)	-.021 (.094)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.408	.158	.31	.226	.226	.301	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.51: Ex-post toxicity of the loan - Overhead Debt ratio (with controls)

	Nb C.	Inc C.	Sh inc's p.	P-XR C.	Sh P-XR	P-XL C.	Sh P-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	1.067*** (.148)	.018 (.077)	-22.535*** (6.285)	.169*** (.032)	3.232*** (.635)	.126*** (.031)	12.625*** (3.060)
$\mathbb{1}_{Toxic}$ X Over. debt rat.	-.301** (.126)	-.094 (.065)	7.489 (5.203)	-.021 (.028)	.238 (.541)	-.020 (.026)	-2.036 (2.606)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
Hist. budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9186	9186	8103	9186	9186	9186	9186
F	42.098	10.893	15.138	18.867	14.674	12.51	12.51

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.52: Press - The mayor vs. the opposition

	Freq.	Percent
# of art. where only the mayor is mentioned	146	26.12
# of art. where the opposition is mentioned	413	73.88

Among the 559 articles where the status of the participants is mentioned, 73% concern the opposition while 26% concern the mayor only.

Table 2.53: Toxic loans and Press Coverage - Probit/2SLS

	Cov Inc (1)	Cov XR (2)	Cov Pop-XR (3)	Cov XL (4)	Cov Pop-XL (5)
$\mathbb{1}_{Toxic}$	-.095** (.044)	.025*** (.007)	.022*** (.006)	.018 (.014)	.140*** (.027)
Dep. FE	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y
N	6631	9180	9180	9181	9181
R2	.394	.043	.041	.247	.183

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



Figure 2.9: Magnitude of Coefficient values - Electoral results

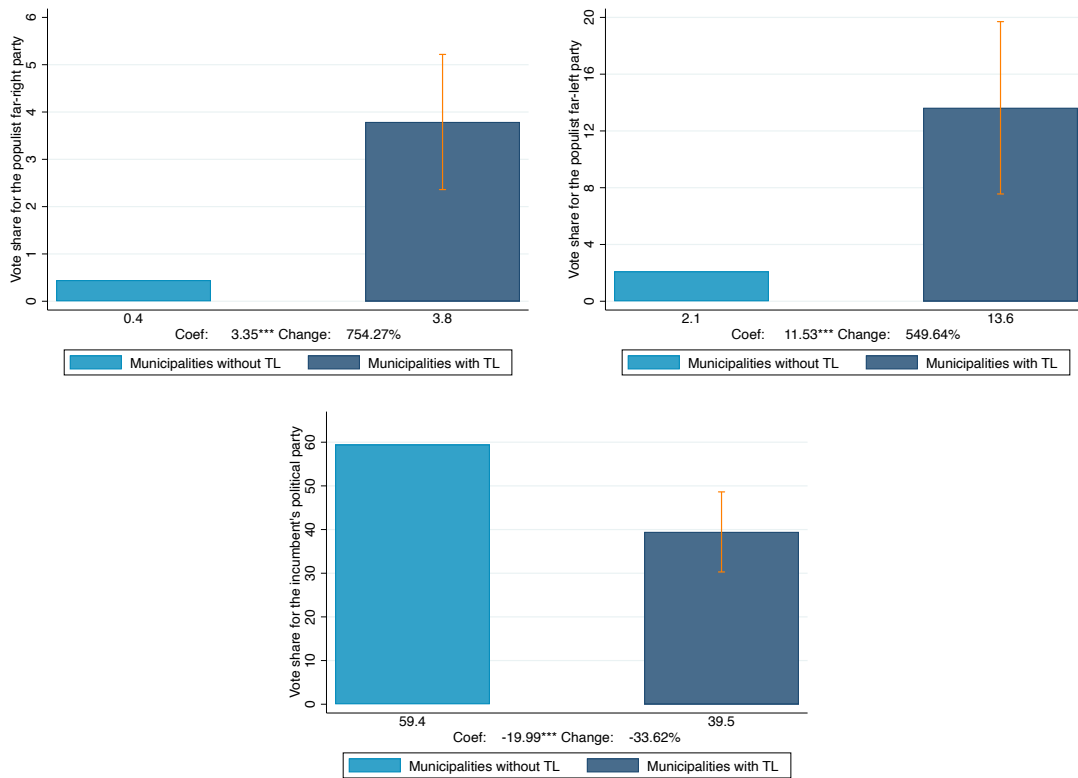
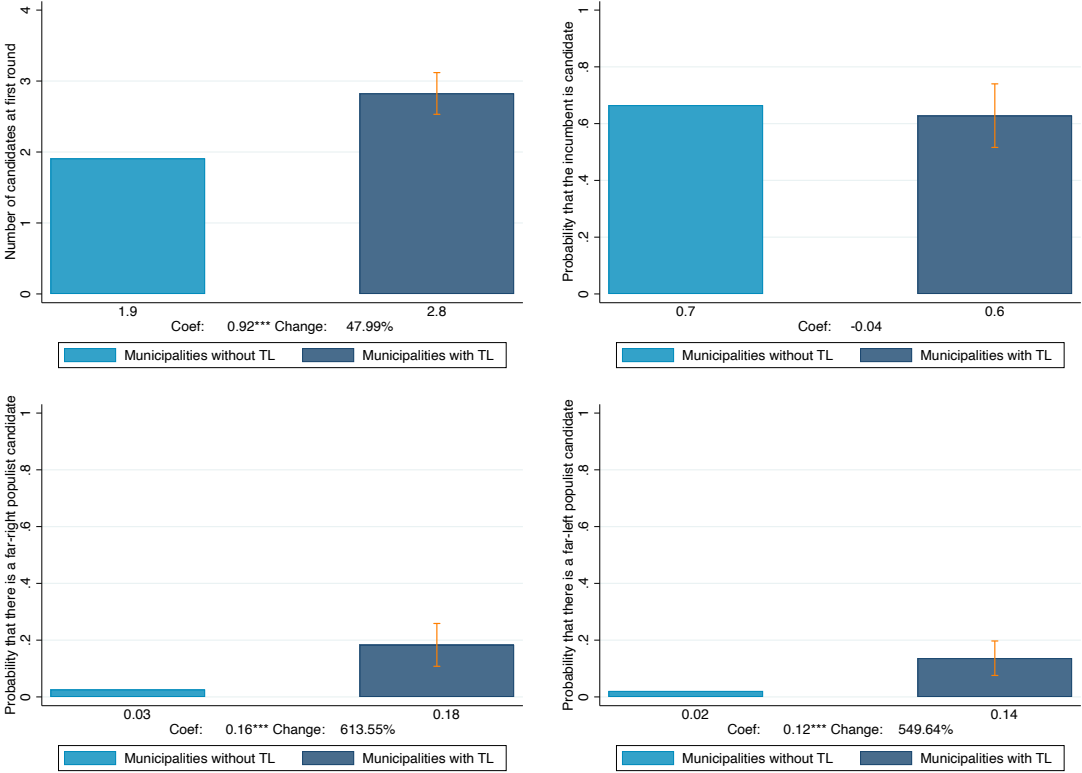


Figure 2.10: Magnitude of Coefficient values - Number of candidates and Likelihood of having a populist candidate



## Appendix D - The role of information: Layout of the *Libération* map

Since the treatment is based on information released through an online map, its effect on the political arena might be channeled through the specific features of the map.

In this section, we test whether the layout of the *Libération* map itself plays a role on populism and populist candidacies. Municipalities with toxic loan(s) were represented by dots of different colors depending on the amount of the overhead ratio: green for a few negative ones, yellow for ratios between 0% and 10%, orange for ratios between 10% and 20%, red for ratios between 20% and 50%, and brown for ratios above 50%. While we do not find any effect of the overhead ratio, it might have been that the color of the dot influenced *per se* the entry decision of politicians (especially since the overhead ratios were available only after clicking on the dots). To test this hypothesis, we run Regression Discontinuity Designs where our treatment is the discontinuous change of color around the two most important thresholds of the overall overhead ratio: 10% (from yellow to orange) and 20% (from orange to red). Figures 2.11 and 2.12 show graphically how the main outcome variables vary respectively at the 10% and 20% thresholds of the overhead ratio. We graphically find no evidence of discontinuous variations of the number of candidacies, the entry of extreme lists and the presence of the incumbent, neither at the 10% nor at the 20% threshold.<sup>46</sup> We confirm this absence of effect in Table 2.54, where we estimate the discontinuity of the outcome variables at both thresholds, following optimal bandwidth computation developed by Calonico et al. (2014) and using a fourth-order polynomial and a triangular kernel.

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<sup>46</sup>Our graphical results suggest as well the absence of clear trends of these outcome variables depending on the overhead ratio.

Table 2.54: Regression Discontinuity Design: Color of the dots

	(1)	(2)	(3)	(4)	(5)
<b>10% Threshold</b>	Nb. cand.	X list	FN list	X-Left list	$\mathbb{1}_{Incumbent}$
10% Threshold - Yellow to Orange	0.288 (0.452)	-0.111 (0.153)	-0.021 (0.124)	-0.146 (0.125)	0.240 (0.148)
Bandwidth	0.073	0.060	0.061	0.062	0.061
N (Left)	789	726	731	736	735
N (Right)	430	391	396	397	396
	(1)	(2)	(3)	(4)	(5)
<b>20% Threshold</b>	Nb. cand.	X list	FN list	X-Left list	$\mathbb{1}_{Incumbent}$
20% Threshold - Orange to Red	0.683 (0.943)	0.158 (0.272)	-0.032 (0.257)	0.306 (0.261)	-0.314 (0.213)
Bandwidth	0.127	0.130	0.144	0.122	0.111
N (Left)	875	921	1068	806	630
N (Right)	130	130	142	128	121

The table presents the results of an RD estimation with an optimal bandwidth calculated using the [Calonico et al. \(2014\)](#).

We employ a triangular kernel and control for an order-four polynomial of the overhead ratio.

Robust standard error.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Figure 2.11: Regression Discontinuity Design: 10% threshold of the overhead ratio (Yellow to Orange)

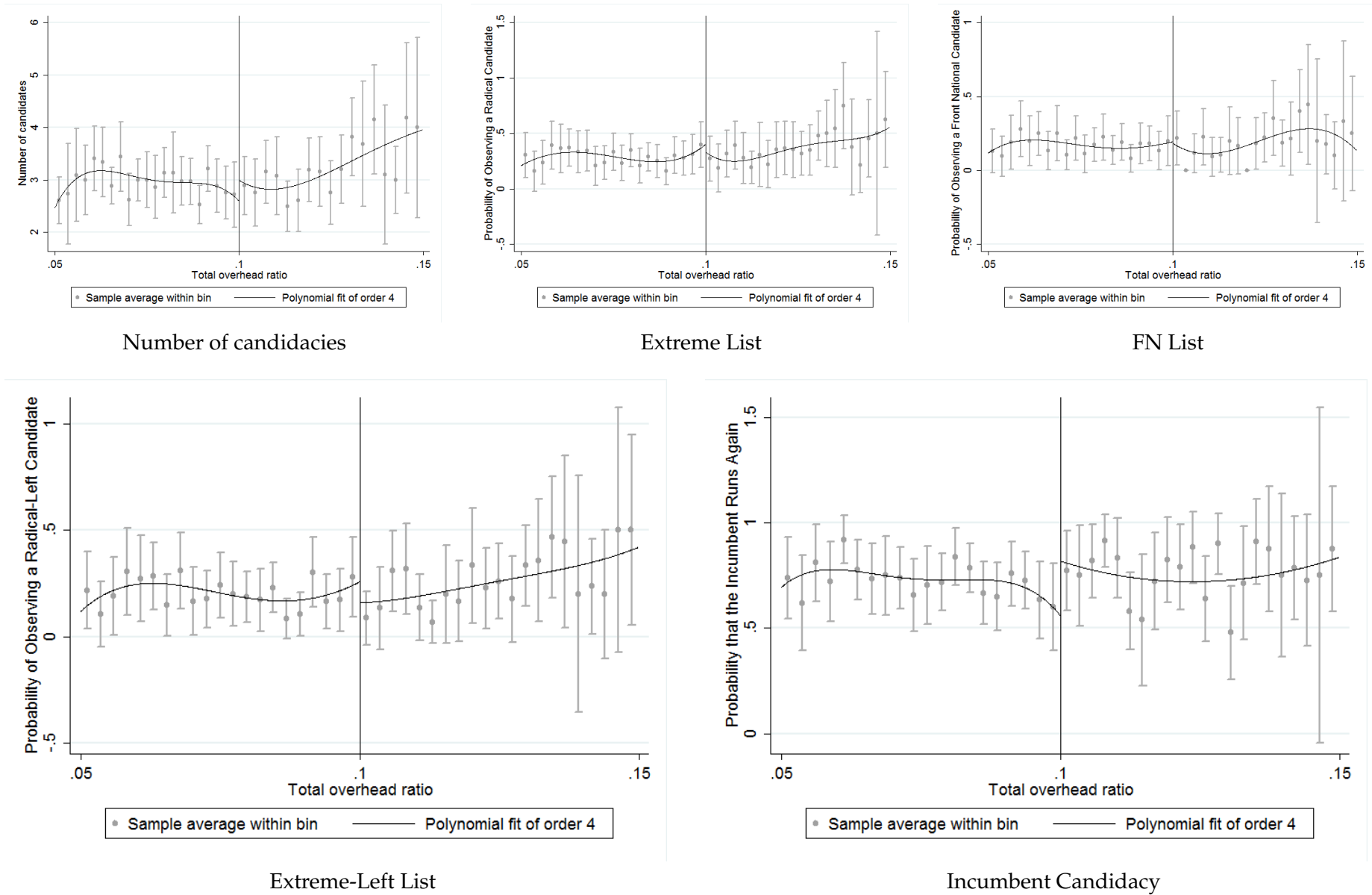
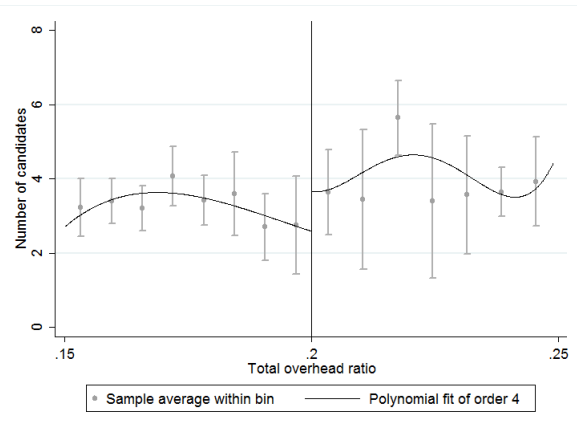
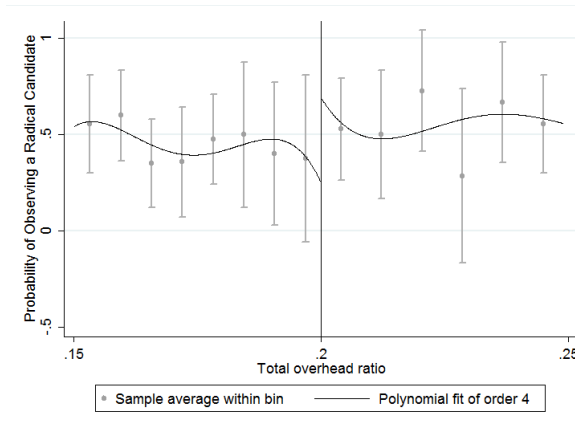


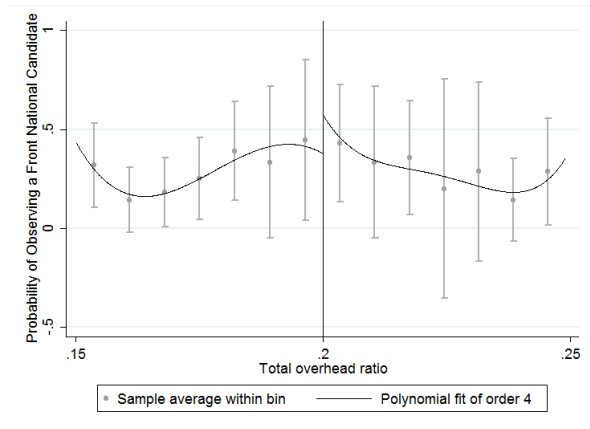
Figure 2.12: Regression Discontinuity Design: 20% threshold of the overhead ratio (Orange to Red)



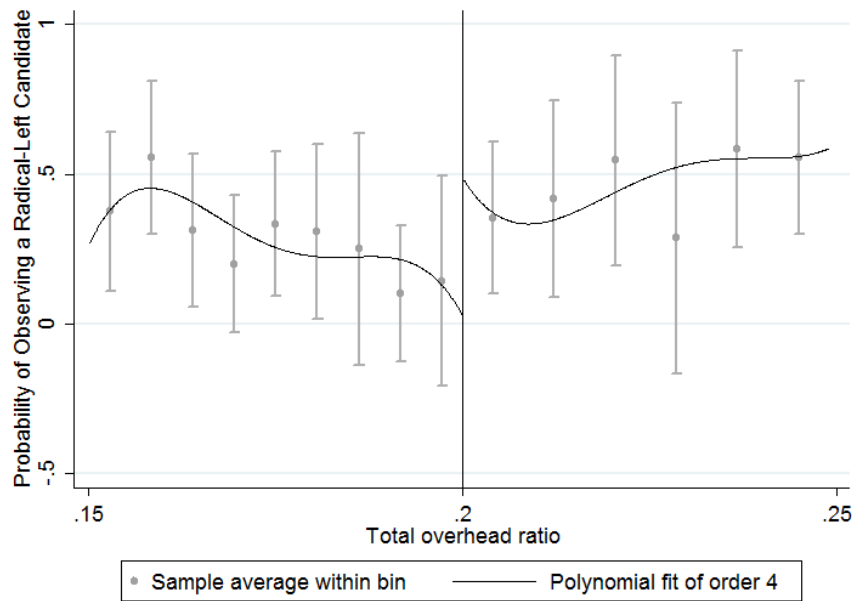
Number of candidacies



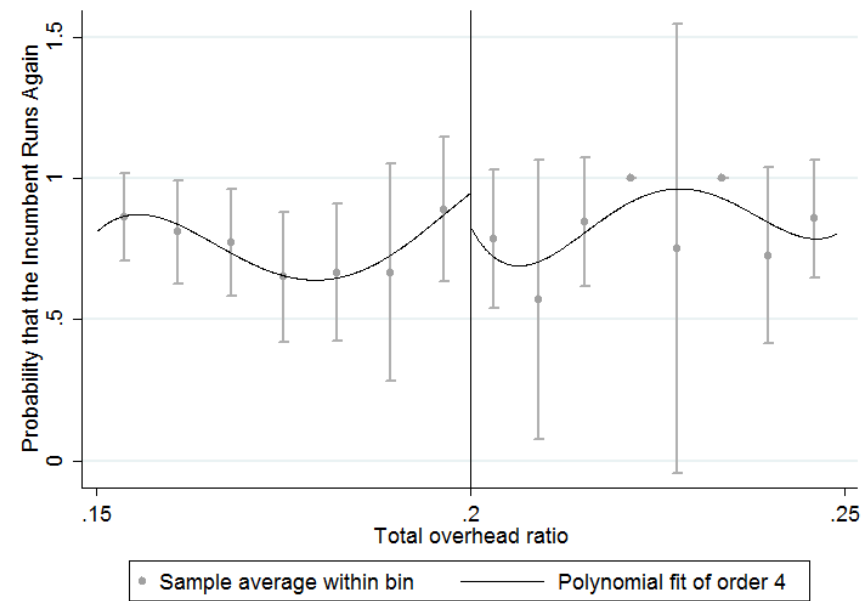
Extreme List



FN List



Extreme-Left List



Incumbent Candidacy

## Appendix E - The role of the incumbent's characteristics: accountability and gender

Here, we test whether treatment effect differs upon the characteristics of the mayor. More specifically, we investigate the roles of accountability and gender of the incumbent.

First of all, we test whether incumbent mayors who were responsible for contracting toxic loans face tougher electoral competition than those who were not. To answer this question, we focus on loans taken between the municipal elections of 2001 and 2008 (which account for 56% of all toxic loans), and compare them with municipalities with no toxic loans at all. The treatment variable then becomes the fact of having contracted toxic loan(s) between 2001 and 2008, as opposed to not having contracted toxic loan(s). We interact this variable with a dummy variable indicating whether the incumbent of the 2014 election was in office between 2001 and 2008. The results are summarized in Table 2.55. Overall, while we find similar effects as the ones measured in our main estimation among incumbent who were not accountable (i.e. who were in office between 2008 and 2014 but not between 2001 and 2008), we do not find significant differences of this effect among mayors who could be held accountable (i.e. who were in office between 2008 and 2014 and between 2001 and 2008). However, this effect does not reflect a pure accountability mechanism. As it compares incumbents in their first term to incumbents with at least two terms, it also includes the effects of experience and popularity. Therefore, one potential explanation for this absence of heterogeneity is that accountable mayors - who were also more experienced - were also more effective in addressing the issues arising from toxic loans, for example by trying to break the contract in court. Thus it may have counterbalanced the potential negative impact of being effectively accountable. Due to data availability, this hypothesis is however hard to assess empirically in our setting.

Moreover, we test whether variations due to toxic loans in number of candidacies or entry differ depending on the gender of the incumbent. The results presented in Table 2.56 show that this is not the case. The rise in number of candidacies or the increased entry of populist lists was not different in municipalities ran by a man or a woman.

Table 2.55: Toxic Loans, Electoral Results and Accountability

	Sh inc's party (1)	Sh X (2)	Sh XR (3)	Sh Pop-XR (4)	Sh XL (5)	Sh Pop-XL (6)
$\mathbb{1}_{Toxic}$	-26.113*** (5.923)	2.359 (1.591)	2.513*** (.890)	2.168** (.850)	-.154 (1.283)	10.366*** (3.962)
$\mathbb{1}_{Reelect}$	1.037 (1.083)	.184 (.181)	.073 (.083)	.073 (.077)	.111 (.163)	-.330 (.448)
$\mathbb{1}_{Toxic} \times \mathbb{1}_{Reelect}$	11.043** (4.738)	-.534 (1.463)	-.877 (.938)	-.430 (.887)	.343 (1.134)	2.402 (4.740)
Dep. FE	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y
N	7348	8392	8392	8392	8392	8392
R2	.193	.256	.17	.172	.237	.144

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of the immigrant population and its growth rate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 2.56: Gender of the incumbent, Toxic Loan and Candidacy

	Nb Cand (1)	Inc C. (2)	X C. (3)	XR C. (4)	Pop-XR C. (5)	XL C. (6)	Pop-XL C. (7)
$\mathbb{1}_{Toxic}$	.916*** (.150)	-.037 (.057)	.256*** (.049)	.163*** (.039)	.158*** (.038)	.191*** (.041)	.115*** (.031)
Female mayor	.127*** (.033)	-.087*** (.019)	-.011 (.008)	-.005 (.005)	-.004 (.005)	-.008 (.007)	-.009 (.006)
$\mathbb{1}_{Toxic} \times$ Female mayor	.016 (.195)	.086 (.065)	.026 (.066)	.037 (.055)	.008 (.055)	.028 (.059)	.027 (.057)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	9181	9181	9181	9181	9181	9181
R2	.406	.158	.307	.223	.223	.299	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$



Table 2.57: Gender of the incumbent, Toxic Loan and Electoral results

	Turn.	Sh inc's p.	Sh X	Sh XR	Sh Pop-XR	Sh XL	Sh Pop-XL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Toxic}$	.017* (.009)	-20.010*** (4.672)	4.040*** (1.324)	3.533*** (.745)	3.346*** (.729)	.507 (1.035)	11.528*** (3.094)
Female mayor	.007** (.003)	-2.544* (1.536)	-.108 (.265)	-.052 (.112)	-.023 (.098)	-.055 (.242)	-.902 (.567)
$\mathbb{1}_{Toxic} \times$ Female mayor	.005 (.008)	.912 (4.668)	1.525 (2.080)	.536 (1.095)	-.356 (.979)	.989 (1.760)	2.700 (5.716)
Dep. FE	Y	Y	Y	Y	Y	Y	Y
Urban status	Y	Y	Y	Y	Y	Y	Y
2000 budgets	Y	Y	Y	Y	Y	Y	Y
Inc. char.	Y	Y	Y	Y	Y	Y	Y
Pop. char.	Y	Y	Y	Y	Y	Y	Y
N	9181	8078	9181	9181	9181	9181	9181
R2	.371	.203	.269	.173	.172	.243	.164

Control variables: The *Department* fixed-effects are dummy variables for the 94 metropolitan French departments. Urban status is a categorical variable, indicating the type of urban area in which a municipality is located (i.e., a urban center, a suburb, a remote area or a rural area). Budgetary variables in 2000 are defined per inhabitants and winsorized at the 1% and 99% levels: local taxation, capital expenditure, debt stock and overall budget result. Controls on incumbent characteristics include : gender, age, socio-professional category and political party . Finally, population characteristics are given by the 2011 Census data. We control for population, socio-professional categories, age distribution, level of education, housing market, the 2001 median income value, the share of immigrants and its growth rate during the last electoral mandate. Robust standard errors are indicated in parentheses.

P-values: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

# Chapter 3

## The Increase in Partisan Segregation in the United States

*With Jacob R. Brown, Enrico Cantoni, Ryan D. Enos and Vincent Pons*

FIRST DRAFT

### Abstract<sup>1</sup>

This paper provides novel evidence on trends in geographic partisan segregation. Using two individual-level panel datasets covering the near universe of the U.S. population between 2008 and 2020, we leverage information on individuals' party affiliation to construct two key indicators: i) the fraction of Democrats among voters affiliated with either major party, which reveals that partisan segregation has increased *across* geographical units, at the tract, county, and congressional district levels; ii) The dissimilarity index, which measures differences in the partisan mix across distinct sub-units and highlights that partisan segregation has also increased *within* geographical units. Tracking individuals across election years, we decompose changes in partisan segregation into different sources: voter migration, generational change, older voters entering the electorate, and voters changing their partisanship or their registration status. The rise in partisan segregation is mostly driven by generational change, in Democratic-leaning areas, and by the increasing ideological conformity of stayers, in Republican-leaning areas.

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# 1 Introduction

In the United States, the geographic separation of Democrats and Republicans is visible at all levels of geographic aggregation, from states to small neighborhoods (Brown and Enos 2021). This separation has its roots at least as far back as the 19th century, when working-class center-left political support began to cluster in urban cores during the Industrial Revolution (Rodden 2019). Since then, partisan segregation has been fueled by the sorting of new sociodemographic groups across parties (Levendusky 2013), and by the legacies of racial and class segregation (Massey and Denton 1993; Trounstine 2018). The resulting segregated distribution of Democratic and Republican voters contributes to representational imbalances in state and federal legislatures (Chen and Rodden 2013), it exacerbates discrepancies between Electoral College and popular vote outcomes in presidential elections (Hopkins 2017), and it impedes support for place-based public policy such as transit and infrastructure (Nall 2018). Partisan segregation may also fuel partisan issue polarization at the elite-level, as parties become representative of distinct geographic areas, and contribute to issue and affective polarization within the mass public, due to diminished exposure to competing ideas from neighbors with a different ideology (Cramer 2016).

Despite the manifold consequences of partisan segregation, efforts to measure the extent and causes of this phenomenon have been impeded by persistent data and measurement problems. Until recently, over-time geographic data on the partisan composition of the electorate were only available at coarse levels of aggregation. As a consequence, first order questions on the trend and causes of partisan segregation in the U.S. remain unanswered. Is partisan segregation increasing, and at what speed? What factors are contributing to its rise or decline? Specifically, to what extent are changes in the geographic distribution of the American electorate produced by changes in the composition of the electorate, due to U.S. internal migration or generational change, vs. changes in the partisan leaning of voters changing their registered partisan affiliation or their registration status? Studies of partisan segregation have been limited to diagnosing aggregate changes over-time, using county- or precinct-level data (Sussell 2013; Kaplan, Spenkuch, and Sullivan 2021), without being able to speak to the causes of these changes. Recent studies have analyzed single sources of changes in partisan geography, particularly the extent to which voters sorting on partisanship is driven by residential mobility (Mummolo and Nall 2017; Martin and Webster 2018), but no study as of yet has proposed a full decomposition of nationwide changes in partisan segregation.

In this paper, we draw on two individual-level panel datasets covering the near universe of U.S. voters between 2008 and 2020 to measure changes in partisan segregation across the U.S.. Focusing on the 30 states that record partisanship on their voter rolls, we measure two distinct dimensions of segregation: i) how different geographic areas evolve over time (using the ratio of Democrats to Democrats and Republicans - hereafter  $D/(D+R)$ ), and ii) how evenly Democrats and Republicans are distributed within areas and neighborhoods (using the index of dissimilarity). We measure both metrics over time and across multiple geographic levels ranging from counties and congressional districts to small neighborhoods. Thanks to our ability to track individuals across time as they move or change their partisan registration, we further decompose the sources of changes in partisan composition across places, quantifying the respective influence of generational change, U.S. internal migration, change in partisanship, and change in registration status.

The data demonstrate a clear and consistent year-to-year increase in partisan segregation *across* the United States. We observe this increase across a range of geographic units, seeing more areas that are becoming either predominantly Republican or predominantly Democratic, and fewer areas that are mixed. This trend is observed when looking at the relative proportion of Democrats across counties and congressional districts, and even in smaller geographies such as Census tracts, block groups, and blocks. We further find, looking at changes in dissimilarity indices across counties and districts, that even conditional on the overall composition of these larger geographies, the neighborhoods *within* them are growing more distinct in terms of partisanship, as evidenced by increasing levels of dissimilarity. Thus, more places are becoming homogeneous in terms of partisanship, and even conditional on regional patterns in partisanship, neighborhoods are growing more distinct along partisan lines. Partisan segregation still reflects a rural-urban political divide, with rural places becoming predominantly Republican and highly urbanized centers becoming predominantly Democratic. We further notice that the Caucasian voting population as well as younger generations are less mixed over time in terms of partisanship, suggesting that they are more concerned by the rising trend in partisan segregation.

Turning to the decomposition analysis, increasing partisan segregation in areas that are growing more Democratic is primarily driven by generational change – from new voters who are predominantly Democrats entering the electorate in these areas. In areas trending Republican, the change is mostly driven by voters changing their partisanship to Republican. We find that residential mobility is also an influential determinant of changing partisan segregation in both Democratic and Republican trending areas, albeit to a much lesser extent than the primary drivers.

This paper builds on several strands of the literature. First, we contribute to the public and scholarly debate on whether or not Democrats and Republicans are becoming increasingly divided across space. Among the media, it has been a common view since [Bishop \(2009\)](#) that Republicans and Democrats are increasingly clustered in like-minded neighborhoods. This idea has been harshly discussed in the literature. [Fiorina \(2005\)](#), [Glaeser and Ward \(2006\)](#), and [Abrams and Fiorina \(2012\)](#) observe very low levels of partisan sorting. More recent studies find more evidence of partisan clustering, such as [Sussell \(2013\)](#), [Johnston, Manley, and Jones \(2016\)](#) or [Kaplan, Spenkuch, and Sullivan \(2021\)](#). Due to data limitation, this literature often fails to capture the actual geographic segregation of voters, using mainly aggregates at the county-state levels subject to the modifiable areal unit problem ([Openshaw 1983](#)). By contrast, [Brown and Enos \(2021\)](#) use cross-sectional individual data to capture partisan segregation at various geographic units, but their analysis is static. The present paper uses two individual-level panel data covering the vast majority of the U.S. voting-eligible population to study *changes* in partisan segregation since 2008.

Second, we shed light on the causes of partisan sorting. In a seminal paper, [Tiebout \(1956\)](#) argues that individuals sort based on their preferences for public policies: for instance, Democrats may locate in neighborhoods with better public infrastructures if they are willing to accept higher tax rates. Recently, several papers have studied the origins of partisan segregation. Among them, a great number focuses on residential sorting, such as [McDonald \(2011\)](#), [Tam Cho, Gimpel, and Hui \(2013\)](#), [Gimpel and Hui \(2015\)](#), [Strickler \(2016\)](#) or [Mummolo and Nall \(2017\)](#). But U.S. internal migration flows appear too small to fully explain the extent of partisan segregation ([Martin and Webster 2018](#); [Lang and Pearson-Merkowitz 2015](#)). Other papers provide alternative explanations for the rise in partisan segregation. Partisan sorting could be the consequence of sorting on other dimensions – such as income segregation ([Gelman 2010](#); [Hersh 2015](#)) or racial segregation. In that case, the underlying causes for the rise of partisan segregation could be similar to the concentration of poverty and to the cultural barriers, observed by [Massey and Denton \(1993\)](#) or by [Rugh and Trounstine \(2011\)](#). Individuals could also change their partisan preferences to align with the people they are living with. Several studies support this hypothesis: [Huckfeldt and Sprague \(1987\)](#) and [Johnston and Pattie \(2011\)](#) show that preferences are more likely to align when people have been living a long-time side by side. [Gay \(2004, 2012\)](#), [Enos \(2014, 2017\)](#) and [Sands \(2017\)](#) find similar results on political preferences. Our paper complements this literature by providing a full statistical decomposition of changes in the partisan composition of the electorate into changes in the population of registered voters and changes in their party registration, using administrative individual-level data.

Finally, our paper builds on the vast literature on political polarization. While polarization on policy issues appears limited (DiMaggio, Evans, and Bryson 1996; Evans 2003; Fiorina and Abrams 2008; Levendusky and Pope 2011), the U.S. are experiencing a growing trend in social polarization, leading to a rise in partisan ideological sorting (Fiorina 2005; Jacobson 2004; Bafumi and Shapiro 2009; Abramowitz and Saunders 2008; Mason 2015). Several recent papers show that increases in affective polarization are particularly large in the U.S. – meaning that citizens increasingly dislike members from other political parties than their own (Iyengar et al. 2019). Among nine OECD countries, the U.S. experienced the strongest rise in affective polarization over the past four decades (Boxell, Gentzkow, and Shapiro 2020). Geographic partisan sorting may contribute to affective polarization due to the social distance it generates between groups (Allport 1954; Iyengar, Sood, and Lelkes 2012; Iyengar and Westwood 2014; Enos 2015, 2017).

The remainder of the paper is organized as follows. Section 2 presents the institutional setting and the data. Section 3 provides robust evidence of an increasing trend in partisan segregation. In Section 4, we explore where partisan segregation has risen the most. Section 5 identifies the main drivers of the increase in partisan segregation. Section 6 concludes.

## 2 Institutional setting and data

### 2.1 Partisan registration in the U.S.

To measure partisan segregation using individual-level data, we need information on the partisan affiliation of voters (i.e., whether they are affiliated with the Democratic or the Republican party). In many U.S. states, partisan registration determines eligibility to vote in political primary elections, with some primaries restricted to only party members (closed primaries) and some restricted to party members and Independents (semi-closed primaries). Thirty states record partisan registration on their voter lists, so each voter who is registered to vote in one of these 30 states may register with a political party (Democratic or Republican party) or may choose to be designated as Independent.

We rely on partisan registration data for several reasons. First, partisan registration is an important political outcome in its own right. It has been shown to have downstream consequences for political attitudes, increasing connections with political parties (Gerber, Huber, and Washington 2010). Which party a voter is registered to

also influences how they are viewed on voter lists by political campaigns, and thus determines which organizations are likely to mobilize them into politics (Hersh 2015). Second, partisan registration is a good proxy for the underlying partisan preferences of voters. In the U.S., partisanship is a social identity that is predictive of, and in many instances causal of, many political behaviors and attitudes (Green, Palmquist, and Schickler 2004). Which party a voter is registered to is predominantly a function of her underlying partisan ideology (Campbell 1958) - with partisan registration being highly correlated with both self-reported partisanship and vote choice. There is even evidence that this relationship has increased over time, as the political parties have sorted and differentiated themselves, evidenced by limited cross-partisan or split ticket voting (Davis and Mason 2016). Third, partisan registration data provide the most comprehensive documentation of partisan preference available at the individual level. Survey data on self-reported partisan preference do not exist at the scale offered by registration data, and administrative vote choice data are not available at the individual level. Unlike voting outcomes, partisan registration data captures partisan preferences without relying on the identity of candidates, on their program or on shifting political climates (Abrams and Fiorina 2012).

## 2.2 Data

We measure partisan segregation using individual-level voter registration records. Our primary data source has been collected by Catalist, a U.S. data vendor. The panel consists of November snapshots for each presidential and midterm elections between 2008 and 2018 (2008, 2010, 2012, 2014, 2016, and 2018). The restriction of the sample to the 30 U.S. states where partisan affiliation data are available results in a total of around 800 million observations.

Catalist covers the near universe of the U.S. voting-eligible population and provides reliable demographic characteristics for nearly all voters (Fraga 2016, 2018), such as age, gender and race. It keeps track of voters who appeared in past voter files but have disappeared from the most recent ones and includes around 55 million unregistered voters thanks to commercial data and customer files. Catalist has long collaborated with the academics (Nickerson and Rogers 2014; Hersh and Nall 2015; Cantoni and Pons 2019). The unregistered population is only partially covered by Catalist data despite their efforts, with around 11 percent of adult citizens who do not appear in commercial voter lists (Jackman and Spahn 2021). This issue is not particularly concerning for our analysis as we focus on change in *registered* population to measure trends in partisan segregation.

While the Catalist files contain geographic identifiers at the county, congressional district, and census tract levels, they do not allow us to study partisan segregation at finer geographic units. To test the robustness of our results at the block group and block levels, we supplement our analysis using voter registration records collected by another non-partisan commercial data vendor, TargetSmart. TargetSmart files provide the exact residential address for each individual, as well as the corresponding latitude and longitude. They also include yearly November snapshots between 2012 and 2020 and are mainly based on official voter registration and turnout records.

To test the robustness of our registration results, we finally use aggregate electoral results as they proxy partisan ideology without any geographic restrictions: in particular, they are not limited to the 30 states where partisan registration is available. The Dave Leip's U.S. Election Atlas provides data on county and district-level vote returns reported by the states. The data contain aggregate summaries of vote returns for all Presidential and Congressional elections in the sample period.

## 2.3 Units of analysis

Using individual panel data, we measure changes in partisan segregation across different geographic units: congressional districts, counties, census tracts, block groups, and blocks. Exploring this flexibility of our data offers several advantages. First, we are able to test against measurement issues that result from variation in the definition of aggregate units ([Openshaw 1983](#); [White 1983](#)). Obtaining similar results at multiple geographic units implies that our results are robust to the level of aggregation we are studying. Second, we would like to see whether partisan segregation is changing across large areas or in smaller neighborhoods. In [Section 3](#), we use counties and congressional districts to measure large-scale changes in partisan segregation, and census geographies (including tracts, block groups, and blocks) to measure neighborhood-level changes in partisan segregation.

To observe partisan segregation over time, we need stable geographic units between 2008 and 2020. County boundaries do not change over time. However, census geographies and congressional districts (CD) do change periodically. Census geographies change every ten years after the new decennial census while CD boundaries are regularly redrawn following redistricting, and potential gerrymandering. For CDs, we construct pseudo-CDs with stable boundaries. A pseudo-CD identifier is equal to a CD identifier at one point in time. Here we choose the 2008 election without loss of generality. As county boundaries do not change over time, a county which is located within a CD in 2008 obtains as pseudo-CD identifier its 2008 CD identification num-



ber. Exact address information in the TargetSmart data is obviously immune to such changes. Furthermore, census definitions did not change during the 2012-2020 period covered by these data.

### 3 The rise in partisan segregation

We rely on two distinct metrics to measure changes in partisan segregation: i) the ratio of  $D/(D+R)$ , i.e. the proportion of Democrats among registered Democrats and Republicans, which measures trends in partisan segregation *across* geographical units, and ii) the index of dissimilarity, which measures trends in partisan segregation *within* geographical units.

#### 3.1 Increase in partisan segregation *across* geographical units

The ratio of  $D/(D+R)$  captures the relative number of Democrats among the voting population of Democrats and Republicans. Using individual-panel data, we define the ratio of  $D/(D+R)$  in geographic unit  $i$  in year  $t$  as follows:

$$D/(D + R)_{i,t} = \frac{\sum_{v \in i,t} D_{v,t}}{\sum_{v \in i,t} (D_{v,t} + R_{v,t})}, \quad (3.1)$$

where  $D_{v,t}$  and  $R_{v,t}$  are equal to 1 if voter  $v$  in year  $t$  is registered as Democrat and Republican, respectively, and 0 otherwise.

Our analysis focuses on shifts in the distribution of  $D/(D+R)$  over time. First, shifts of this distribution to the left or to the right indicate whether the fraction of Democrats has decreased or increased over time, overall. Second, we assess whether the tails of the distribution have increased or decreased over time. A widening of the distribution would indicate that geographic units are growing homogeneous, either towards Democratic or Republican homogeneity, and that partisan segregation is increasing across units. We measure the widening of the distribution of  $D/(D+R)$  with two indicators: the standard deviation and the kurtosis of the distribution.

We examine these changing distributions for each geographic unit, weighting by the initial number of registered voters (i.e, in 2008 for the Catalist data or in 2012 for the TargetSmart data). As mentioned in Section 2.3, we calculate the ratio for multiple geographic units: counties, pseudo-CDs, census tracts, census block groups, and cen-

sus blocks. The ratio of  $D/(D+R)$  can be only computed at the block-group and block levels using TargetSmart data.

We first document the trend in partisan segregation across counties and pseudo-CDs using the Catalist data. Figure 3.1 shows the weighted distribution of the ratio  $D/(D+R)$  for years 2008 and 2018. The centers of the distributions shift very slightly to the left (1 percentage point), indicating that overall, counties and congressional districts have grown slightly more Republican over the time period. However, the most prominent change is the widening of the distribution over the decade. The kurtosis of the distribution has decreased between 2008 and 2018, both at the county (2.95 vs 2.78) and at the pseudo-CD (4.14 vs 3.29) levels. Consistently, the standard deviations have increased, from 0.15 in 2008 to 0.17 in 2018 at the county level and from 0.12 to 0.13 at the pseudo-CD level. In other words, partisan segregation has increased over time across counties and pseudo-CDs: voters live in counties and CDs that are becoming increasingly homogeneous towards Democrats or Republicans.

The stylized fact of an increasing trend in partisan segregation is very robust. First, we test whether or not there is a consistent year-to-year increase in partisan segregation. Appendix Figure 3.11 displays the distributions across electoral years 2008, 2010, 2012, 2014, 2016 and 2018. We observe systematic year-to-year decreases (resp. increases) in the kurtosis (resp. in the standard deviations) of the distribution of  $D/(D+R)$ . It implies that partisan segregation has been consistently increasing over the time window. Second, we test whether our results can be extended to the entire country and are robust to the use of another proxy for partisan preferences. Appendix Figure 3.13 uses Congressional elections rather than party registration data as input. The standard deviations are not increasing but the kurtosis is strongly decreasing, both at the county (3.04 vs 2.65) and at the pseudo-CD (3.56 vs 2.48) levels. It confirms that the rise in partisan segregation is not limited to the 30 states for which individual partisan affiliation is available.

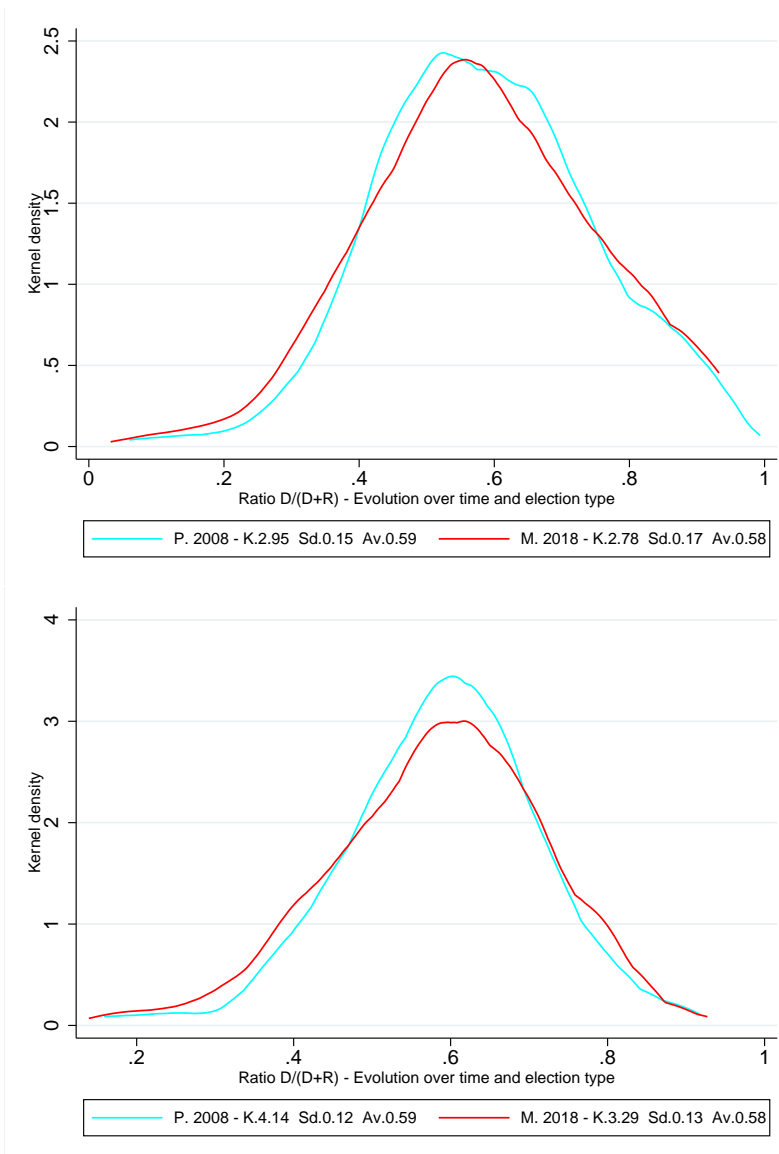
Importantly, we also observe this increasing trend in partisan segregation across units at smaller geographies. Appendix Figures 3.7 and 3.8 show the weighted kernel distributions of the ratio of  $D/(D+R)$  at the census tract-level using respectively Catalist data and TargetSmart data.<sup>2</sup> We observe similar shifts in kurtosis and in standard deviations at this much finer geographic level as at the county and pseudo-CD levels. Despite using entirely separate datasets, we also find similar shapes at the census tract level of the weighted kernel distributions, with an average closed to 0.6 in both datasets. Reassuringly, our results do not depend on the type of dataset we are study-

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<sup>2</sup>Note that the kurtosis is not normalized in Appendix Figure 3.8 but it is nevertheless decreasing.

ing at and they are robust to the use of stable geographic units at the tract level. Using the TargetSmart data, we further examine changes in  $D/(D+R)$  at even smaller geographic units, block-group and block levels, from 2012 to 2020. Appendix Figures 3.9 and 3.10 display declining kurtoses at each of these units, demonstrating the pervasive rise in partisan segregation during the time period.

Figure 3.1: Weighted kernel distributions of the ratio  $D/(D+R)$  in 2008 and in 2018 - At the county and pseudo-CD levels (resp. above and below) using Catalist data



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2008 in geographic unit  $i$ . K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution. The kernel distribution of the ratio  $D/(D+R)$  is featured in blue in 2008 (at Presidential election) and in red in 2018 (at Midterm election)

### 3.2 Increase in partisan segregation *within* geographical units

We now turn to the index of dissimilarity to study trends in partisan segregation *within* geographical units. The index of dissimilarity measures the unevenness of the distribution of two demographic groups across neighborhoods within a large geographic unit. It has been commonly used in social science literature to measure segregation (Massey and Denton 1993; Reardon and O’Sullivan 2004; Klinkner and Hapanowicz 2005; Glaeser and Ward 2006; Brown and Enos 2021). In our analysis, it captures how different neighborhoods look compared to each other in terms of proportion of Democrats and Republicans, with respect to the overall partisan composition of the larger geography. Using our individual-level datasets, we formally define the dissimilarity index as follows:

$$DI_{i,t} = \frac{1}{2} \sum_{j \in i} \left| \frac{\sum_{v \in j,t} D_{v,t}}{\sum_{v \in i,t} D_{v,t}} - \frac{\sum_{v \in j,t} R_{v,t}}{\sum_{v \in i,t} R_{v,t}} \right|, \quad (3.2)$$

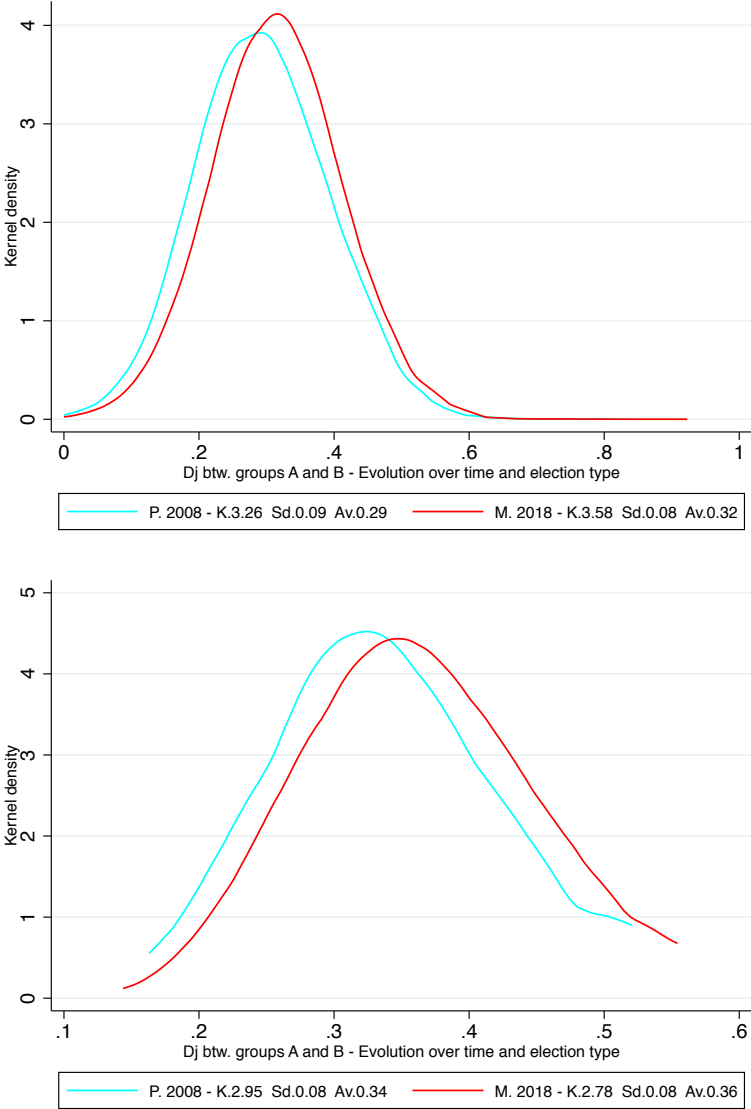
with  $DI_{i,t}$  the index of dissimilarity in geographic unit  $i$  in year  $t$ ,  $j$  the neighborhood sub-unit within  $i$ , and  $D_{v,t}$  and  $R_{v,t}$  defined as before. We calculate the dissimilarity index for counties and for pseudo-CDs, using census tracts as the sub-geography definition of a neighborhood.

Figure 3.2 shows the weighted kernel distribution of the index of dissimilarity at the county and pseudo-CD levels, in 2008 (blue line) and in 2018 (red line) using the Catalist data. Here, we do not focus on the widening of the distribution, but instead on whether or not the distribution is shifting to the right or to the left. We observe a notable mean increase in the index of dissimilarity from 2008 to 2018, both at the county (3 percentage points) and at the pseudo-CD (2 percentage points) levels. The increase has been continuous over time (Appendix Figure 3.12).

Using the ratio of  $D/(D+R)$ , we already notice that partisan homogeneity is increasing in absolute terms within small geographic areas (such as Census tracts, block groups, and blocks). The dissimilarity index adds further information, testing whether these local-level changes are surprising in the context of the larger geographic unit in which the neighborhood is located. Here, the increase in the dissimilarity index confirms that local-level changes are not merely a product of broader regional changes. In other words, a neighborhood is not shifting more Republican because there is a growing number of Republicans in the county where it is located. Partisan segregation is

instead increasing *within* counties or pseudo-CDs, with neighborhoods becoming more distinct in terms of partisan composition.

Figure 3.2: Weighted kernel distributions of the dissimilarity index in 2008 and in 2018 - At the county and pseudo-CD levels (resp. above and below) using Catalist data



Note: The kernel distributions of the dissimilarity index are weighted by the number of registered voters in 2008 in geographic unit  $i$ . K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution. The kernel distribution of the dissimilarity index is featured in blue in 2008 (at Presidential election) and in red in 2018 (at Midterm election)

## 4 Characteristics of areas driving the rise in partisan segregation

### 4.1 Change in partisan segregation in Democratic vs. Republican areas

The widening of the distribution of the ratio  $D/(D+R)$  over time does not mean that partisan segregation has increased in *all* geographic units. We classify units along two criteria: whether or not there were initially more Republicans or Democrats and whether or not the voting population has become more homogeneous over time. This classification allows potential trend differences between Democratic and Republican places.

Specifically, we group geographical units into the four following categories: 1. Places becoming more homogeneous in favor of Republicans, 2. Places becoming more homogeneous in favor of Democrats, 3. Places becoming more heterogeneous in favor of Republicans, and 4. Places becoming more heterogeneous in favor of Democrats. Categories 1 and 2 contribute to the overall increase in partisan segregation *across* geographical units while categories 3 and 4 alleviate the rising trend in partisan segregation. We first look at the initial value of the ratio  $D/(D+R)$ . If the 2008 value of the ratio  $D/(D+R)$  is below (resp. above) its median value, it means that relatively, there was a low (resp. high) fraction of Democrats in 2008 in unit  $i$ . Unit  $i$  is growing more homogeneous with respect to partisan affiliation, if it experiences a larger increase in the fraction of voters affiliated with the dominant partisan group compared to the median change in  $D/(D+R)$ . Republican (resp. Democratic) places becoming more homogeneous are places where the ratio  $D/(D+R)$  is below (resp. above) the median in 2008 and where the change in  $D/(D+R)$  is below (resp. above) the median change over time.

Table 3.1 shows that a majority (61%) of the 1,375 counties have contributed to the overall increase in partisan segregation visible on Figure 3.1. Counties fueling the rise in partisan segregation are mainly "Republican" counties, with a low initial ratio  $D/(D+R)$ . On the contrary, partisan segregation has mainly decreased in counties with a high fraction of Democrats in 2008. These results are consistent with a relative increase in the number of Republicans over the period (see Appendix Figures 3.14, 3.15, and 3.16). Even though the number of pseudo-CDs is considerably smaller (135), Appendix Table 3.5 features similar results.

Table 3.1: Share of counties experiencing an increase vs. decrease in partisan homogeneity between 2008 and 2018 - Using Catalist data

Variable	Obs	Mean (%)
<i>Increase in partisan homogeneity</i>	<b>1,375</b>	<b>61</b>
In favor of Republicans	1,375	56
In favor of Democrats	1,375	5
<i>Decrease in partisan homogeneity</i>	<b>1,375</b>	<b>39</b>
In favor of Republicans	1,375	31
In favor of Democrats	1,375	8

Note: Counties experiencing an increase (resp. a decrease) in partisan homogeneity contribute to (resp. alleviate) the rising trend in partisan segregation. Counties becoming more homogeneous in favor of Republicans are "Republican" counties with an initial ratio of  $D/(D+R)$  below the median and where the change in  $D/(D+R)$  is below the median change over time. Counties becoming more heterogeneous in favor of Republicans are "Democratic" counties with an initial ratio of  $D/(D+R)$  above the median and where the change in  $D/(D+R)$  is below the median change over time.

## 4.2 Geographical and sociodemographic correlates

### *County characteristics*

Combining census data with the Catalist data, Table 3.2 shows t-test results comparing counties fueling the rise in partisan segregation with counties alleviating that trend. Counties contributing to the increase in partisan segregation have a higher median household income (\$49,749 vs. \$46,204), a more educated population (88% vs. 84% graduated from high-school or university), slightly more homeowners (72% vs. 71%), and a higher Gini inequality index.

### *Population characteristics*

The population is older on average in counties contributing to the rise in partisan segregation. The median age is around 42 years old in these counties while it is equal to 40 years old in other counties. Specifically, the share of registered voters older than 58 is significantly higher in the first type of counties (34% vs. 31%), and the share of registered voters under 43 is significantly lower (36% vs. 40%). This does not necessarily mean that older voters are responsible for the rise in partisan segregation. We examine this possibility more directly by measuring the increase in partisan segregation across age groups in Section 4.3.

Table 3.2 also reveals important differences in the ethnic composition of counties contributing to the increase in partisan segregation versus those going against that

trend. The former set of counties have a larger share of White voters among the registered population (92% vs. 84%), a smaller share of Black and Hispanic voters (resp. 3% vs. 9% and 3% vs. 4%), and higher racial homogeneity. This finding is consistent with [Brown and Enos \(2021\)](#), who show that partisan segregation is highly but imperfectly correlated with racial segregation.

Table 3.2: T-test table - Counties experiencing an increase vs. a decrease in partisan homogeneity between 2008 and 2018

	Diff	(1) ↑ in part. homogeneity Mean	(1) #	(2) ↓ in part. homogeneity Mean	(2) #
<i>Census</i>					
Total population	-24,859	120,660	843	145,519	532
Median age	1.706***	41.708	843	40.002	532
Sh. Female pop.	-0.001	0.498	843	0.499	532
HHI Ethnic heterogeneity	0.092***	0.736	843	0.644	532
Sh. Foreign-born pop.	0.422	5.395	843	4.973	532
Sh. Non-white pop.	-0.101***	0.177	843	0.278	532
People/Sq Mile	178	430	843	252	532
Sh. Urban pop.	-0.027	0.423	843	0.450	532
Median income	3,544***	49,749	843	46,204	532
Gini index	-0.015***	0.436	843	0.451	532
High-school dipl. or above	0.040***	0.881	843	0.841	532
Sh. Homeowners	0.014***	0.723	843	0.708	532
<i>Among the registered population</i>					
Sh. Registered voters	0.020***	0.758	843	0.738	532
Democrats	-0.228***	0.315	843	0.543	532
Independents	0.027***	0.226	843	0.199	532
Republicans	0.201***	0.459	843	0.259	532
Aged btw. 17-27	-0.012***	0.145	843	0.157	532
Aged btw. 28-42	-0.021***	0.219	843	0.240	532
Aged btw. 43-57	0.002	0.296	843	0.293	532
Aged over 58	0.031***	0.340	843	0.309	532
Black	-0.065***	0.026	843	0.091	532
Caucasian	0.089***	0.924	843	0.836	532
Hispanic	-0.010**	0.031	843	0.041	532

Note: The t-test table compares counties which contribute to the rise in partisan segregation (i.e., which experience an increase in partisan homogeneity) vs. counties which alleviate that trend (i.e., which experience a decrease in partisan homogeneity). Counties which contribute to the rise in partisan segregation are counties in which both the initial value *and* the change in  $D/(D+R)$  are below the median, or both are above the median.

Finally, counties contributing to the increase in partisan segregation have a larger share of registered voters (76% vs. 74%) and a larger share of Independents among the registered population (23% vs. 20%). In line with Section 4.1, there are also more Republicans (46% vs. 26%) and fewer Democrats (32% vs. 54%) in these counties.



### *Rural vs. urban places*

By contrast with all these differences, we do not find any significant difference in population density and the share of urban population between counties contributing to the increase in partisan segregation and others. To complement the statistics provided in Table 3.2, Figure 3.3 shows a map distinguishing the four types of U.S counties defined by the initial fraction of Democrats ( $D/(D+R)$ ) and its change. Counties are featured in darker or lighter blue (resp. darker or lighter red) if their fraction of Democrats (resp. Republicans) has relatively increased. Counties fueling the rise in partisan segregation are either displayed in darker blue, when they become more homogeneous in favor of Democrats, or displayed in darker red, when they grow more homogeneous in favor of Republicans. First, we note that counties driving the overall increase in partisan segregation are located both in rural and urban areas, consistent with Table 3.2. Second, we observe large geographic clusters. For instance, Oregon, Nevada, Utah, Wyoming, South Dakota, Iowa, Nebraska, and Kansas had a large fraction of Republicans in 2008 and have seen this fraction increasing over time. Louisiana, South Oklahoma, Kentucky, West Virginia, and North Alaska have followed a different trend. In 2008, there were more Democrats relatively but between 2008 and 2018, they have experienced an increase in the fraction of Republicans. They do not contribute to the overall increase in partisan segregation. Third, the map does feature a rural-urban divide but the distinction is not between counties contributing to the increase in partisan segregation versus counties which do not. The increase in partisan segregation has benefited the Republicans, in rural areas, and the Democrats, in urban centers. In counties becoming homogeneous in favor of Republicans, population average is equal to 61,955. In counties growing homogeneous in favor of Democrats, the number of inhabitants is larger - with an average equal to 730,715. In other words, geographic partisan segregation has been fueled by Democratic-leaning urban areas and by Republican-leaning rural areas, painting a picture of two divided Americas.

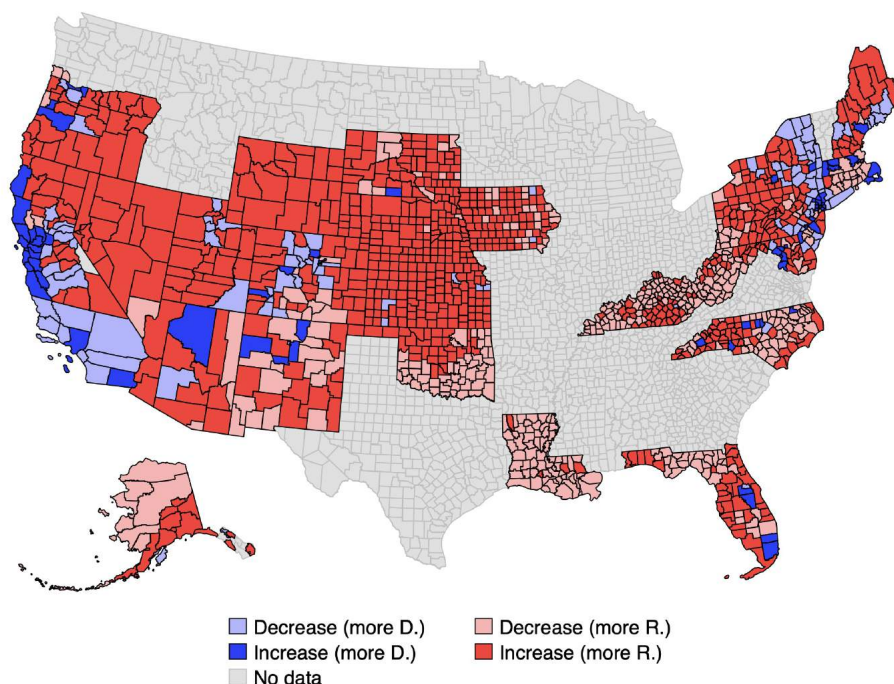
### **4.3 Change in partisan segregation across groups of citizens**

The Catalist data indicate the age, gender, and race of each registered voter along with their partisan affiliation. Figures 3.4 and 3.5 plot the weighted kernel distributions of the ratio  $D/(D+R)$  at the county level, by age category and race, both in 2008 and 2018.<sup>3</sup>

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<sup>3</sup>Appendix Figure 3.17 plots the weighted kernel distribution of the ratio  $D/(D+R)$  per gender group. Female voters are more likely to register as Democrats than their male counterparts. However, we do not find evidence that male or female voters differ in terms of change in partisan segregation.

Figure 3.3: Change in partisan homogeneity by U.S. county, using Catalist data

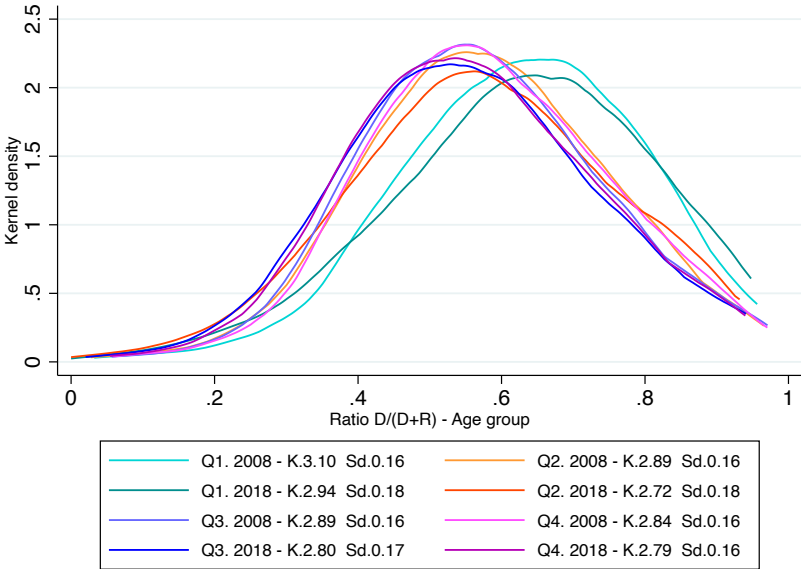


Note: Only thirty U.S. states (plus the District of Columbia) record partisan registration on their voter list. Counties which contribute to the rise in partisan segregation are counties experiencing an increase in partisan homogeneity (i.e., either featured in darker blue, when it is in favor of Democrats, or in darker red, when it is in favor of Republicans). Counties which alleviate the rise in partisan segregation are counties experiencing a decrease in partisan homogeneity (i.e., either featured in lighter blue, when it is in favor of Democrats, or in lighter red, when it is in favor of Republicans).

Age categories correspond to the quartiles of the overall age distribution of the registered population. The first quartile includes registered voters aged 17 to 27, the second one, voters aged 28 to 42, the third one, voters aged 43 to 57, and the fourth one, voters over 58. As shown in Figure 3.4, the younger voters are, the more they tend to register as Democrats. This is particularly striking for the youngest age category (17-27 years old). Second, the increase in partisan segregation has mainly been driven by voters who are among the two first quartiles of the age distribution and aged under 43. The kurtosis of the distribution of the ratio  $D/(D+R)$  has decreased by 0.16 and 0.17 points in the first and second quartiles between 2008 and 2018, as compared to decreases by 0.09 and 0.05 points in the third and fourth quartiles. The standard deviation has also increased more for the first and second quartiles. Even though population is slightly older in counties fueling the rise in partisan segregation, as shown in Table 3.2, this increase has mostly been driven by younger voters.

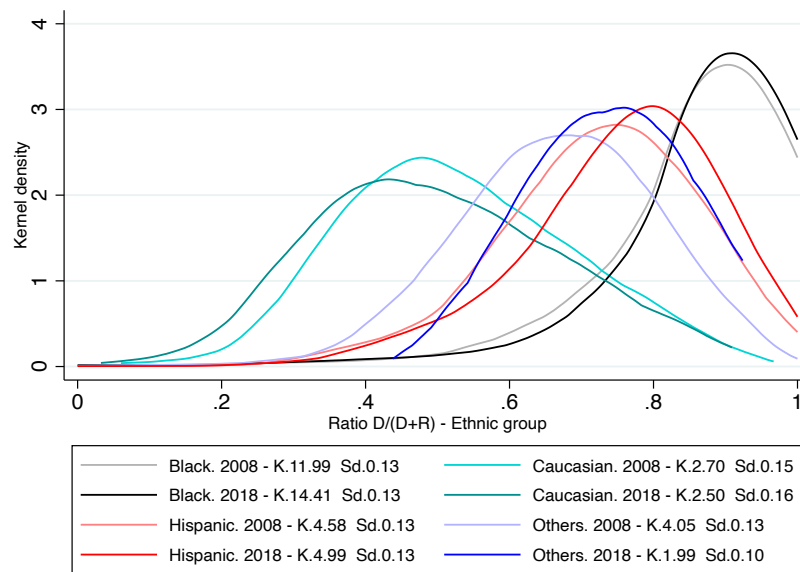
We distinguish four ethnic groups: Blacks, Whites, Hispanics, and others. The last group contains registered voters from other minority groups (such as Asian, Native Americans) as well as voters whose race is unknown. As is commonly known, Figure 3.5 shows that Black and Hispanic voters are much more likely to register as Democrats than White voters. Even compared to young voters, their weighted median ratio of  $D/(D+R)$  is particularly large: 0.732 for Hispanic voters and 0.90 for Black voters. We do not observe any increase in partisan segregation among Hispanic and Black voters. The standard deviation of their distribution remained constant and the kurtoses *increased* between 2008 and 2018. White voters, whose share was higher in counties fueling the rise in partisan segregation, are the only ethnic group for which partisan segregation has increased.

Figure 3.4: Weighted kernel distributions of the ratio  $D/(D+R)$  at the county level - By age group using Catalist data



Note: The first quartile includes registered voters aged 17 to 27, the second one, voters aged 28 to 42, the third one, voters aged 43 to 57, and the fourth one, voters over 58. Kernel distributions are weighted by the number of registered voters in 2008.

Figure 3.5: Weighted kernel distributions of the ratio  $D/(D+R)$  at the county level - By ethnic group using Catalist data



Note: Kernel distributions are weighted by the number of registered voters in 2008.

## 5 Drivers of the increase in partisan segregation

This last section conducts an accounting exercise to identify which factors have contributed the most to the rise in partisan segregation. Unlike the previous analyses, which could have been conducted using repeated cross-sections of individual-level data, this exercise requires to identify voters registering for the first time, voters who change their partisan affiliation, and those who move in and out of an area. We are able to do so thanks to our data which are in panel format and which track movers across state and county borders.

### 5.1 Explaining factors

Changes in the ratio  $D/(D+R)$  in a particular area can be driven by changes in the composition of the electorate present in that area as well as changes in their partisanship.

Changes in the composition of the electorate can be caused by U.S. internal migration, generational change, and adult “entries” in the dataset. U.S. internal migration simply refers to registered voters moving across areas between 2008 and 2018. Generational change results from young adults registering for the first time between 2008 and 2018 while other voters died in that period. We also observe entries of adult voters in

the dataset. Appendix Figure 3.18 shows the age distribution of individuals entering in the dataset. The median age of new entrants is 24 years old. While most new entrants are relatively young, 30% of entrants are aged over 34. We define adult entries as new entrants aged 25 and over. These entries represent 1% to 2% of the number of registered voters per electoral year (Appendix Table 3.6).<sup>4</sup>

Along with composition effects, changes in partisanship of people who were present in the area both in 2008 and in 2018 also contribute to changes in partisan segregation. We distinguish two types of changes in partisanship: change in registration status and change in partisan affiliation of registered voters. Change in registration status relates to voters who were registered and affiliated with a party in 2008 but not in 2018, or vice versa. Change in partisan affiliation refers to voters who were registered both in 2008 and 2018 but switched partisan affiliation in between. We consider switches between Democrats and Republicans, switches between Independents and Democrats, and switches between Independents and Republicans. Independents include all registered voters who are affiliated neither with the Republican party nor with the Democratic party.

## 5.2 Decomposition of the change in $D/(D+R)$ into explaining factors

The change in  $D/(D+R)$  between 2008 and 2018 in a particular area can be written as follows, after using partial derivatives:

$$\begin{aligned}\Delta \frac{D}{(D+R)} &\approx \frac{R}{(D+R)^2} \Delta D - \frac{D}{(D+R)^2} \Delta R \\ &\approx \sum_f \left( \frac{R_{08}}{(D_{08}+R_{08})^2} \Delta D_f - \frac{D_{08}}{(D_{08}+R_{08})^2} \Delta R_f \right) \\ &\approx \sum_f \Delta f,\end{aligned}\tag{3.3}$$

where  $\Delta$ s indicate changes between 2008 and 2018,  $R_{08}$  and  $D_{08}$  are the numbers of Republicans and Democrats in the area in 2008, and explaining factors are indexed by  $f$ .  $\Delta D_f$  and  $\Delta R_f$  designate the net changes in the number of Democrats and Republicans

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<sup>4</sup>Adult entries include migrants who have acquired the U.S. citizenship between 2008 and 2018: Appendix Figure 3.19 shows that the share of adult entries is strongly correlated with the share of foreign-born population. Other adult entries may also result from the imperfect tracking of individuals over time and across space.

due to factor  $f$ , and

$$\Delta_f = \frac{R_{08}}{(D_{08} + R_{08})^2} \Delta D_f - \frac{D_{08}}{(D_{08} + R_{08})^2} \Delta R_f \quad (3.4)$$

is the contribution of factor  $f$  to the change in  $D/(D+R)$ .

For all factors except voters switching between the Democrats and Republicans,  $\Delta D_f$  and  $\Delta R_f$  can be written as:

$$\Delta D_f = N_{I,f} \times s_{I,f}^D - N_{O,f} \times s_{O,f}^D$$

$$\Delta R_f = N_{I,f} \times s_{I,f}^R - N_{O,f} \times s_{O,f}^R,$$

where  $I$  and  $O$  respectively refer to inflows and outflows,  $N_{I,f}$  is the number of voters who were registered Democrats or Republicans in the area in 2018 but not in 2008 due to factor  $f$ ,  $N_{O,f}$  is the number of voters who were registered Democrats or Republicans in the area in 2008 but not in 2018 due to factor  $f$ ,  $s_{I,f}^D$  (resp.  $s_{I,f}^R$ ) is the share of voters who were registered as Democrats (resp. Republicans) in the area in 2018 due to factor  $f$  and  $s_{O,f}^D$  (resp.  $s_{O,f}^R$ ) is the share of voters who were not registered Democrats (resp. registered Republicans) in the area anymore in 2018 due to factor  $f$ . For instance, when we consider the contribution of U.S internal migration to changes in  $D/(D+R)$ ,  $N_{I,f}$  is the number of voters registered as Democrats or Republicans in the area in 2018 who used to live in another area before, and  $s_{I,f}^D$  is the share of those voters registered as Democrats (instead of Republicans) in 2018.

Replacing  $\Delta D_f$  and  $\Delta R_f$  in Equation (3.4), we obtain the following equation:<sup>5</sup>

$$\begin{aligned} \Delta_f = & N_{I,f} \times \left( \frac{R_{08}}{(D_{08} + R_{08})^2} s_{I,f}^D - \frac{D_{08}}{(D_{08} + R_{08})^2} s_{I,f}^R \right) \\ & - N_{O,f} \times \left( \frac{R_{08}}{(D_{08} + R_{08})^2} s_{O,f}^D - \frac{D_{08}}{(D_{08} + R_{08})^2} s_{O,f}^R \right) \end{aligned} \quad (3.5)$$

A factor  $f$  may contribute to the change in  $D/(D+R)$  for two reasons: i) if the number of Democrats and Republicans concerned by factor  $f$  is large (i.e., large values for  $N_{I,f}$  and  $N_{O,f}$ ), and ii) due to behavioral differences between Democrats and Republicans, reflected in differences between  $s_{I,f}^D$  and  $s_{I,f}^R$  or between  $s_{O,f}^D$  and  $s_{O,f}^R$ .

For each explaining factor  $f$ , we disentangle reason i) from reason ii) by checking the values of  $N_{I,f}$  and  $N_{O,f}$  and by measuring the strength and the sign of the correla-

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<sup>5</sup>Note that for "entries" in the dataset,  $N_{O,f} = 0$  by definition.

tion between  $\Delta \frac{D}{(D+R)}$  on one hand and  $\frac{s_{I,f}^D}{s_{I,f}^D + s_{I,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  or  $\frac{s_{O,f}^D}{s_{O,f}^D + s_{O,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  on the other. This correlation is informative because affiliated voters appearing in (resp. disappearing from) the area between 2008 and 2018 due to factor  $f$  generate a positive  $\Delta_f$  and contribute to increasing  $D/(D+R)$  if and only if  $\frac{s_{I,f}^D}{s_{I,f}^D + s_{I,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  is positive (resp.  $\frac{s_{O,f}^D}{s_{O,f}^D + s_{O,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  is negative). Intuitively,  $D/(D+R)$  increases if there are relatively more Democrats appearing in the area and relatively fewer Democrats disappearing from the area than at baseline.

For switches between Democrats and Republicans,  $\Delta D_f$  and  $\Delta R_f$  are defined as follows:

$$\Delta D_f = -\Delta R_f = \beta R_{08} - \alpha D_{08},$$

with  $\beta$  the share of Republicans who become Democrats, using the initial number of Republicans as denominator, and  $\alpha$  the share of Democrats who become Republicans, using the initial number of Democrats as denominator. Replacing  $\Delta D_f$  and  $\Delta R_f$  by their respective definitions in Equation (3.4), we obtain that:

$$\Delta_f = \frac{\beta R_{08} - \alpha D_{08}}{R_{08} + D_{08}}. \quad (3.6)$$

$\Delta_f$  is positive if and only if  $\frac{\beta}{\alpha + \beta} - \frac{D_{08}}{D_{08} + R_{08}}$  is positive. Therefore, for this factor, we disentangle reason i) from reason ii) by checking the number of switches between Democrats and Republicans and by measuring the strength and the sign of the correlation between  $\Delta \frac{D}{(D+R)}$  and  $\frac{\beta}{\alpha + \beta} - \frac{D_{08}}{D_{08} + R_{08}}$ .

### 5.3 Results of the decomposition

Similarly as in Section 4, we group counties into four categories: 1. Places becoming more homogeneous in favor of Republicans, 2. Places becoming more homogeneous in favor of Democrats, 3. Places becoming more heterogeneous in favor of Republicans, and 4. Places becoming more heterogeneous in favor of Democrats. Figure 3.6 displays the percentage of the total change of  $D/(D+R)$  explained by the different factors in these four categories. We notice important differences between Democratic-leaning areas and Republican-leaning areas. In the first set of areas, changes in the composition of the electorate and, in particular, generational change are the main drivers of the increase in the fraction of Democrats. In Republican-leaning areas, changes in partisanship are instead the main drivers. In particular, switches between Democrats and Republicans explain a large share of the change of  $D/(D+R)$  in these areas. Appendix Figure 3.20 shows consistent patterns at the pseudo-CD level. We also find qualita-

tively similar patterns when restricting the sample to counties in which the change in  $D/(D+R)$  was in the top or bottom deciles (Appendix Figures 3.21 and 3.22).

As underlined in Section 5.2, a factor may account for a large share of the change of  $D/(D+R)$  due to two reasons: 1) if a large number of voters accounted for by this factor, and ii) if changes were tilted towards the Republicans or the Democrats, as expressed by the correlation between  $\Delta \frac{D}{(D+R)}$  on the one hand, and  $\frac{s_{I,f}^D}{s_{I,f}^D + s_{I,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  or  $\frac{s_{O,f}^D}{s_{O,f}^D + s_{O,f}^R} - \frac{D_{08}}{D_{08} + R_{08}}$  on the other hand. Focusing on counties contributing to the rise in partisan segregation, Tables 3.3 and 3.4 provide numbers about the size of each factor and compute the correlations with the change in  $D/(D+R)$  to disentangle these two reasons. Appendix Tables 3.7 and 3.8 provide the corresponding results for counties which alleviate the overall increase in partisan segregation, because their initial ratio  $D/(D+R)$  was above the median and its change below the median change, or the reverse. Again, our results are robust to the type of geographical unit we are studying: for results at the pseudo-CD level, see Appendix Tables 3.9 and 3.10.

We first note that the correlation coefficients are generally positive for inflows and negative for outflows, as expected. The more  $D/(D+R)$  increases, the larger the fraction of new Democrats appearing as a result of any of the factors compared to the baseline. U.S. internal migration is an important exception as correlation coefficients with outflows tend to be positive: overall, there are relatively more Democrats among voters leaving an area when  $D/(D+R)$  is rising. The other factors show sufficiently strong deviations from the baseline to compensate for this factor.

Second, correlation coefficients are stronger for affiliated voters appearing in an area than for those disappearing, indicating that the former contribute more to changes in  $D/(D+R)$  than the latter.<sup>6</sup>

Third, we pay special attention to the factors contributing the most to the change of  $D/(D+R)$  in Figure 3.6. Remember that generational change is one of the main factors in Democratic-leaning counties. The correlation coefficients with the change in  $D/(D+R)$  are not larger in places growing more Democratic than in others, but they are larger than correlation coefficients for other factors, both for affiliated voters appearing and disappearing from the data. Turning to  $N_{I,f}$  and  $N_{O,f}$ , we observe that the number of young voters newly registered as Democrats or Republicans in 2018 is on average larger than the number of voters concerned by the other explaining factors in Democratic-leaning counties, and particularly so in counties in which the baseline

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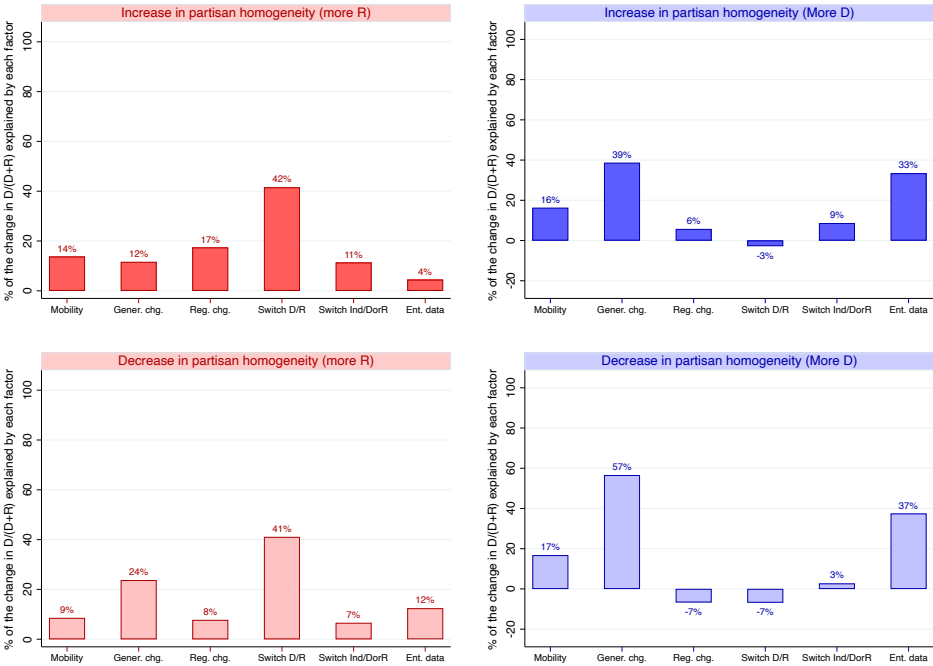
<sup>6</sup>Appendix Figures 3.23 and 3.24 display correlation coefficients between the change of  $D/(D+R)$  and the deviation from equilibrium for the entire set of counties. Correlations appear particularly strong, with dots well-fitted by a linear line.



ratio was already above the median. In sum, the fact that generational change is the main driver of the rise in partisan segregation in Democratic counties has to do both with the large number of young voters coming of age in these counties and the large share of Democrats among them.<sup>7</sup>

We finally look at switches between Democrats and Republicans, the main factor responsible for the change in  $D/(D+R)$  in Republican-leaning areas. Interestingly, the number of voters switching between the Republican and Democratic parties is not particularly large in these counties. However, switches disproportionately take place towards the Republican party, as indicated by very strong correlation coefficients. By contrast, the corresponding correlation coefficients are much lower in areas in which the fraction of Democrats increases.

Figure 3.6: % of  $\Delta D/(D+R)$  explained by each factor at the county level - Using Catalyst data



Note: The figure features the % of  $\Delta D/(D+R)$  explained by each factor per change in partisan homogeneity.  $\Delta D/(D+R)$  is computed grouping all counties experiencing the same trend in partisan homogeneity. Explaining factors are mobility, generational change, change in registration status, switches between Democrats and Republicans, switches between Independents and Republicans, and adult entries in the dataset.

<sup>7</sup>Correlation coefficients due to voters disappearing from the data as a result of generational change are lower than for voters appearing in the data: Republicans and Democrats do not die at large differential rates.

Table 3.3: Correlation between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$  - At the county level

	All counties		↑ in Homog.		↑ in Homog. (R)		↑ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	.932***	-.693***	.904***	-.759***	.879***	-.564***	.829***	-.367***
U.S. Internal migration	.881***	.474***	.868***	.176***	.759***	.311***	.705***	-.105***
Change in partisan affil. btw. Ind & D/R	.905***	-.350***	.893***	-.668***	.838***	-.385***	.706***	.082***
Change in partisan reg. status	.902***	-.067***	.881***	-.511***	.789***	.084***	.778***	-.083***
Voters "entering" the dataset as reg.	.925***	-	.901***	-	.883***	-	.814***	-
Change in partisan affil. btw. D & R	.907***		.887***		.793***		.492***	
	N = 1,375		N = 843		N = 769		N = 74	

Note: The table features the correlation between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$ . Counties are classified according to their trend in partisan homogeneity.

Table 3.4: Number of voters registered as Democrats or Republicans per factor - At the county level

	All counties		↑ in Homog.		↑ in Homog. (R)		↑ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	6913.852 (21780.415)	5495.164 (13707.715)	6353.331 (23308.341)	5022.841 (13851.941)	3101.09 (6708.205)	2891.367 (5250.178)	40150.27 (67257.599)	27172.892 (37120.769)
U.S. Internal migration	6265.049 (14031.951)	6437.052 (15780.258)	6179.066 (13849.056)	6297.694 (16748.832)	4054.832 (8959.067)	3472.925 (7062.842)	28253.878 (28745.238)	35652.392 (41871.982)
Change in partisan affil. btw. Ind & D/R	2317.258 (6863.225)	2053.103 (7545.515)	2077.028 (6595.273)	1793.488 (7814.226)	1117.74 (2748.072)	881.113 (1848.421)	12045.851 (17658.695)	11274.784 (23842.507)
Change in partisan reg. status	1678.284 (5353.06)	9365.578 (29084.272)	1557.046 (5712.64)	8698.976 (28653.125)	831.45 (1712.274)	4855.226 (10320.549)	9097.365 (16804.317)	48642.811 (81092.838)
Voters "entering" the dataset as reg.	6825.012 (23786.616)	-	6697.114 (25442.388)	-	3211.65 (7131.47)	-	42917.676 (73982.187)	-
Change in partisan affil. btw. D & R	4025.551 (10752.88)		3567.377 (10444.618)		2148.982 (4457.792)		18307.189 (28421.409)	
	N = 1375		N = 843		N = 769		N = 74	

Note: The table features the number of voters registered as Democrats or Republicans per factor. Counties are classified according to their trend in partisan homogeneity.

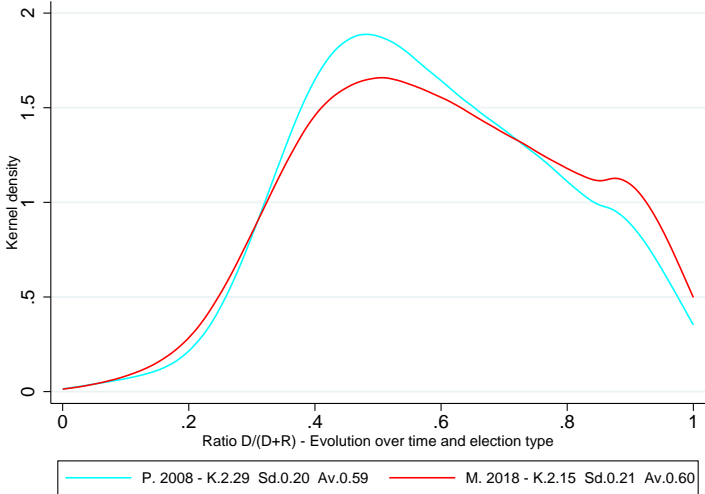
## 6 Conclusion

Using individual-level panel data, this study provides new evidence showing that geographic partisan segregation has increased in the U.S. since 2008. Exploring changes in the ratio of Democrats to Democrats and Republicans, we observe that counties, congressional districts, census tracts, block groups, and blocks all tend to display more extreme (either very high or very low) fractions of Democrats over time. The increase in partisan segregation *across* geographical units goes hand in hand with an increase in partisan segregation *within* counties and congressional districts. These results indicate that places are growing more homogeneous in terms of partisanship, on average, and even conditional on regional patterns, neighborhoods are growing more distinct along partisan lines. The rise in partisan segregation takes place in both rural and urban areas – with places growing more Republican located in rural parts of the U.S. and places with an increasing fraction of Democrats in densely urbanized areas. The increase in partisan segregation is most prominent among White voters and among younger generations. This last result suggests that the effects of the increase in partisan segregation on attitudes may be long-lasting.

To the best of our knowledge, this paper is also the first study to decompose the causes of partisan segregation, adjudicating between competing explanations, and showing important regional variation in these causes. In particular, we find that the increase in the fraction of Democrats, in Democratic-leaning places, is primarily driven by the entry of young voters. In Republican-leaning places, the increase in geographic segregation is instead mostly driven by Democrats changing their partisan affiliation to register as Republicans. In the next iteration of the paper, we will investigate whether the increase in partisan segregation correlates with political polarization and other attitudes.

# Appendix A - The Rise in Partisan Segregation

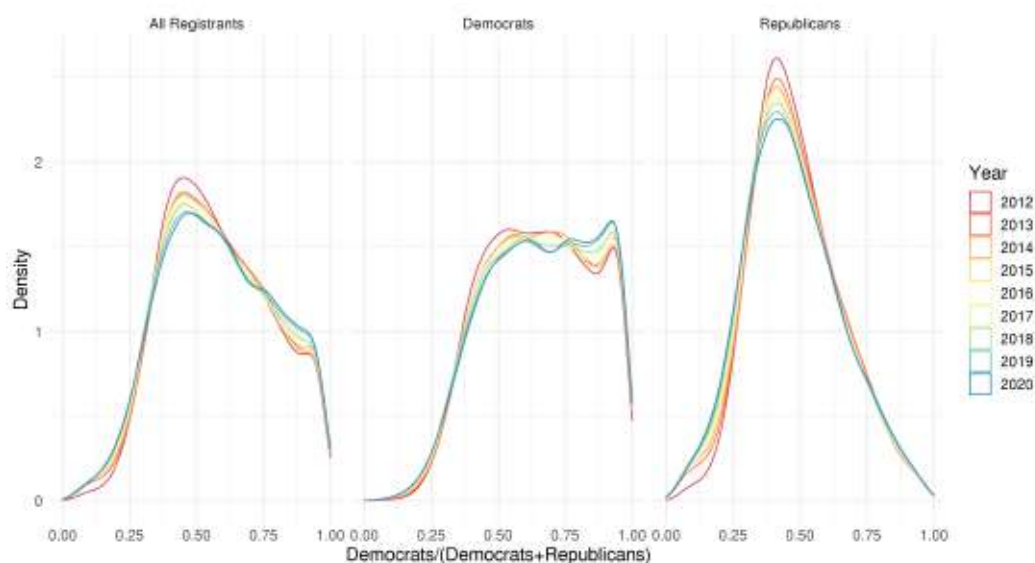
Figure 3.7: Weighted kernel distributions of the ratio  $D/(D+R)$  in 2008 and in 2018 - At the census tract level using Catalist data



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2008 in geographic unit  $i$ . K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution. The kernel distribution of the ratio  $D/(D+R)$  is featured in blue in 2008 (at Presidential election) and in red in 2018 (at Midterm election)

Figure 3.8: Weighted kernel distributions of the ratio  $D/(D+R)$  between 2012 and 2020  
 - At the census tract level using TargetSmart data

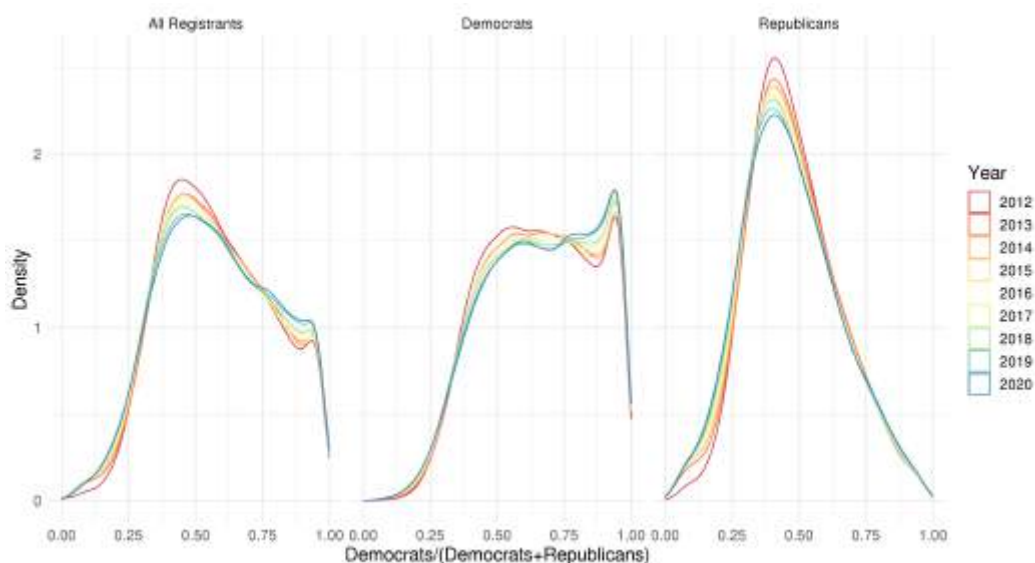
Year	Mean	Kurtosis	Dem. Mean	Rep. Mean	Dem. Skew	Rep. Skew
2012	0.579	-0.775	0.650	0.487	-0.074	0.439
2013	0.582	-0.730	0.657	0.484	-0.137	0.301
2014	0.578	-0.718	0.653	0.479	-0.137	0.285
2015	0.577	-0.738	0.655	0.476	-0.142	0.302
2016	0.578	-0.755	0.654	0.475	-0.156	0.300
2017	0.578	-0.786	0.657	0.473	-0.175	0.318
2018	0.578	-0.786	0.656	0.472	-0.181	0.307
2019	0.582	-0.821	0.660	0.473	-0.211	0.320
2020	0.584	-0.824	0.661	0.474	-0.225	0.304



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2012 in geographic unit  $i$ . Dem. Mean (resp. Rep. Mean) displays the average of the fraction of Democrats (resp. Republicans) among the registered population. Dem. Skew (resp. Rep. Skew) indicates the skewness of the kernel distribution of the fraction of Democrats (resp. Republicans) among the registered population.

Figure 3.9: Weighted kernel distributions of the ratio  $D/(D+R)$  between 2012 and 2020  
 - At the census block group level using TargetSmart data

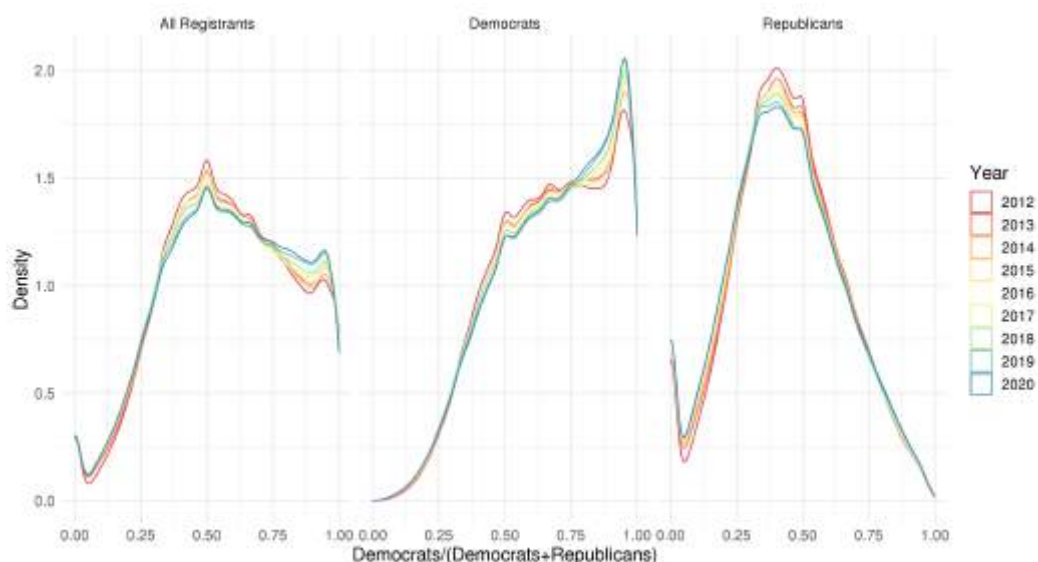
Year	Mean	Kurtosis	Dem. Mean	Rep. Mean	Dem. Skew	Rep. Skew
2012	0.579	-0.771	0.653	0.483	-0.103	0.423
2013	0.582	-0.760	0.660	0.479	-0.166	0.304
2014	0.578	-0.749	0.657	0.474	-0.165	0.291
2015	0.578	-0.770	0.658	0.472	-0.170	0.308
2016	0.578	-0.787	0.657	0.470	-0.184	0.308
2017	0.578	-0.817	0.660	0.468	-0.204	0.326
2018	0.579	-0.817	0.659	0.467	-0.210	0.315
2019	0.582	-0.849	0.664	0.468	-0.240	0.327
2020	0.584	-0.851	0.665	0.469	-0.254	0.312



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2012 in geographic unit  $i$ . Dem. Mean (resp. Rep. Mean) displays the average of the fraction of Democrats (resp. Republicans) among the registered population. Dem. Skew (resp. Rep. Skew) indicates the skewness of the kernel distribution of the fraction of Democrats (resp. Republicans) among the registered population.

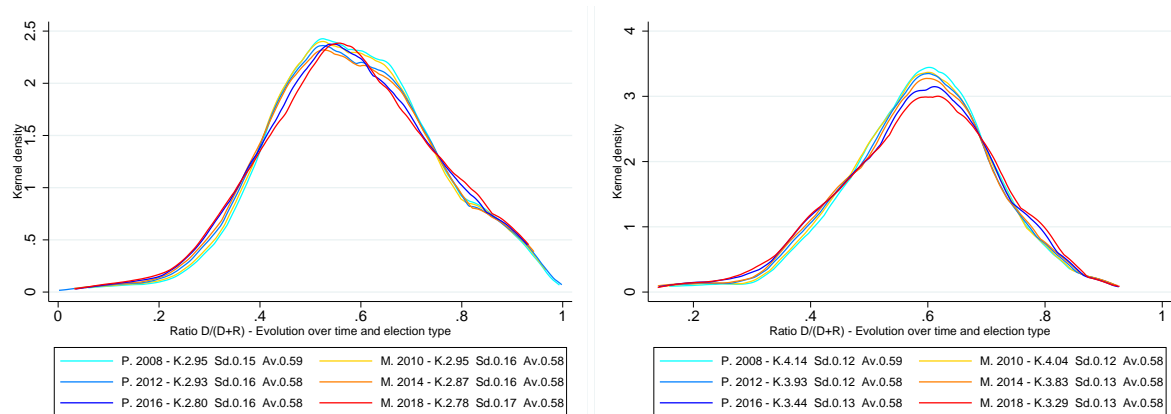
Figure 3.10: Weighted kernel distributions of the ratio  $D/(D+R)$  between 2012 and 2020  
 - At the census block level using TargetSmart data

Year	Mean	Kurtosis	Dem. Mean	Rep. Mean	Dem. Skew	Rep. Skew
2012	0.581	-0.674	0.681	0.444	-0.293	0.065
2013	0.583	-0.700	0.686	0.443	-0.341	0.066
2014	0.579	-0.706	0.683	0.438	-0.334	0.076
2015	0.578	-0.726	0.684	0.436	-0.342	0.091
2016	0.579	-0.732	0.683	0.435	-0.352	0.096
2017	0.579	-0.754	0.686	0.433	-0.371	0.111
2018	0.580	-0.746	0.685	0.432	-0.374	0.106
2019	0.583	-0.756	0.689	0.433	-0.402	0.109
2020	0.585	-0.745	0.689	0.435	-0.411	0.097



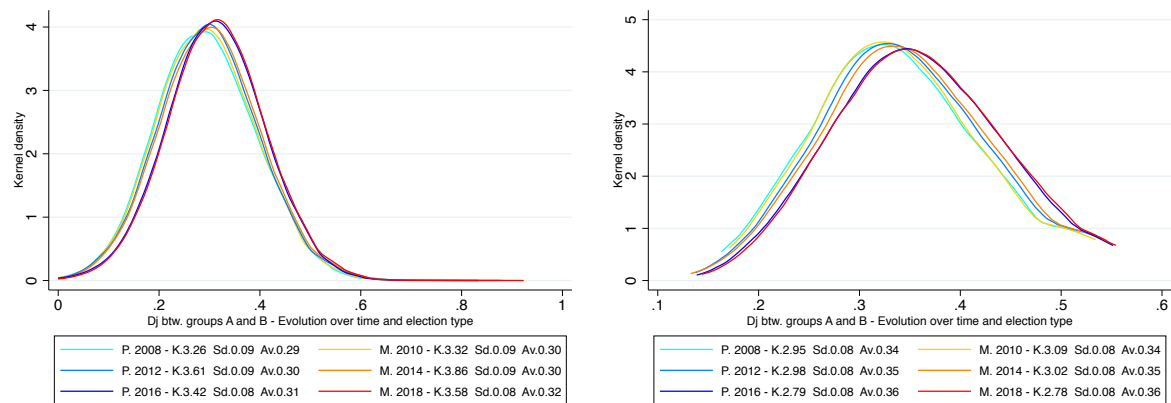
Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2012 in geographic unit  $i$ . Dem. Mean (resp. Rep. Mean) displays the average of the fraction of Democrats (resp. Republicans) among the registered population. Dem. Skew (resp. Rep. Skew) indicates the skewness of the kernel distribution of the fraction of Democrats (resp. Republicans) among the registered population.

Figure 3.11: Weighted kernel distributions of the ratio  $D/(D+R)$  between 2008 and 2018 - At the county and pseudo-CD levels (resp. left and right) using Catalist data



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2008 in geographic unit  $i$ .  $K$  refers to the kurtosis,  $Sd.$  to the standard deviation and  $Av$  to the average of the kernel distribution. The kernel distributions of the ratio  $D/(D+R)$  are featured in blue at Presidential elections and in orange/red at Midterm elections

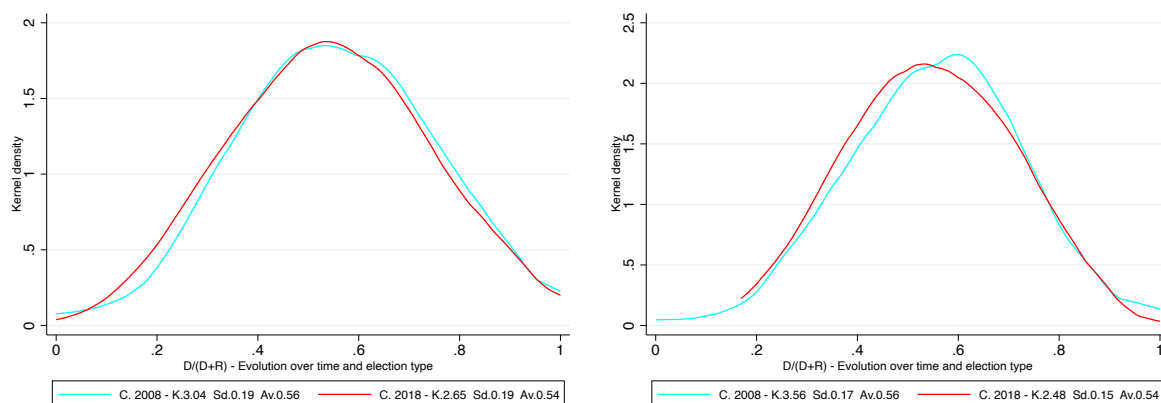
Figure 3.12: Weighted kernel distributions of the dissimilarity index between 2008 and 2018 - At the county and pseudo-CD levels (resp. left and right) using Catalist data



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2008 in geographic unit  $i$ .  $K$  refers to the kurtosis,  $Sd.$  to the standard deviation and  $Av$  to the average of the kernel distribution. The kernel distributions of the ratio  $D/(D+R)$  are featured in blue at Presidential elections and in orange/red at Midterm elections



Figure 3.13: Weighted kernel distributions of the ratio  $D/(D+R)$  in 2008 and in 2018 - At the county and pseudo-CD levels (resp. left and right) using *Congressional elections results*



Note: The kernel distributions of the ratio  $D/(D+R)$  are weighted by the number of registered voters in 2008 in geographic unit  $i$ . K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution. The kernel distribution of the ratio  $D/(D+R)$  is featured in blue in 2008 (at Presidential election) and in red in 2018 (at Midterm election)

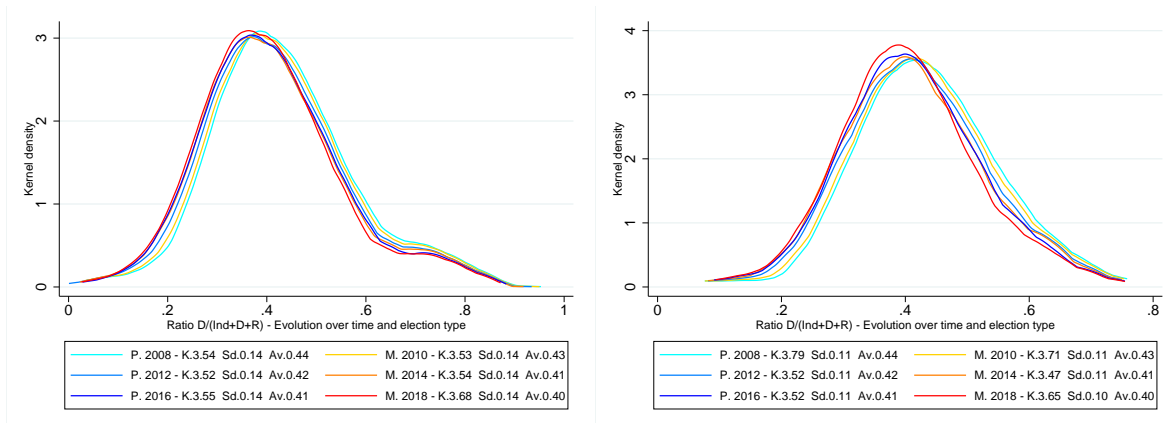
## Appendix B - Where has partisan segregation risen the most over the last decade?

Table 3.5: Share of pseudo-CDs experiencing an increase vs. decrease in partisan homogeneity between 2008 and 2018 - Using Catalist data

Variable	Obs	Mean (%)
<i>Increase in partisan homogeneity</i>	135	54
In favor of Republicans	135	41
In favor of Democrats	135	13
<i>Decrease in partisan homogeneity</i>	135	46
In favor of Republicans	135	26
In favor of Democrats	135	2

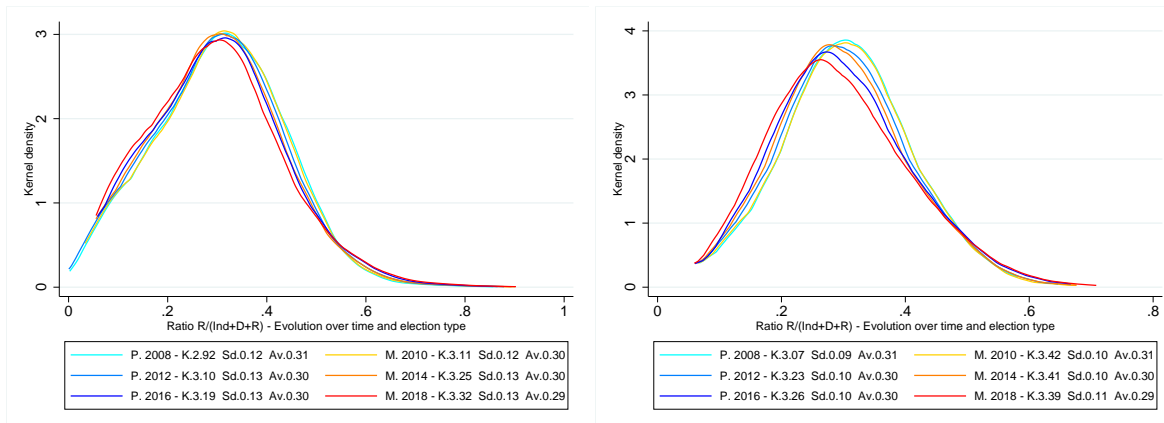
Note: Pseudo-CDs experiencing an increase (resp. a decrease) in partisan homogeneity contribute to (resp. alleviate) the rising trend in partisan segregation. Pseudo-CDs becoming more homogeneous in favor of Republicans are "Republican" Pseudo-CDs with an initial ratio of  $D/(D+R)$  below the median and where the change in  $D/(D+R)$  is below the median change over time. Pseudo-CDs becoming more heterogeneous in favor of Republicans are "Democratic" Pseudo-CDs with an initial ratio of  $D/(D+R)$  above the median and where the change in  $D/(D+R)$  is below the median change over time.

Figure 3.14: Change over time in the share of Democrats among registered voters - At the county (on the left) and pseudo-CD (on the right) level using Catalist data



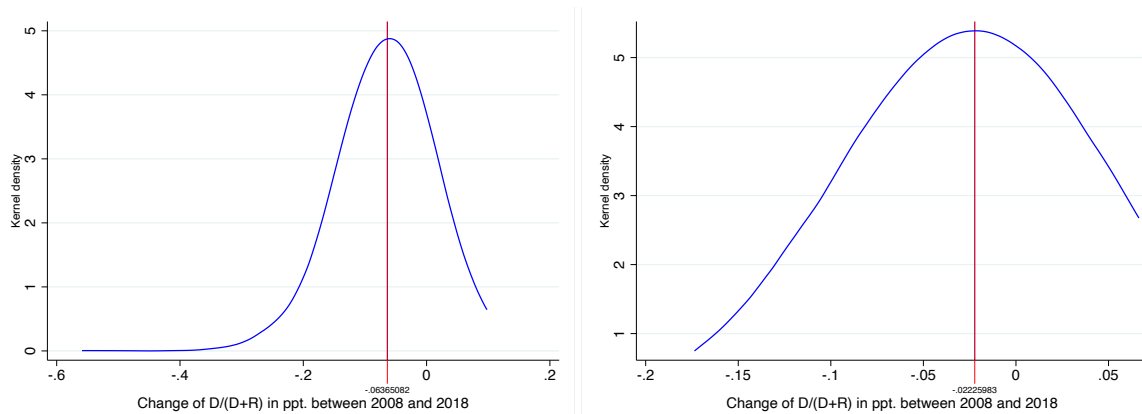
Note: The kernel distributions of the share of Democrats among registered voters are weighted by the number of registered voters in 2008 in geographic unit *i*. K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution.

Figure 3.15: Change over time in the share of Republicans among registered voters - At the county (on the left) and pseudo-CD (on the right) level using Catalist data



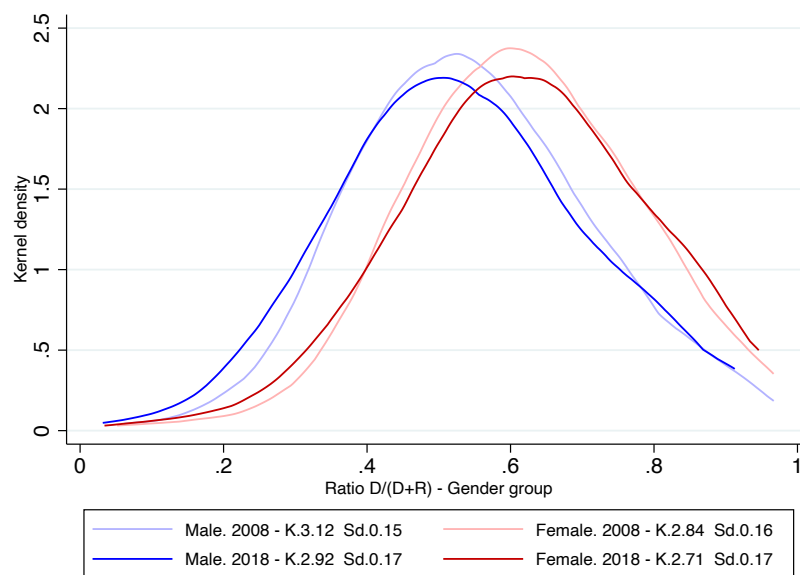
Note: The kernel distributions of the share of Republicans among registered voters are weighted by the number of registered voters in 2008 in geographic unit *i*. K refers to the kurtosis, Sd. to the standard deviation and Av to the average of the kernel distribution.

Figure 3.16: Change of the ratio  $D/(D+R)$  between 2008 and 2018 - At the county (on the left) and pseudo-CD (on the right) level using Catalist data



Note: The kernel distributions are weighted by the number of registered voters in 2008 in geographic unit  $i$ .

Figure 3.17: Weighted kernel distributions of the ratio  $D/(D+R)$  - Per Gender - At the county level using Catalist data



Note: Kernel distributions are weighted by the number of registered voters in 2008.

## Appendix C - The Drivers of the Increase in Partisan Segregation

Table 3.6: Frequency per year - Entry of registered voters

	Nb of young entrants	Prct	Nb of adult entrants	Prct
2010	3,372,255	1.4	3,000,400	1.2
2012	6,565,797	2.5	5,278,785	2.0
2014	4,285,358	1.6	4,114,352	1.5
2016	8,668,469	3.0	8,299,274	2.9
2018	5,927,825	2.0	6,594,512	2.2

Note: Young entrants are defined as voters aged under 25 at their entry in the dataset. Adult entrants are aged over 25.

Table 3.7: Correlation coefficient between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$   
- At the county level

	↓ in Homog.		↓ in Homog. (R)		↓ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	.960***	-.631***	.935***	-.572***	.792***	-.194***
U.S. Internal migration	.907***	.692***	.856***	.544***	.638***	.045***
Change in partisan affil. btw. Ind & D/R	.924***	.160***	.892***	-.119***	.479***	-.126***
Change in partisan reg. status	.921***	.375***	.857***	.249***	.768***	-.254***
Voters "entering" the dataset as reg.	.957***	-	.937***	-	.691***	-
Change in partisan affil. btw. D & R	.932***		.874***		.752***	
	N = 532		N = 426		N = 106	

Note: The table features the correlation between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$ . Counties are classified according to their trend in partisan homogeneity.

Table 3.8: Number of voters registered as Democrats or Republicans per factor - At the county level

	↓ in Homog.		↓ in Homog. (R).		↓ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	7802.047 (19098.407)	6243.602 (13455.002)	4847.467 (11018.706)	4513.739 (10168.279)	19676.113 (34284.197)	13195.689 (20882.977)
U.S. Internal migration	6401.295 (14329.063)	6657.878 (14122.529)	3685.423 (8670.837)	3937.291 (8635.894)	17316.028 (24162.735)	17591.557 (23580.646)
Change in partisan affil. btw. Ind & D/R	2697.923 (7257.693)	2464.487 (7086.662)	1504.284 (4199.587)	1375.514 (3777.7)	7495 (12883.435)	6840.925 (13117.285)
Change in partisan reg. status	1870.397 (4726.462)	10421.867 (29751.262)	1187.427 (2976.198)	6245.556 (13605.447)	4615.16 (8223.322)	27205.906 (58067.806)
Voters "entering" the dataset as reg.	7027.677 (20917.67)	- -	4239.493 (11908.38)	- -	18233.019 (38476.759)	- -
Change in partisan affil. btw. D & R	4751.566 (11195.638)		2966.932 (6555.467)		11923.774 (19876.59)	
	<b>N = 532</b>		<b>N = 426</b>		<b>N = 106</b>	

Note: The table features the number of voters registered as Democrats or Republicans per factor. Counties are classified according to their trend in partisan homogeneity.

Table 3.9: Correlation between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$  - At the pseudo-CD level

	All pseudo-CDs		↑ in Homog.		↑ in Homog. (R)		↑ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	.940***	-.750***	.900***	-.779***	.906***	-.722***	.846***	-.380***
U.S. Internal migration	.887***	.503***	.816***	.123***	.673***	.306***	.509***	-.346***
Change in partisan affil. btw. Ind & D/R	.916***	-.287***	.903***	-.551***	.885***	-.153***	.784***	.441***
Change in partisan reg. status	.904***	-.130***	.863***	-.451***	.726***	-.013***	.794***	-.486***
Voters "entering" the dataset as reg.	.936***	-	.915***	-	.868***	-	.723***	-
Change in partisan affil. btw. D & R	.936***		.915***		.868***		.723***	
	<b>N = 135</b>		<b>N = 73</b>		<b>N = 55</b>		<b>N = 18</b>	

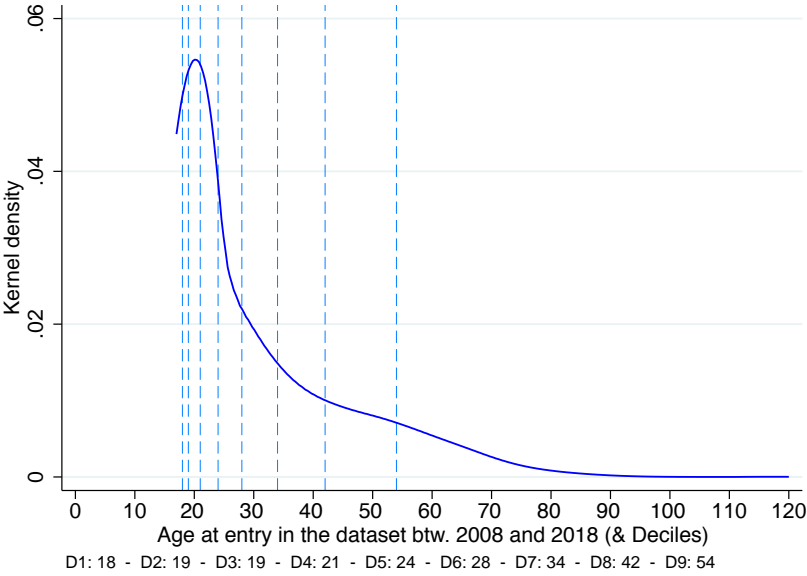
Note: The table features the correlation between the change in  $D/(D+R)$  and  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$ . Pseudo-CDs are classified according to their trend in partisan homogeneity.

Table 3.10: Number of voters registered as Democrats or Republicans per factor - At the pseudo-CD level

	All pseudo-CDs		↑ in Homog.		↑ in Homog. (R)		↑ in Homog. (D)	
	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.	Infl.	Outfl.
Generational change	70353.015 (92440.858)	55890.252 (61773.835)	73441.589 (100938.542)	57411.342 (69984.037)	47407.782 (43531.627)	40220.218 (25797.868)	152989.333 (168045.923)	109939.778 (121456.8)
U.S. Internal migration	48291.667 (47496.874)	49858.837 (56714.837)	54480.507 (50348.549)	53839.438 (58038.581)	45017.073 (43888.744)	37119.836 (28394.462)	83396.556 (58674.692)	104927.111 (89652.597)
Change in partisan affil. btw. Ind & D/R	25813.615 (33994.282)	23326.519 (35179.318)	24143.849 (30936.947)	21816.219 (33070.359)	17064.364 (17239.432)	14870.582 (14468.253)	45775.611 (49516.946)	43039 (57740.925)
Change in partisan reg. status	17026.719 (22422.029)	95104.178 (136203.13)	17931.932 (24640.69)	100859.274 (127938.304)	12141.491 (11612.331)	74509.8 (66751.504)	35624.944 (41270.42)	181371.556 (214617.795)
Voters "entering" the dataset as reg.	69229.911 (100930.355)	- -	77865.233 (112620.238)	- -	50446.4 (59426.896)	- -	161645 (180652.966)	- -
Change in partisan affil. btw. D & R	44726.044 (49748.737)		44614.534 (49638.806)		33312.945 (25517.948)		79147.167 (81801.724)	
	N = 135		N = 73		N = 55		N = 18	

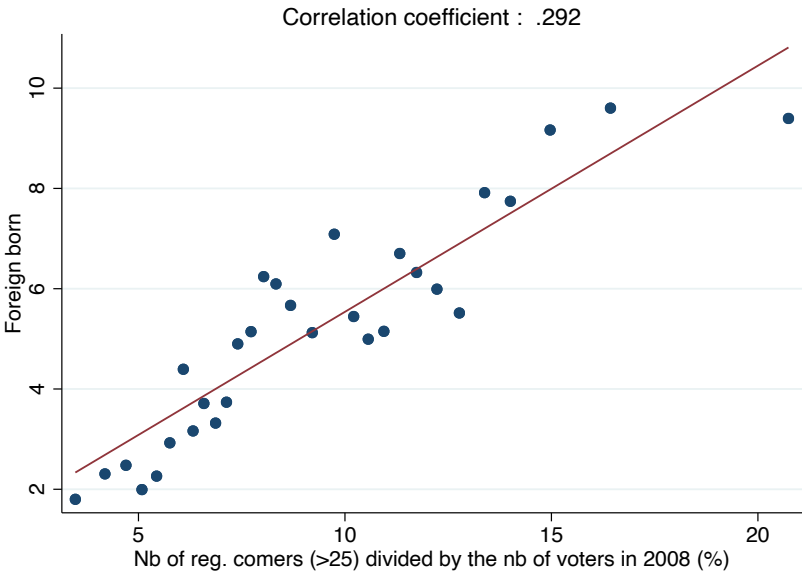
Note: The table features the number of voters registered as Democrats or Republicans per factor. Pseudo-CDs are classified according to their trend in partisan homogeneity.

Figure 3.18: Age distribution of voters who first enter the dataset between 2008 and 2018



Note: This figure displays the age distribution of voters who are not in the dataset in 2008 but enter between 2008 and 2018. The variable age is defined as age at first appearance in the dataset.

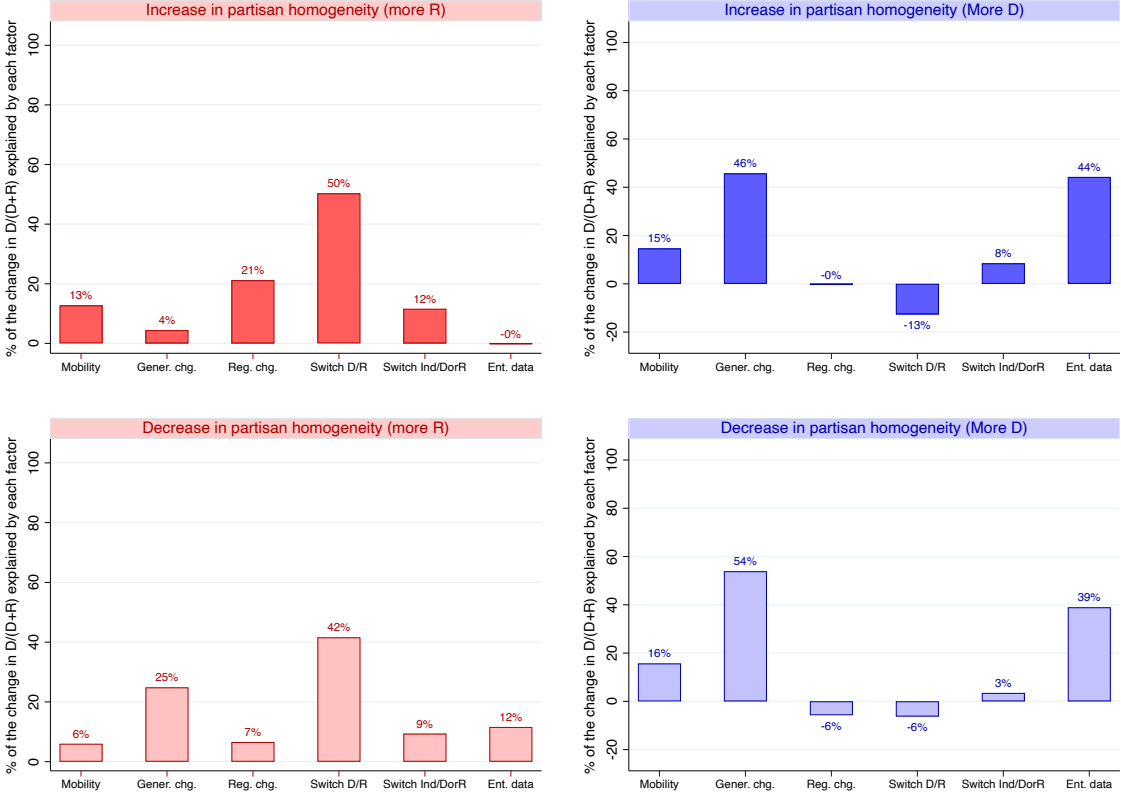
Figure 3.19: Correlation between the share of foreign-born citizens and the share of adult entrants between 2008 and 2018 among registered voters in 2008



Note: This figure displays the share of foreign-born citizens at the county level in 2010 (Census). Adult entrants are adult voters aged over 25 at their first appearance the dataset.

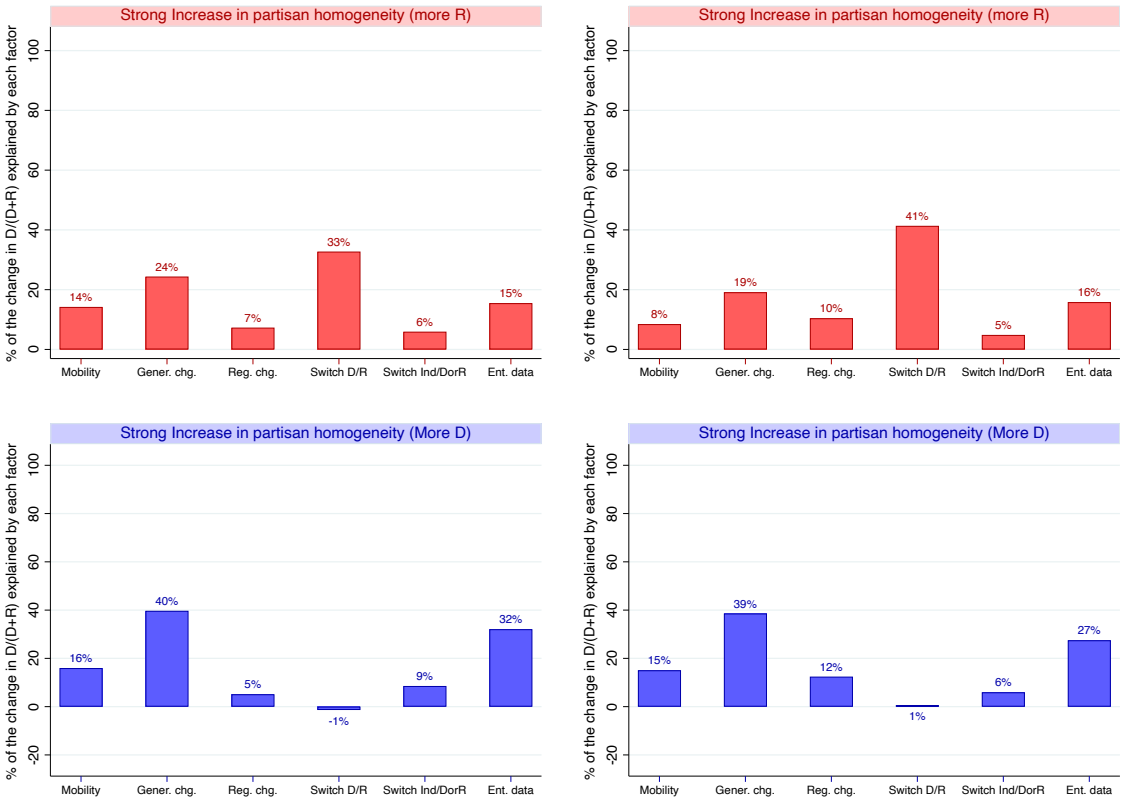


Figure 3.20: % of  $\Delta D/(D+R)$  explained by each factor at the pseudo-CD level - Using Catalist data



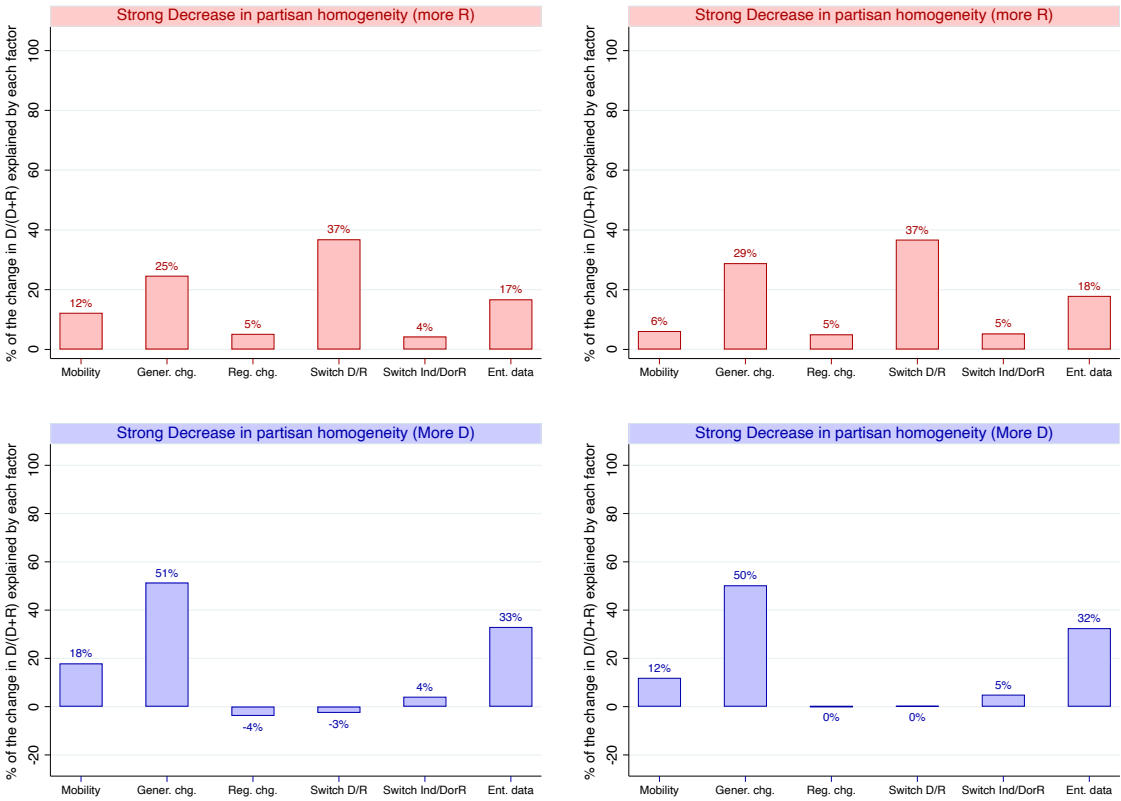
Note: The figure features the % of  $\Delta D/(D+R)$  explained by each factor per change in partisan homogeneity.  $\Delta D/(D+R)$  is computed grouping all pseudo-CDs experiencing the same trend in partisan homogeneity. Explaining factors are mobility, generational change, change in registration status, switches between Democrats and Republicans, switches between Independents and Republicans, and adult entries in the dataset.

Figure 3.21: % of  $\Delta D/(D+R)$  explained by each factor - Counties (resp. left) and Pseudo-CDs (resp. right) experiencing the largest increase in partisan homogeneity - Using Catalist data



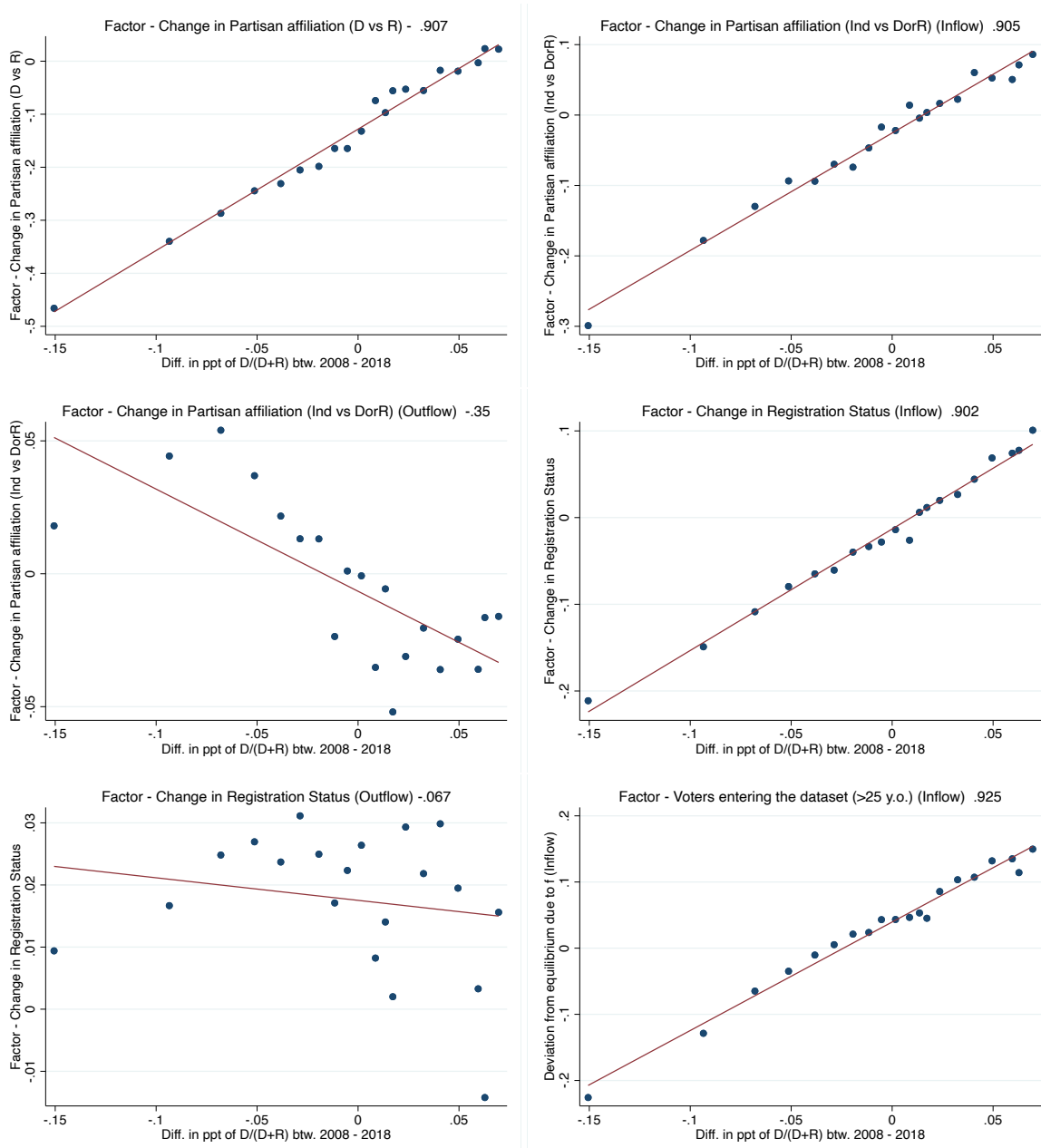
Note: The figure features the % of  $\Delta D/(D+R)$  explained by each factor per change in partisan homogeneity.  $\Delta D/(D+R)$  is computed grouping all geographic units  $i$  experiencing the same trend in partisan homogeneity. Geographic units where the increase in partisan homogeneity is the largest either correspond to units where partisan segregation is increasing and where  $\Delta D/(D+R)$  belongs to the first (resp. last) decile of the distribution when it is in favor of Republicans (resp. Democrats). Explaining factors are mobility, generational change, change in registration status, switches between Democrats and Republicans, switches between Independents and Republicans, and adult entries in the dataset.

Figure 3.22: % of  $\Delta D/(D+R)$  explained by each factor - Counties (resp. left) and Pseudo-CDs (resp. right) experiencing the largest decrease in partisan homogeneity - Using Catalist data



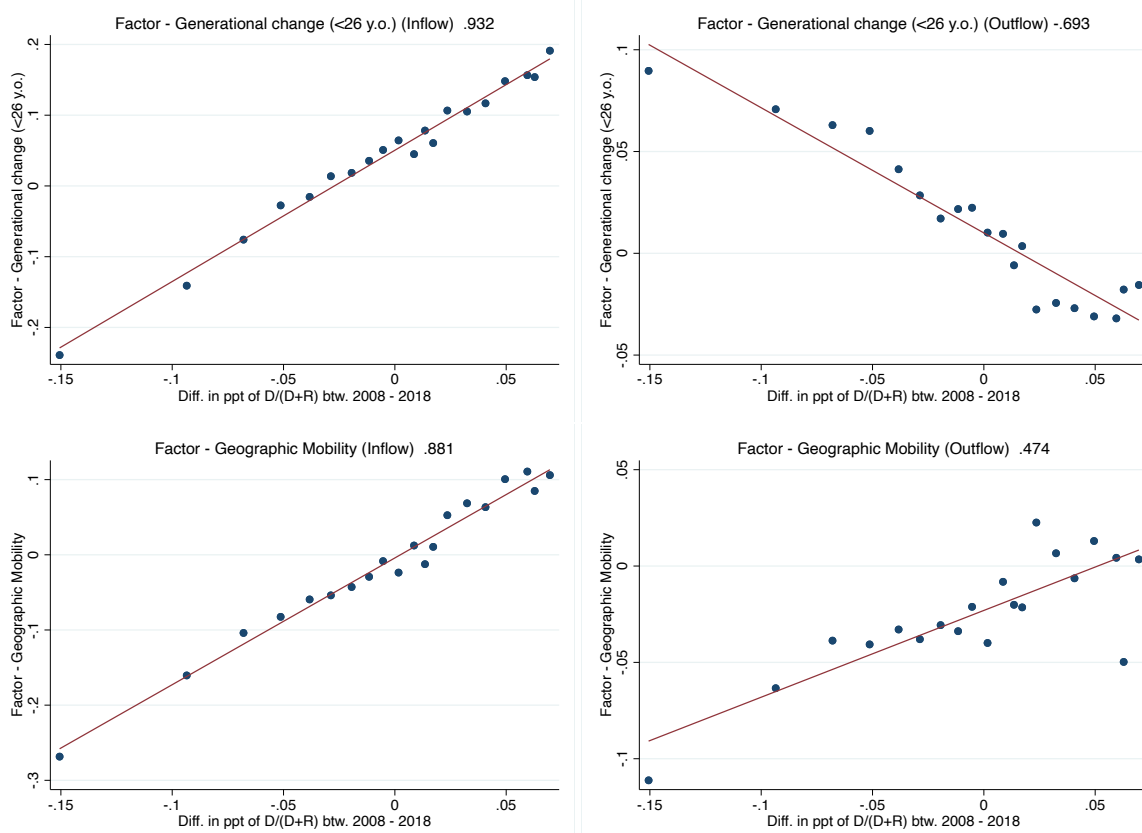
Note: The figure features the % of  $\Delta D/(D+R)$  explained by each factor per change in partisan homogeneity.  $\Delta D/(D+R)$  is computed grouping all geographic units  $i$  experiencing the same trend in partisan homogeneity. Geographic units where the decrease in partisan homogeneity is the largest either correspond to units where partisan segregation is decreasing and where  $\Delta D/(D+R)$  belongs to the first (resp. last) decile of the distribution when it is in favor of Republicans (resp. Democrats). Explaining factors are mobility, generational change, change in registration status, switches between Democrats and Republicans, switches between Independents and Republicans, and adult entries in the dataset.

Figure 3.23:  $\Delta D/(D+R)$  vs  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$  - At the county level (Including all counties, independently from partisan segregation status) - Using Catalist data



Note: Dots represent the local averages of  $\frac{s_f^D}{s_f^R+s_f^D} - \frac{D_{08}}{D_{08}+R_{08}}$ . Averages are computed within bins of the change in D/(D+R) measured in percentage points. The fit is linear.

Figure 3.24:  $\Delta D/(D+R)$  vs  $\frac{s_f^D}{s_f^R + s_f^D} - \frac{D_{08}}{D_{08} + R_{08}}$  - At the county level (Including all counties, independently from partisan segregation status) - Using Catalist data



Note: Dots represent the local averages of  $\frac{s_f^D}{s_f^R + s_f^D} - \frac{D_{08}}{D_{08} + R_{08}}$ . Averages are computed within bins of the change in  $D/(D+R)$  measured in percentage points. The fit is linear.

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**Titre :** Essais en Economie Publique et Politique: Une approche empirique

**Mots clés :** Populisme, Emprunts Toxiques, Ségrégation partisane, Dette publique, Activité économique, Innovation financière

**Résumé :** Ce manuscrit est à l'intersection entre l'économie publique et politique. Fondée à partir d'une approche empirique, elle explore plusieurs problématiques touchant les démocraties occidentales en ce début de XXI siècle : telles que l'augmentation de la dette publique, le populisme ou encore la ségrégation partisane. Le premier chapitre étudie les effets de chocs d'endettement locaux sur l'activité économique, lorsque le niveau d'endettement est particulièrement élevé. A partir de deux chocs exogènes qui ont affecté les municipalités françaises exposées au Franc Suisse, je trouve qu'une couverture médiatique défavorable sur l'endettement public est suffisante pour affecter la marge intensive des établissements étudiés. Une montée réelle de l'endettement local peut quant à elle engendrer des effets persistants sur l'activité économique locale, en augmentant les fermetures d'établissements. Le second chapitre est co-écrit avec Gianmarco Daniele et Paul Vertier. Afin d'explorer la montée du populisme, il propose un nouveau mécanisme entre populisme et crise financière: la révélation de scandales financiers. En utilisant une stratégie d'identifica-

tion par variable instrumentale, nous observons que les scandales financiers sont suffisants pour propulser les partis populistes – indépendamment de chocs économiques avérés. La révélation de scandales financiers apparaît également comme un mécanisme distinct mais complémentaire à d'autres explications sur la montée du populisme. Le troisième chapitre est co-écrit avec Jacob Brown, Enrico Cantoni, Ryan Enos et Vincent Pons. A notre connaissance, il est le premier à utiliser des données individuelles de panel pour tester la montée de la ségrégation partisane aux Etats-Unis. Nous observons une augmentation de la ségrégation partisane entre 2008 et 2020 – aussi bien au niveau des districts congressionnels, qu'à celui des comtés ou encore à celui d'unités géographiques inférieures. Dans les zones à tendance républicaine, la ségrégation partisane s'accompagne de changement de préférences au sein de l'électorat – avec une part croissante de Démocrates devenant Républicains. Dans les zones à tendance Démocrate, une dynamique intergénérationnelle est à l'oeuvre.

**Title :** Empirical Essays on Public and Political economy

**Keywords :** Populism, Toxic Loan, Partisan Segregation, Public debt, Economic activity, Financial innovation

**Abstract :** This PhD dissertation lies at the intersection of public and political economy. Based on empirical studies in France and in the U.S., this dissertation explores some challenges faced by Western democracies in the wake of the twenty-first century: high-level of public indebtedness, populism and partisan segregation. Chapter 1 provides first evidence on the effects of local public debt shocks on economic activity for highly indebted local governments. Exploiting two exogenous shocks on public debt that affect French municipalities indebted with CHF-toxic loans, I am able to disentangle the impact of an information shock on public debt from the effect of an actual debt increase. I find that negative press coverage on local public debt is sufficient to impact – at least temporarily – the intensive margin. Compared to information shocks, actual increase in local public debt burden can trigger persistent consequences on local economic activity, by increasing plant closures in highly-indebted municipalities. Chapter 2 is joint with Gianmarco Daniele and Paul Vertier. It considers the disclosure of public financial scandals as a new mechanism for the rise of populism. Using an instrumen-

tal variable as main identification strategy, we find in the subsequent municipal elections that public financial scandals are sufficient to fuel the entry of populist parties - independently from any adverse economic shocks. Importantly, entries of populist parties are reinforced by cultural and economic factors, meaning that this new mechanism can be viewed as complementary to other explanations for the rise of populism. Chapter 3 is joint with Jacob Brown, Enrico Cantoni, Ryan Enos and Vincent Pons. To the best of our knowledge, we are the first to use individual-panel data to test whether or not partisan segregation has actually been increasing over the last decade. Exploring two datasets, we find robust evidence that partisan segregation has been overall increasing between 2008 and 2020 – at the congressional district level, at the county level and even in smaller geographic units. We show that the rise of partisan segregation is mainly driven by generational change in Democratic-leaning places. In contrast, in Republican-leaning places, partisan segregation is fueled by change in partisan affiliation among Democrats and Republicans.