The Political Economy of Financial Innovation: Evidence from Local Governments

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Abstract

We investigate the development of an innovative and high-risk type of borrowing for local governments, known as structured loans. Using transaction data for more than 2,700 local governments in France, we show that the adoption of these instruments is more frequent for politicians from highly indebted local governments, from politically contested areas, and during political campaigns. Taking on structured loans helps incumbents get re-elected, and initially allows them to maintain lower taxes. Our findings illustrate how financial innovation can amplify principal-agent problems within the political system.

Keywords: Financial innovation, Political Economy, Principal-agent problem, Structured debt, Public Finance *JEL codes:* P16, H74, G11, G32

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"We are playing the dollar against the Swiss franc until 2042."
Cedric Grail, CEO of City of Saint Etienne, France (Business Week, 2010)

1 Introduction

Since the beginning of the 2000s, European local governments have been borrowing by means of an innovative financial instrument, known as structured loans. These loans have three defining features: a long maturity, a fixed/low interest rate for the initial period of the loan, followed by an adjustable rate that depends on the value of a given financial index (e.g., Libor, slope of the yield curve, or foreign exchange rate). Any structured loan can be broken down into a standard loan and a short position in a series of long-term options. The option position initially provides the borrower with a lower interest rate resulting from receiving the option premiums. However, selling options exposes the borrower to the risk of paying a much higher interest rate in the future. A typical example is the case of a local government paying a fixed 2% rate for the first three years of a loan, and then for the remaining 12 years, the rate is set to 2% plus the maximum between (1-USDCHF)/ USDCHF and zero. Hence, if USDCHF=0.80 as in July 2011, this leads to an annual interest rate of 27%.

The motive for financial innovation in general remains a largely debated question. Innovative instruments are traditionally intended to improve risk sharing and better match users' demand (Allen and Gale, 1994). However, they might also lead to speculative behavior (Simsek, 2013), which, in turn, can amplify principal-agent problems through opacity (Sato, 2014).

This latter motive may be especially relevant in a setting involving politicians, as it is prone to severe agency costs. Indeed, career concerns for politicians are important due to the need for periodical reelection. Furthermore, voters only have limited information on politicians' actions. Politicians may cater to specific preferences of voters to get reelected, while hiding the actual costs of these policies. For instance, politicians' willingness to facilitate access to homeownership led to large mortgage guarantee programs that contributed to the subprime crisis (Rajan, 2010). Similarly, shrouding part of the compensation of public workers might have played an important role in current public pension shortfalls (Glaeser and Ponzetto, 2014). Furthermore, to comply with Eurozone

requirements, some scholars have argued that Greece entered into OTC swap transactions to hide a significant part of its debt during its examination and obtained Euro-entry approval (Zingales, 2015). In this paper, we want to test whether certain circumstances foster politicians to implement innovative financial transactions that could obfuscate budget imbalances, and whether, and how, these transactions can help incumbent politicians get re-elected.

The local government market for structured loans in France represents an ideal laboratory to answer these questions for three reasons. First, structured loans offer great flexibility to the borrowers in terms of cash-flow distribution across time and states of nature, allowing *bad type* politicians to imitate *good type* in the short run by obfuscating budget deficits. Second, these transactions are undisclosed to taxpayers, making it impossible for taxpayers to adequately monitor the government's financial health. Third, as France possesses more than 35,000 local governments, many of which have been using structured loans, it allows us to conduct a large sample analysis. The significant heterogeneity in terms of financial situation, political environment, election timing, size and location of these governments brings additional sources of identification.

Using two proprietary datasets, we provide empirical evidence consistent with politicians strategically using risky innovative financial products for their own interest. First, we document that despite access to cheap credit during the 2000's, politicians have been increasingly implementing these risky transactions: more than 2,700 public entities have been issuing structured loans, and outstanding products in our data amount to more than EUR23 billion, with associated unrealized losses of EUR4 billion as of the end of 2009.[1] These losses represent more than one year of tax revenue for the decile of local governments that used high-risk structured loans the most. Among the 300 largest local governments, structured loans account for more than 20% of outstanding debt, and more than 72% of this sample use structured loans. Among these structured loans, 40% exhibit a high risk profile, as they rely on highly volatile underlying assets, or a highly leveraged option position.

Second, we show that the propensity, size, and timing of these transactions vary ac-

[1]This compares with overall estimate of EUR30bn outstanding structured loans. The total unrealized losses estimates as of end of 2015 are EUR20 billion, or 1% of France's GDP. Source: `http://www.lefigaro.fr/conjoncture/2015/11/27/20002-20151127ARTFIG00136-emprunts-toxiques-la-dette-des-collectivites-se-creuse-encore.php`

cording to politicians' incentives. A cross-section of our data illustrates how politicians from highly indebted local governments are significantly more likely to turn to this type of loan, suggesting a higher incentive to hide the actual cost of debt. We provide additional evidence supporting a causal link between the level of indebtedness and the local government's propensity to use structured debt by instrumenting the level of local government debt with floods, an arguably exogenous source of expenditures. We also find that incumbent politicians running in closely contested areas are more inclined to use structured loans, which is consistent with them shifting cash-flows in the future to aid them in being re-elected in the short run. When comparing a treatment group that confronts elections during our sample period (municipalities and counties) to a control group that does not (regions, hospitals, and social housing entities), we find that structured loan transactions are more frequent during the political campaign than after the election.

Our results are consistent with financial innovation amplifying agency cost in the political system. Conversely, our empirical evidence is hard to reconcile with other explanations for the development of the market: banks exploiting a potential lack of financial sophistication from politicians, a hedging demand from local governments, local government investing on behalf of their taxpayers, and the lack of alternative source of funding for local governments. First, controlling for local government size, politicians whose profession requires higher education are more inclined to use structured loans than politicians from a less educated background. Second, revenues of local governments do not correlate with the exposure provided by structured loans. Third, politicians are unlikely to use structured loans as a substitute for investing on their taxpayers' behalf, as they do not disclose the transactions and take highly concentrated exposure. Fourth, a significant share of local governments implement separately the derivative part and the standard loan, which demonstrates their ability to obtain traditional credit.

Finally, we explore the real effects of structured loan usage. By instrumenting the use of structured loans with the distance to the closest branch of the leading bank, we find that structured loan usage initially increases the likelihood for a politician to get re-elected. We also provide evidence suggesting that politicians using structured loans maintain initially lower local taxes, a political choice itself correlated with re-election. Local fiscal policy might therefore be the channel through which politicians attempt to signal their type.

Our empirical analysis relies on two proprietary datasets that contain detailed information on structured loan usage in France. Our first dataset contains the entire debt portfolio for a sample of the 300 largest French local governments as of the end of 2007. For each debt instrument, we observe the notional amount, maturity, type of product, underlying financial index, and lender identity. Structured debt amounts to EUR10.4 billion for this sample, out of EUR52 billion total debt. Our second dataset includes all of the structured transactions made by Dexia, the leading bank on the French market for local government loans, between 2000 and 2009. This dataset provides loan-level information, including the transaction date and the mark to market as of the end of 2009.[2] The data cover more than 2,700 local governments (see Appendix A for more information on local government types), for a total of EUR23.7 billion of outstanding structured loans. We complement the second dataset with detailed accounting data, election results, list of floods, mayor demographics, and GPS coordinates.

We perform probit regressions where the dependent variable is an indicator of the use of structured loans. To strengthen identification, we complement these correlation specifications with two distinct instrumental variable analyses. In the spirit of Morse (2011), we instrument indebtedness with the occurrence of floods, the most widespread type of natural catastrophe in France. We then instrument the propensity to use structured loans with the distance to the closest branch of the main lender, an important determinant of banking relationships (Degryse and Ongena, 2005). We also implement a difference-in-differences specification when analyzing the role of election timing.

Our paper relates to two main streams of the literature. First, our work complements studies of the political economy of finance, including political agency problems (Besley and Case, 1995), political incentives and credit (Rajan, 2010), their influence on financial decisions for local governments (Butler, Fauver, and Mortal (2009), Ang et al. (2014)), or on bank bailouts (Behn, Haselmann, Kick, and Vig, 2014). Because structured loans allow local governments to cosmetically reduce their immediate cost of debt, our work directly relates to the off-balance sheet borrowing of local governments, mainly through pension fund liabilities (Novy-Marx and Rauh, 2011). Similar to the sophisticated mortgage borrowers studied by Amromin et al. (2013), politicians may deliberately exploit certain characteristics of innovative financial products to their own advantage, regardless of the

[2]The mark-to-market corresponds to the market value of unwinding the derivative position.

long-term risks they impose on the taxpayer. Aneja et al. (2015) show that politicians can use financial instruments as a way to signal their commitment. Related to our findings on election timing, Dinc (2005) shows that government banks lend more in election years, while Bertrand et al. (2007) document that politicians influence CEOs to avoid layoffs prior to elections. Halling et al. (2016) document revenue transfers from government owned banks to local governments. We also complement findings on the economic effects of political uncertainty (Julio and Yook, 2012), with a public finance channel. Additionally, our study offers a non-bank set-up to consider collective moral hazard (Farhi and Tirole, 2012).

Second, our paper contributes to the recent challenges to the traditional role of financial innovation as improving risk sharing (Zingales, 2015; Shiller, 2013; Simsek, 2013; Célérier and Vallée, 2016), its associated risks (Gennaioli, Shleifer, and Vishny, 2012), and negative effects (Rajan, 2006).

2 Market Background

This section presents some background information on the market for structured loans and classifies them by their level of risk.

2.1 Structured Loan Design

In this study, a structured loan refers to a bank loan obtained by a local government, in which the interest rate formula differs from either a constant fixed rate, or a floating rate such as Libor + spread (referred to as "standard loans" throughout this study). Structured loans offer an initial period with a guaranteed low interest rate, which typically lasts between two and seven years. In a subsequent period, the interest rate follows a formula based on a given underlying financial index, for instance a foreign-exchange rate. The loan design embeds a sale of options on this underlying financial index by the borrower, meaning that the local government will pay a higher interest rate if the underlying reaches a certain threshold.

Figure 1 displays a snapshot from a structured loan contract that plots the interest rate the borrowers must pay as a function of the USDCHF exchange rate. Signed by both lender and borrower, this payoff diagram illustrates the profile resulting from the

transaction: a short position in options, which can lead the local government to pay more than 30% in annual interests for a 20-year loan.

[Insert Fig 1 here]

Appendix B provides a typology of the structured loans. In exchange for the risk it is taking, the borrower receives the option premium, which is subtracted from the interest cost. As with any short position in options, the risk of the transaction increases with its maturity, the volatility of the underlying index, the leverage in the interest rate formula, and the cap level.[3] Local governments are among the issuers that have the longest debt maturity, typically ranging from 15 to 30 years, which is a prerequisite for structuring products with several years of guaranteed low interest rates, and thus locking in interest cost through the next election cycle.

There are three main designs for obtaining a large option premium, thereby substantially decreasing the initial interest rate. First, the structured loan can be indexed to a highly volatile index, which increases the likelihood that the option strike will be met. Second, the formula can be levered, as in the *Steepener* example in Appendix B, which increases the size of the option sale. Third, the formula can rely on a carry-trade, for instance by creating a long position in a high-interest rate currency and a short one in a low-interest rate currency. Figure A1 breaks down the structured loan into both its components: the standard loan, and the sale of options. Some transactions consist only in the sale of options, and are marketed as structured swaps.

[Insert Fig A1 here]

2.2 Regulatory and Accounting Framework

French local governments are constrained in terms of financial assets as they are only allowed to invest in euro-denominated sovereign bonds. In contrast, on the liability side, their only constraint is that the notional of any derivative contract must match the one of an existing loan; and this requirement is met by design for structured loans. However, there is no constraint on the type of exposure, nor the leverage they can gain

[3]Structured loans generally do not possess any cap on the interest rate the borrower may face.

through derivative contracts. Additionally, local governments have no obligation to disclose derivative transactions, or to distinguish structured loans from standard loans in their financial statements, and typically keep this information private.

There are two aspects of French governmental accounting standards that are relevant to the development of the structured loan market. First, French local governments must comply with the *golden rule*: they are forbidden from borrowing to balance their operating budget. Loan proceeds can only be used for investment purposes. However, the cost of debt is considered as an operating expense: structured loans are therefore a way of balancing the budget without raising tax or cutting expenditures. Second, local governments do not mark to market derivatives in their financial statements. Only the interests that are paid during the accounting year are accounted for. This makes it challenging for taxpayers to identify the true cause behind a debt with an initial low interest rate. This also means that if the transaction evolves negatively for the local government, this will only appear after the initial period of guaranteed coupon. Anecdotal evidence suggests that the guaranteed period is often designed to cover the remaining length of the local politician's mandate.

2.3 Supply Side Characteristics

European local-government banking market consists of banks specialized in local governments, such as Dexia or Depfa, and European universal banks. As opposed to the US, European local governments rely only marginally on the bond market. The bank lending market offered them a low credit margin until the financial crisis: in 2007, the average credit spread for a bank loan to a French government was below 10 bps over Euribor.[4] Under Basel rules, local government loans are risk-weighted like central governments for regulatory capital purposes.[5] These loans were typically refinanced by banks at an even lower rate through covered bond issuances. Consistent with this appetite for local government credit, banks do not ask local governments to post collateral on structured loan transactions, despite the large exposure they generate. Collateral requirements, typically in place with corporate clients, would hinder structured transactions for local governments, as margin calls would be both costly to manage and visible to voters.

[4]Source: FCL 2007 French Local Government Survey.
[5]https://www.bis.org/publ/bcbs128b.pdf

Banks offer structured loans as part of their lending product menu. Though the market for structured loans is typically dominated by national players who have historical relationships (for instance Dexia in France, or Deutsche Bank in Germany), some of the universal banks are active across several European countries, such as Royal Bank of Scotland.

Anecdotal evidence suggests that structured loan transactions are highly profitable for banks, with markups embedded in the derivative part of around 5% of the loan notional. This markup comes in addition to the margin of the standard loan. Structured loans are however relatively less profitable for the bank than retail structured products, which developed in the same period.[6]

2.4 Risk Classification

Although structured loans all rely on the mechanism previously described (an implicit sale of options, the premium of which is subtracted from the initial interest rate), they exhibit diverse risk profiles. These profiles correspond to different magnitudes of initial reduction in interest rate: the riskier the product, the lower the interest rate during the initial subsidy period, and/or the longer this period. In this study, we rely on the risk classification established by the French Government following the first litigations, the so-called Gissler scale, to measure the risk of structured loans. For more details regarding the different types of structured loan, and the Gissler scale, see Appendix B.

We classify a structured product as high-risk if it scores 3 or higher on the Gissler scale. Given this definition, loans that are indexed to the slope of the yield curve, foreign interest rates, or to a foreign exchange rate are classified as high-risk. The latter are a more recent development of the market. Products that are linked to domestic interest rates or inflation are not considered high-risk and score below 3 on the Gissler scale.

This classification is based on loan characteristics at inception and is independent from the market conditions that prevail during the life of the product. A high-risk product may offer a low interest rate until its maturity *ex post*; nevertheless, the borrower enters into a risky transaction that can create large losses *ex ante*. Structured products that

[6]Although the magnitude of absolute markups is comparable, in the 3-5 % range (Henderson and Pearson, 2011; Célérier and Vallée, 2016), retail products maturity is much shorter, around five years on average, versus 15 years for structured loans.

are not classified as high-risk still bear significantly more risk than standard financing, as their nonlinear payoffs can trigger sudden and long-lasting increases in the cost of debt.

2.5 Litigations and Bail-outs

Starting in 2010, local governments have been unwilling or unable to pay the high interest rates resulting from the pre-set formulas, and 446 structured loans from Dexia alone have been challenged in courts before 2014. Court outcomes initially led to the cancellation of the structured loans that did not disclose an overall Annual Percentage Rate (APR) in their contract, but this decision was later repelled by the Higher Court of Justice in France.[7]

In this context, local governments had no choice but to pay the high interests, or unwind the position and pay the mark-to-market value. Thus, the city of Lyon paid 425 million euros of unwinding costs to unwind loans with a face value of 217 million euros.

However, a partial government bailout has been implemented since 2014, in the form of a 50% participation of the central government to these unwinding costs. This government subsidy is financed for half by a new tax on banks' systemic risk contributions. More than 600 local governments have benefited from this partial bailout as of 2016.[8] The amount allocated to the bailout fund has been increased from EUR1.5bn to EUR3bn at the beginning of 2015, which is significantly below the total estimated unwind cost, even before the Swiss National Bank episode. Because the main player in the market, Dexia, was nationalized during the financial crisis, the French government faced a trade-off between having only local taxpayers pay for the structured loan losses, or sharing the cost nationwide. It was eventually decided to split the cost equally.[9]

This specific context, as well as the fact that French local governments cannot legally default, might explain that banks were able to limit their losses, as opposed to other episodes involving local governments and derivatives, such as Jefferson County in the US (Bergstresser and Cohen, 2012), or the London Borough of Hammersmith and Fulham in the UK (Tickell, 1998).

[7]Source: `http://www.lesechos.fr/idees-debats/cercle/cercle-107127-emprunts-toxiques-le-coup-de-jar` `php`.

[8] Source: `http://proxy-pubminefi.diffusion.finances.gouv.fr/pub/document/18/20979.pdf`

[9]Dexia's bailout did not stem from its local government operations but from losses at its US subsidiary, the monoliner FSA, and from a large loan made to troubled DEPFA bank.

3 Hypotheses

We build on the theory of incentives, more specifically on the principal-agent model, to structure our empirical analysis of the political economy of financial innovation.

The principal-agent model (Jensen and Meckling, 1976) is one of the most influential frameworks in both economics and political science. Because voters' (the principal) and politicians' (the agent) interests do not necessarily align, agency costs frequently emerge in the political system. As the sovereign debt crisis in Europe illustrates, politicians may focus on getting re-elected at the expense of implementing sound budget decisions. Agency problems are amplified in specific environments, for instance when agent actions are not observable by the principal, or when the cost of current decisions can be shifted in the future. A financial innovation may be designed to fulfill these conditions.

Besley (2006) develops an agency model of politics, where incumbent politicians signal their type through their fiscal policy. In this framework, structured loans would allow incumbents from the bad type to imitate the actions of the ones from the good type by initially maintaining lower taxes. A good type politician maximizes voter welfare whereas a bad type politician maximizes rent, defined as the excess of tax revenue over expenditure in public goods.

Structured loans fit well into this theoretical framework because: (1) these transactions are undisclosed to voters and (2) their flexible payoff profile allows for easily shifting economically large cash-flows to the future and/or to certain states of nature with a relatively low probability. A parallel can be drawn with the reaching for yield phenomenon, where institutional investors improve the yield of their investments by increasing their risk on unobserved dimensions (Becker and Ivashina, 2015). We derive two sets of empirically testable hypotheses from the principal-agent framework.

The first set of hypotheses relate to which politicians are more likely to implement these innovative financial transactions. First, the incentive to shift costs to the future/to certain states of nature should be higher for politicians governing highly indebted entities, as the financial constraint is more likely to be currently binding and limit politicians' actions.[10] Second, the incentives for incumbents to implement such transactions should be higher when the coming elections are closely contested. Third, incumbent politicians

[10] Assuming voters do not understand or observe the transactions, politicians can also communicate on immediate budget improvements, which might be a salient topic.

should have higher incentives to implement structured loans prior to the election, when they are campaigning for reelection, as the budget is under higher scrutiny from voters and any tax hike or spending cut would be likely to negatively affect the campaign.

The second set of hypotheses cover the effects of implementing structured loans. First, implementing structured loans should help incumbent politicians achieve their goal: getting re-elected. Politicians who used structured loans should be more likely to stay in office, *ceteris paribus*. Second, when using structured loans, politicians should allocate the immediate cash flows from these transactions towards budget decisions that send a positive signal about their type, such as cutting tax.

4 Data

Our empirical analysis relies on two proprietary datasets that contain a wealth of information on local governments' structured loans, traditionally undisclosed to the public.

4.1 Local Government Level Debt Data (Dataset A)

We obtain our first dataset, which covers 293 French local governments, from a leading European financial consulting firm for local governments. These data come from the firm's annual survey on local government debt management in France. This dataset contains the entire debt portfolio as of year-end 2007, including standard loans, structured loans and swaps, broken down by type of borrowing instruments, for nearly all of the largest local governments: French regions (25 out of 27) and French Counties (96 out of 100) as well as the largest cities (96) and intercity associations (76). Collectively, these local governments have a total debt of EUR52 billion, or 38.2% of the total debt of all French local governments, which includes EUR10 billion of structured debt, or a third of the total outstanding amount in France as estimated by the French Congress.

Dataset A exhibits three main strengths for the purpose of our analysis. First, it covers all the structured loans implemented by a given local government, regardless of the bank acting as a counterparty. Second, it provides us with detailed data on the whole debt portfolio, not only on its structured loan component. Third, the sample is focused on the largest local governments, which offers a large scope in euro terms (38% of total debt of French local governments). Conversely, this data come with some limitations.

The structure of the dataset is a single cross-section of outstanding debt and does not provide transaction dates. As a result, it prevents us from conducting any panel analysis. Additionally, the anonymous nature of this dataset hinders us from matching it with variables in addition to what was initially provided to us.

4.2 Loan Level Data on Structured Transactions (Dataset B)

Our second dataset contains loan level data for all structured loan transactions implemented with Dexia, the largest lender in this market, between 2000 and 2009. This second dataset is almost ten times larger than the first, as Dexia represents more than 70% of the market for public sector-structured loans (French National Assembly, 2011). The French newspaper *Libération* posted these confidential risk-management data on its website following an internal leak from the bank. This dataset contains 2,741 different public sector entities: 16 regions (vs. 25 in dataset A); 66 counties (vs. 96); 539 intercities (vs. 76); 1,588 municipalities (vs. 96); 288 hospitals (vs. zero); 115 social housing entities (vs. zero); and 129 other borrowers, including airports, harbors, chambers of commerce, healthcare cooperatives, public-private joint ventures, schools, research institutes, nursing homes, fair organizers, and charities. The local governments in our sample vary significantly in terms of size; for instance, 37 cities have fewer than 1,000 inhabitants, and 29 cities have more than 100,000 inhabitants.[11]

The data also include information on trade inception dates, allowing us to build a panel to conduct time-series analysis.

The main strengths of Dataset B are (1) the transaction-level and panel nature of the dataset, (2) the presence of unique variables such as mark-to-market value, and (3) a unique identifier (INSEE code) that permits to complement the dataset with accounting data for all local governments. Its main limitation is that these data cover structured loans from Dexia only, and should therefore be considered as a lower bound of structured loan activity, both in terms of intensive margin and extensive margin. However, the fact that Dexia represents more than 70% of the market, and that 40% of the residual can be identified in dataset A mitigates this concern.

[11] There are more than 36,000 municipalities in France, the majority having less than 500 inhabitants.

4.3 Complementary Datasets

We complement the previous structured loan data with five types of data: detailed accounting data, election results, mayor demographics, the list of floods in France, and GPS coordinates.[12] The accounting data, provided by the French Ministry of the Interior, include the highest level of detail possible for balance sheet and income statement, at an annual frequency for the period 2002-2012. These accounting data are under French governmental accounting standards. The dataset on election results, provided by the Center for Socio-Political Data (CDSP), includes the votes obtained by each political party during French municipal elections going back up to 1983. The sample covers all municipalities with more than 9,000 inhabitants. The third complementary dataset includes information on age, gender, political affiliation, and professional occupation for all the mayors in France since 2001. These data are collected by the French Ministry of the Interior and constitute the *Registre National des Elus*. We collect the list of floods, by municipality, from the Ministerial Decrees on natural catastrophes in France.[13] Floods are the most frequent type of natural disaster in France. These data are cleanly matched with the other datasets using municipalities' unique identifier, *INSEE code*. GPS coordinates for municipalities and Dexia branches allow us to calculate distances as the crow flies for the purpose of our instrumental variable analysis.

5 Structured Loan Adoption and *Ex Post* Losses

5.1 Extent of the Structured Loan Phenomenon

Panel A of Table 1 provides summary statistics on the debt profile of the local governments from the sample of dataset A, which are the 300 largest local governments in France.

[Insert Table 1 here]

Funding is achieved through the following channels: standard bank loans, structured loans, revolving facilities, and bonds. Structured debt represents a significant share of the total debt of local governments, accounting for 20.1% of all outstanding debt and being

[12] Dataset A being anonymized, we only match these data to dataset B.
[13] The complete list of floods is available at: http://macommune.prim.net/gaspar.

used by more than 72% of the local governments in our sample from dataset A. The fraction of structured debt varies extensively across local governments, with some local governments borrowing almost exclusively through this channel. Within the structured debt component, we also examine the specific amount of high-risk structured loans, as defined in the previous section.[14] Overall, high-risk structured loans represent 8.4% of total debt in our sample, and are used by 43% of the local governments. Again, there is significant heterogeneity among local governments in their use, with some governments having up to 71.7% of their total debt consisting of high-risk structured loans.

Panel B of Table 1 provides summary statistics for dataset B, which comprises 2,741 structured loan users.[15] By construction, every local government in this subset uses at least one structured loan, for a total amount of EUR23 billion, or more than three quarters of the total amount estimated by the French National Assembly. Among these, more than EUR13 billion of structured loans are considered high-risk under our classification. The average number of structured transactions is approximately two, but 163 entities have more than five structured loans in their debt portfolio. Dataset B also contains information on the mark-to-market of transactions as of the end of 2009. The mark-to-market is negative for local governments in 92% of the cases.

The aggregated number of transactions per semester are plotted in Figure 2. We observe the rapid development of the market followed by a sharp contraction after 2007. This figure also exhibits the evolution of the composition of the transactions implemented: high-risk structured loans, as defined in the previous section, become more and more prevalent over time.

[Insert Figure 2 here]

5.2 *Ex Post* Losses

The financial crisis brought a spike of volatility in all financial markets, which led to large negative mark-to-market on structured loans, and in many cases caused the interest rates

[14] See Table A1 in Appendix D for the breakdown of Table 1 by type of local government, and by type of structured product. The most popular products are those linked to domestic interest rates, which account for nearly half of the outstanding structured debt (47.7%). Other underlying indices (sorted by decreasing popularity) include the interest rate curve slope (26.8%), foreign exchange (14.8%), inflation (3.4%), and foreign interest rates (2.4%).

[15] The number of observations is lower for total debt because dataset B has to be matched with accounting data, which are not available for certain types of local governments.

to jump to double-digit levels. Although our data do not allow us to precisely calculate the interest paid for our full sample, we are able to do so for a sample of 49 structured loans whose precise term sheet is available on a political website.[16] Figure 3 plots the interest rate charged on these structured loans, and illustrates how some exceeded 50%. Red dots represent the time when a loan becomes subject to a litigation.

[Insert Figure 3 and Table 2 here]

On the other hand, our dataset provides us with bank estimates of the mark-to-market values of the transactions as of year-end 2009, which are summarized in Table 2. Within the decile of local governments that use structured loans the most, losses represent 301 euros per inhabitant or 62% of yearly tax revenues. These losses are even larger for local governments that use high-risk structured loans, and foreign exchange linked structured loans, for which these numbers are respectively 615 and 873 euros of losses per inhabitant, and 116% and 222% of their yearly tax revenues to unwind the positions. Compared to when the mark-to-market values were computed (December 2009), the Swiss Franc strengthened by 30% with respect to the Euro. Assuming a linear relationship between the EURCHF evolution and the mark-to-market, the current unwind costs of these positions should be four times larger at today's rate (July 2016).

Having documented that the structured loan phenomenon has created significant *ex post* losses, we now turn to the cross-section of structured loan usage to investigate whether it is consistent with our predictions from the principal-agent framework.

6 Structured Loan Usage and Politician Incentives

6.1 Indebtedness and Structured Loan Usage

Figure 4 provides an initial overview of the popularity of structured loans by quartiles of indebtedness for the local governments in Dataset A. The figure shows unconditional statistics that suggest that highly indebted local governments use structured loans more frequently and to a larger extent. The economic magnitude is particularly large: local governments from the last quartile of indebtedness are more than twice as likely to implement structured loans as entities from the first quartile of indebtedness.

[16] `http://emprunttoxique.info`

[Insert Figure 4 here]

We extend the analysis in Table 3 and run several probit regressions on the use of structured loans by local governments based on Dataset A. The dependent variable is an indicator variable on the local government having some structured products in its debt portfolio in column 1, and on having high-risk structured loans in column 2. Columns 3 and 4 correspond to tobit regressions where the dependent variables are the share of structured loans and the share of high-risk structured loans, as a percentage of the local government's total debt.[17] For each specification, we include a large set of control variables: debt per inhabitant, equipment expenditure per inhabitant, share of wages in operating expenditure, log(population), average debt maturity, lender fixed effects, and local government type fixed effects (regions, counties, intercities, and cities).[18] We cluster standard errors by local government types, as for instance municipality and region budget structures differ. Finally, columns 5 and 6 replicate columns 1 and 2 on dataset B, and provide consistent results.

[Insert Table 3 here]

All these specifications confirm that a higher level of debt is associated with a higher propensity for, and a larger magnitude of, structured loan usage. All coefficients on the debt over population ratio are positive and highly statistically significant. This robust correlation is consistent with the existence of greater incentives for highly indebted local governments to shift the actual cost of debt to certain future states of nature, likely due to a closer monitoring of their debt. An alternative explanation for this empirical result would be that indebted local governments turn to structured loans as last-resort financing when other means of financing are unavailable to them, following a pecking order. However, the empirical evidence described in Section 7 is inconsistent with this alternative hypothesis.

To strengthen the case for a causal relationship between the level of indebtedness and the propensity to use local governments, we conduct two complementary analyses: we

[17] We use tobit models left-censored at zero and right-censored at one, as the fraction of the total debt of a borrower that is in structured loans lies mechanically between zero and one (Wooldridge, 2002).

[18] Debt average maturity provides us with an important control, as structured loans require long-maturity debt (recall that these loans rely on an implicit sale of options). However, the results are robust when not including this control.

first instrument the level of debt by the occurrence of local floods, and we then implement a placebo analysis where we test the relationship between indebtedness and other types of borrowing instrument.

Instrumenting Indebtedness with Floods

An abundant literature uses natural disasters as a source of exogenous variation, for instance as a shock to school placement (Imberman, Kugler, and Sacerdote, 2012), personal spending (Morse, 2011), risk salience (Dessaint and Matray, 2016), and supplier-client networks (Barrot and Sauvagnat, 2016). We rely on this literature and focus on the most frequent type of natural disaster in France: floods. These catastrophes generate significant damages to local public infrastructures, which in turn generate costs to local governments. We therefore hypothesize that floods will be positively correlated with indebtedness. Floods, by their exogenous nature, should however be orthogonal to other potential drivers of structured loans usage, which ensures the absence of exclusion restriction violations. Floods are frequent enough in France to address concerns over statistical power and external validity: around one third of French municipalities witnessed at least one flood episode during the 2000-2010 decade.

We define as *affected*, municipalities that encountered at least one flood during the period 2002-2008. We then regress debt per inhabitant on the *Floods* indicator variable, which takes value one if the municipality has had a flood during the 2002-2008 period, and zero otherwise. We control for county fixed effects, as some zones are more likely to be affected due to their geography.

Column 1 in Table A4 shows that affected municipalities have on average more debt than non-affected ones, which is likely to come from the damages floods generate. Columns 2 and 3 display the results of the instrumental variable analysis. We find that an exogenous increase in indebtedness is associated with a higher likelihood of using structured loans. Coefficients in the second stage of the instrumental variable analysis are larger than in the simple probit from Table 3, which suggests that potential sources of endogeneity are biasing against the positive correlation we document. Our instrument passes the strength test of Stock and Yogo (2005), as the first stage exhibits a F-statistics of 22, to compare with a relevant threshold of 16.

[Insert Table A4 here]

To rule out any mechanical effects driving our initial correlation result, we also conduct a placebo analysis. We replicate columns 1 and 2 of Table 3 on dataset A, using indicator variables for using revolving loans, bonds, and floating rate loans as dependent variables. Results are presented in Table A2 of Appendix D. We do not find any positive correlation between the level of indebtedness and the likelihood of using these other types of funding instrument. Our result on structured loan usage is therefore unlikely to come from a specification artifact.

6.2 Politically Contested Areas and Structured Loan Usage

We test whether local governments with a less established party are implementing more structured loan transactions than political strongholds. For all municipalities with more than 9,000 inhabitants, for which past elections results are available since 1983, we proxy political strongholds with an indicator variable equal to one if the governing party during the development of the structured loan market has been in power for more than 12 years. We also conduct robustness checks with the number of years for which the party of the incumbent mayor has been in power before the 2001 election, the number of political swings during the period 1983-2001, and an indicator variable equal to one if the margin of victory was below 5% in the 2001 election.[19] We conduct probit regressions on the use of structured loans, using our stronghold indicator variable as an explanatory variable. We include the usual controls.

[Insert Table 5 here]

The results in Table 5 provide supportive evidence for a positive effect of political contestation on the use of structured loans. Strongholds are significantly less likely to implement structured loans. When calculating the marginal probability effect, we find that incumbents from politically contested municipalities are 8% more likely to implement structured loans, which is sizable when compared to the average participation of 56% for this subsample. This result is robust to our alternative measures of political stability. The longer a political party has been uninterruptedly in power when the structured loan market develops, the less likely it is that its politicians use structured loans. The more political swings there has been in a given area before the development of the market,

[19] All these measures are built with data anterior to the development of structured loans.

the more likely it is that structured loans are used. When the preceding election is won by a tight margin, politicians are also more likely to implement such transactions. These findings provide robust evidence that politicians with relatively more challenging re-elections are more likely to enter into risky transactions.

6.3 Election Timing and Structured Loan Usage

We use a difference-in-differences approach to test whether local governments engage more frequently in structured loans in the period prior to an election, which coincides with their re-election campaign. We compare a treatment group that includes counties, municipalities, and intercities that held elections at the end of 2008Q1, with a control group consisting of regions, whose elections were in 2004 and 2010, and public entities with no elections (e.g., hospitals and social housing entities). The governing teams of the entities from the treatment group are chosen simultaneously following the same election cycle. Those from the control group are either chosen at a different time, or have management renewals according to idiosyncratic timing. Hospitals and social housing entities are state-owned in France, with processes and statuses very similar to local governments: these entities fulfill a public service while having a budget independent from the central state. Both groups are typically covered by the same department in banks and consulting firms. We use panel conditional logit regressions in a difference-in-differences setup, as is appropriate to account for individual fixed effects (Wooldridge, 2002). We examine the likelihood of implementing a structured transaction in a given quarter before and after the election (for periods of 12 and 18 months before and after the election) for both groups, controlling for quarter fixed effects. The exact model specification is as follows:

$$\Pr(Transaction_{i,t}) = Q_t + \alpha_i + \beta \times I_{\{Treatment\ Group\ =\ 1\ \cap\ Pre\ Treatment\ =\ 1\}} + \varepsilon_{i,t} \qquad (1)$$

where the dependent variable is the probability that local government i conducts a transaction in quarter t, Q_t are the time fixed effects for each quarter, α_i are individual fixed effects, and the $I_{\{Treatment\ Group\ =\ 1\ \cap\ Pre\ Treatment\ =\ 1\}}$ variable is an interaction term between an indicator variable that is equal to one if local government i is in the treatment group and an indicator variable that is equal to one if quarter t is before the election. Results are shown in Table 6.

[Insert Table 6 here]

When comparing to the control group with no elections in 2008, we observe that local governments in the treatment group are significantly more likely to implement structured transactions in the period preceding the election than in the period following it. When calculating the marginal probability effect, we find that politicians are 10% more likely to implement structured loans before an election than after. The results are robust to the time window under consideration, and cannot be explained by a downward trend in the market, due to the identification strategy. We also conduct a placebo analysis in which we randomly select a sample of the same size as our initial treatment group and use it for the interaction term. The coefficients obtained are much lower in magnitude and not significantly different from zero, which is consistent with our previous result being driven by the election cycle. To further ensure robustness, we replicate both analyses in panel B, using OLS instead of conditional logit as a regression model. Results are unchanged.

7 Alternative Explanations

In this section, we consider four additional and non mutually-exclusive mechanisms for explaining politicians' implementations of structured loans.

7.1 Financial Literacy

In this subsection, we consider the hypothesis that the structured loan market developed due to the exploitation by banks of a lack of financial sophistication from local government politicians.[20] We find two stylized facts that are hard to reconcile with this view: politicians whose profession requires higher education are more inclined to use structured loans than politicians from less educated backgrounds, and this effect is even stronger for high-risk structured loans. Larger cities, which have access to more resources such as financial consultants, are more likely to use both structured and high-risk structured loans than smaller cities.

Local politicians have been vocal *ex post* both in the media and in French Congress about their lack of understanding of the risks embedded in the structured loan trans-

[20] Although some aspects of the debt management can be delegated to a civil servant, important decisions such as loan issuances typically require a signature from the highest ranked elected representative.

actions they implemented. For instance, in his testimony before the French Congress' committee on structured loans, the deputy mayor of the city of Saint Etienne, who originally decided to take on some structured loans, stated that *"[he] was not able to read the information [he] received because [he was] not a financial expert"*. To assess the role of financial sophistication on the use of structured debt, we estimate probit models where the dependent variable takes a value of one if the local government made use of structured debt during our sample period on proxies for financial sophistication.

We use mayor's current or former occupation, age on election date, and education level as explanatory variables. These variables are known to be correlated with financial sophistication (Lusardi and Mitchell, 2011). As politicians in larger local governments are likely to benefit from more resources and support from specialized staff and advisors, we include a series of indicator variables for several size brackets. We therefore compare municipalities of the same size, but with mayors of different background. Table 7 provides the coefficients of probit regressions where the dependent variable is an indicator variable for the use of structured loans in columns 1, 3, and 5, and for the use of high-risk structured loans in columns 2, 4, and 6. We observe that the likelihood to use structured loans significantly increases with local government size, and decreases with mayor age. Mayors from more educated backgrounds are more likely to use structured loans than the others. The six occupations that are associated with the highest point estimates are, in decreasing order, senior civil servants ("haut-fonctionnaires"), politicians, executives, regulated profession (doctors, lawyers), engineers, and A-level civil servants. We conduct a more precise test in columns 5 and 6: when restricting the sample to mayors who are public servants, for whom we can precisely infer their education level, we find that more educated mayors are more likely to have implemented structured transactions.

Overall, these results are hard to reconcile with the hypothesis that the development of this market is due to banks exploiting politicians' lack of financial sophistication.

[Insert Table 7 here]

7.2 Hedging

Under the assumption that these contracts are fairly priced, structured loans may create value if they provide positive cash flows at times when revenues are low and external

financing is costly to obtain (Froot et al., 1993). Anecdotal evidence provided by Figure 3 does not support this hedging motive for structured loans: the interest rates of FX-linked structured loans increase dramatically during the recent financial crisis, which coincides with more challenging credit market for local governments, and lower tax revenues.

We complement this anecdotal evidence with a formal correlation analysis between French local government revenues and the different underlying financial indices used in structured loans: Euribor 3 months, Swap Rate 10Y - Swap Rate 2Y, EURCHF, and EURUSD. Our analysis covers revenues of all French regions, counties, and the 100 largest cities, for the 1999-2010 period. Overall, we find little to no correlation between revenues and financial indices (results are available in Table A5 in Appendix D). We also run a pooled regression of the change in operating revenues for all local governments on the change in the financial indices used to structure the loans while controlling for inflation. The estimated parameters that are associated with the financial indices also remain insignificant. This finding is inconsistent with a Froot et al. (1993) view of hedging, but is consistent with empirical evidence of corporations using so-called hedging policies to make directional bets (Baker, Ruback, and Wurgler, 2005).

7.3 Investment Strategy on Behalf of Taxpayers

An alternative view to the political agency framework for the development of the structured loan market is that local governments are implementing an investment strategy on behalf of their taxpayers. Issuing structured loans leads them to sell deeply out of the money put options on financial indices, which have been shown to yield high Sharpe ratios. Even though *ex post* this strategy appears to have created large losses, it might be *ex ante* beneficial to taxpayers to do so. This view is however hard to reconcile with both the data and the institutional details of the market. First, there is no clear competitive advantage for the local government to be implementing this investment strategy, and not the households themselves, who may tailor the option sale to their own financial situation. Second, under this view, local politicians should be publicizing their transactions, and not keep them private, as they typically do. Third, this view yields an opposite prediction to the political agency framework: the most indebted local governments should be doing less of these transactions, as they already bear significant financial risk. Empirically we find

that the most indebted local governments are more likely to be implementing structured loan transactions. Fourth, even though the sale of puts can be value enhancing, local governments should not concentrate their risk on a limited set of exposures, which we observe in the data. For instance, 33 of the top 300 local governments have more than 20% of their debt exposed to a single exposure. As an investor, local governments should also not take on an amount of risk they cannot bear, whereas our *ex post* losses analysis shows that many local governments are not in a position to absorb the losses they are incurring.

7.4 Access to Liquidity

Another alternative explanation for the development of the structured-loan market is that banks propose only these products to certain local governments, which therefore face no other way to obtain credit. There are however two facts in our data that are hard to reconcile with this view. First, 106 out of the 293 local governments in dataset A use structured swaps, which embed a sale of options, but do not provide principal funding. These local governments are therefore able to obtain standard loans, which they subsequently use as the underlying loan for a structured swap transaction. Second, we observe in dataset A highly indebted local governments that have debt composed of standard loans only, suggesting that even financially distressed local governments have access to standard financing during our sample period. Standard loans also offer very low credit margin (below 10bps on average) during our sample period, which is consistent with the large supply of credit for local governments.

7.5 Coordination between Politicians

Coordination between local government politicians might amplify the adoption of innovative financial instruments, all the more so as local government members and civil servants belong to strong local and political networks, and as structured transactions typically remain private. We find empirical evidence suggestive of coordination, namely geographic local correlation on the adoption of the innovative products we study, which may come from collective moral hazard or herding.

We use a panel conditional logit model to estimate the effect of the number of active

neighbors of a local government on its likelihood of entering into a similar trade in the current period. The model specification is as follows:

$$\Pr(Transaction_{i,t}) = Q_t + \alpha_i + \beta \times \sum_{k \in J(i)} I_{k,t-1,\{Active\,=\,1\}} + \varepsilon_{i,t} \tag{2}$$

where the explained variable is the probability that local government i conducts a transaction in quarter t, Q_t are quarterly fixed effects, α_i are individual fixed effects, $J(i)$ is the set of local governments from the same county as local government i, and $I_{k,t-1,\{Active\,=\,1\}}$ is an indicator variable that is equal to one if local government k was active in quarter $t-1$. In the OLS specification, the left-hand-side variable is replaced by the aggregated notional amount of transactions implemented by local government i in quarter t.

Table A6 in the appendix displays the conditional logit regression coefficients. The coefficients on the number of active local governments is positive and statistically significant. The likelihood to enter into structured debt transactions appears therefore to increase with the number of active neighbors in the previous period. Having one or more neighboring local governments implement a structured loan during the previous quarter raises by 8% the likelihood for a given government to do so in a given quarter. This result cannot be caused by a time trend as we use quarter fixed effects.

Politicians might coordinate to decrease their reputation costs in case the transactions go wrong (Scharfstein and Stein, 1990), or to increase the likelihood of a bailout by the central government, which would represent a form of collective moral hazard, as rationalized in Farhi and Tirole (2012). Alternatively, the local correlation can also stem from a purely behavioral herding, where politicians are intrigued or reassured by other politicians following the same strategy.

8 The Real Effects of Structured Loan Usage

We explore the effects of using structured loans on both electoral outcomes and budget decisions by instrumenting the use of structured loans with the geographic distance to the closest Dexia branch. Controlling for potential sources of endogeneity, we find that structured loan usage is associated with a higher likelihood of being re-elected, and with

lower taxes.

For comparison purposes, we first run a probit regression on being re-elected, using an indicator variable for using structured loans as the main explanatory variable. Results are presented in column 1 of Table 8. We do not find a significant relationship between using structured loans and the likelihood of being re-elected. We also find in column 2 that politicians using structured loans increased relatively more local taxes.

These two coefficients should however be considered as subject to strong selection effects. As described in the previous sections, the decision to enter into structured loan transactions is indeed highly correlated with variables that are likely to affect both electoral outcomes and budget decisions. For instance, the selection effect on financially constrained local governments may bias against being re-elected, and in favor of increasing taxes.

Adequately measuring the effects of using structured loans therefore calls again for an instrumental variable analysis.

8.1 First Stage

We instrument the propensity to use structured loans with the geographic distance of the local government to the closest Dexia branch, as the crow flies. Geographic distance has been established as an important determinant of lending activity (Degryse and Ongena, 2005). More specifically, Bharath et al. (2011) also instrument lending relationship with distance. The list of Dexia branches is provided in Appendix C, and roughly corresponds to the list of French regional capitals.[21]

In the first stage, we test whether distance to Dexia branches is correlated with structured loan usage, and whether the previously documented effect of distance on lending also holds for structured loans. We regress with a probit model the propensity to use structured loans on the distance to the closest Dexia branch, controlling for the main determinants of structured loan usage, such as population and indebtedness.[22] Results

[21]There are no branch openings or closings during our sample period, which limits concerns over endogenous entries or exits. One limitation of the instrument, however, is that distance to the closest branch is partially correlated with being in a rural area. We mitigate this concern by controlling for population categories in the first stage. Although, for the same level of population, being in a rural area can affect the *level* of budget items and the political color of a municipality, it is more difficult to link it to the evolution of budget items, and to *changes* in political color.

[22]Since the dependent variable in the first stage is a binary variable, we follow the same methodology

are shown in columns 3 of Table 8. The negative relationship between distance to branch and propensity to implement structured loans appear both statistically significant and robust to a battery of controls.

[Insert Table 8 here]

8.2 Second Stage

Using the instrument described in the previous subsection, we can now test whether using structured loans indeed helps local politicians get re-elected. We run the following regression:

$$\Pr(re-election_i) = \alpha + \beta \times I_{StructuredLoan_i(Instrumented)} + \gamma \times X_i + \epsilon_i \qquad (3)$$

where $re-election_i$ is an indicator variable for having the same political party stay in power after the 2008 municipal election, $I_{StructuredLoan_i(Instrumented)}$ is the instrumented variable obtained in the first stage, and X_i is a set of controls. Column 4 of Table 8 presents the results. We observe that the quasi-exogenous increase in the propensity of using structured loans is associated with an increase in the likelihood of having the same party re-elected. The coefficient on the instrumented indicator variable for structured loan usage is positive and statistically significant. This result is robust to a battery of controls, and represents evidence consistent with structured loans helping politicians get re-elected in the short-run.

Another test made possible by the use of the instrumental variable analysis is to assess whether using structured loans has an impact on tax policy. As structured loans provide immediate savings, we specifically test the hypotheses regarding the allocation of these cash flows: whether their usage allowed politicians to decrease local taxes. We run an OLS regression with the following difference specification, which implicitly controls for local government fixed effects in column 5 of Table 8:

$$\Delta(Tax_i)_{2002-2007} = \alpha + \beta \times I_{StructuredLoan_i(Instrumented)} + \gamma \times X_i + \epsilon_i \qquad (4)$$

as in Faulkender and Petersen (2006). Wooldridge (2002) shows that this approach yields consistent coefficients and correct standard errors. We restrict our sample to municipalities to maximize comparability.

where $\Delta(Tax_i)_{2002-2007}$ corresponds to the difference between the beginning and the end of the political mandate for municipalities. We find that the coefficient on the indicator variable for structured loan use is negative and statistically significant. This result suggests that politicians use the short term savings provided by structured loans to relatively decrease the amount of tax per inhabitant.[23] This action is consistent with politicians seeking re-election by catering to taxpayers' preference for low taxes, which represents a likely channel for the previous re-election result.

8.3 Discussion

To better assess these results, we conduct two complementary analyses whose detailed results are displayed in the online appendix. First, we regress the re-election indicator variable on tax evolution, to test whether reducing tax is associated with a higher likelihood of being re-elected. We find that maintaining lower taxes is associated with a higher likelihood of being re-elected, which suggests that tax policy might indeed be the channel through which structured loans help incumbents being re-elected.

Second, we separately replicate Table 8, substituting to the indicator variable for structured loan usage: (1) an indicator variable for high-risk structured loan usage and (2) an indicator variable for exclusively non-high-risk structured loan usage. We find that in the instrumental variable analysis, high-risk structured loans are associated with an even larger decrease in tax, which is consistent with the larger subsidy they initially provide. In the OLS setting, selection and treatment effects appear to cancel out, as high-risk structured loan usage is not associated with a higher likelihood of being re-elected. On the other hand, non-high-risk structured loans have a lower impact on tax, but appear to be associated with a similarly higher likelihood of incumbent re-election. Selection effects appear to be weaker for these loans, as their usage is associated with a higher likelihood of re-election in the OLS setting.

[23] As the amount of tax per inhabitant is structurally increasing during the period, this coefficient means that local governments using structured loans have less increased their tax over the period.

9 Conclusion

In this paper, we present evidence consistent with financial innovation acting as an amplifier of principal-agent problems in the political system. We find that most local politicians implemented structured-loan transactions, as these types of loans account for a surprisingly high 20% of their total outstanding debt. We find that such loans are utilized significantly more frequently within local governments that are highly indebted, which is consistent with their greater incentives to shift interest payments to the future. Incumbent politicians from politically contested areas are also more likely to use structured debts, and transactions are more frequent before elections than after elections. We finally show that using structured loans helps politicians get re-elected, and allows them to maintain lower local tax for their voters.

During the subprime crisis, securitization facilitated a political agenda of easy access to home ownership in the US. Similarly, we show that financial institutions in Europe designed financial securities fitting politicians' agenda.

Our results convey potential regulatory implications. Rather than banning structured loans, we suggest imposing strict public disclosure requirements on transactions by local governments to increase reputation risk and facilitate monitoring by voters, which has been proven to be efficient (Ferraz and Finan, 2008). Furthermore, changing public accounting standards to account for mark-to-market losses and gains should curb the incentives by increasing transparency, as observed in comparable markets (Jenter, Lewellen, and Warner, 2011). Such changes would limit the use of structured loans while maintaining the autonomy of local governments in terms of financial decisions. However, the greatest risk of structured loans likely lies in outstanding transactions and the resulting losses. The recent bailout of structured loan users answers only partially to this challenge.

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10 Figures

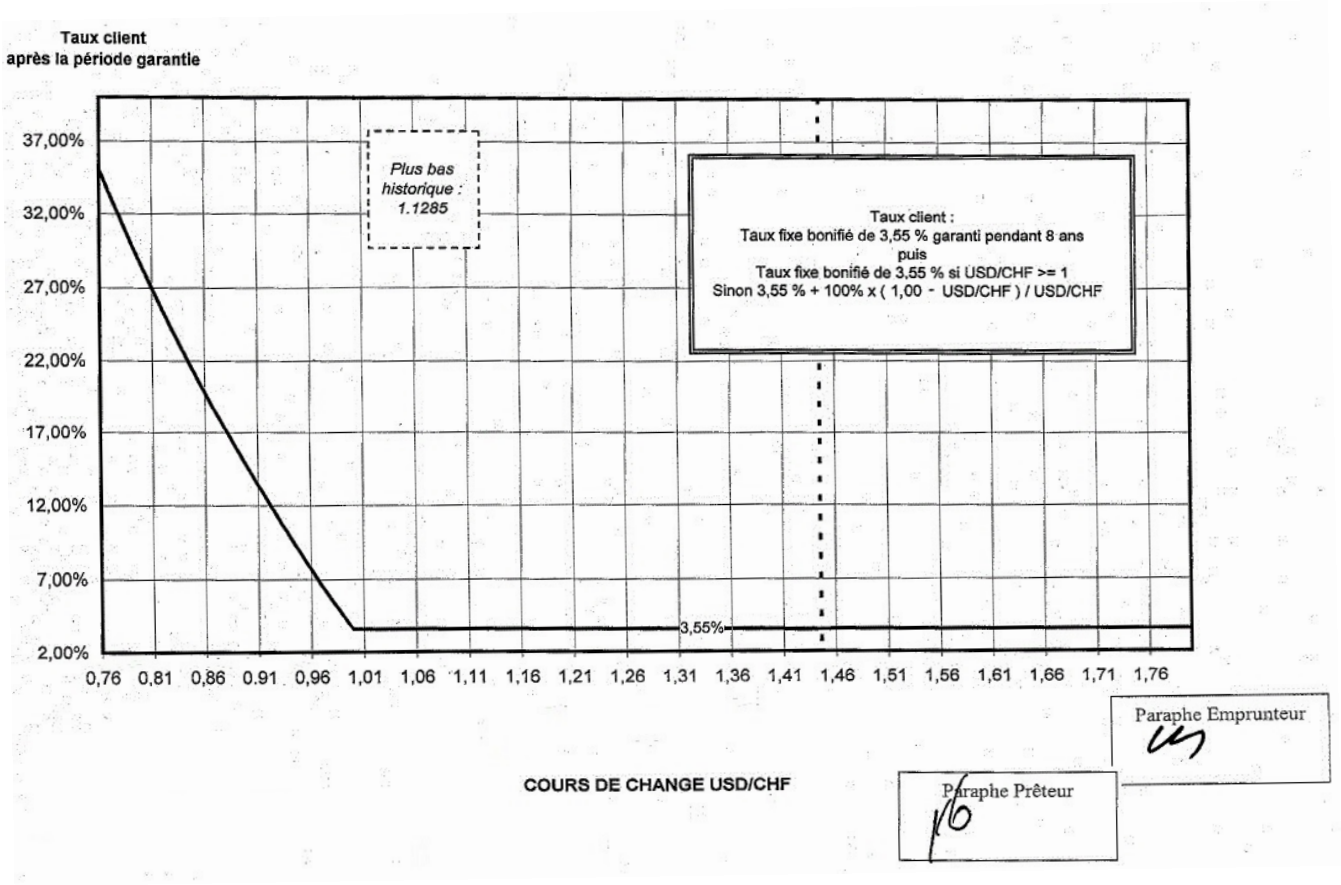


Figure 1: Interest Rate Scenarios

Note: This figure represents the interest rate to be paid on a structured loan (y-axis) as a function of the USDCHF exchange rate (x-axis). The figure is extracted from an actual structured loan contract, and is signed by both borrower (*Emprunteur*) and lender (*Preteur*). The vertical dotted line located at USDCHF = 1.44 denotes the exchange rate when the contract was originally signed. As mentioned in the graph, the lowest historical level of the USDCHF exchange rate was 1.1285.

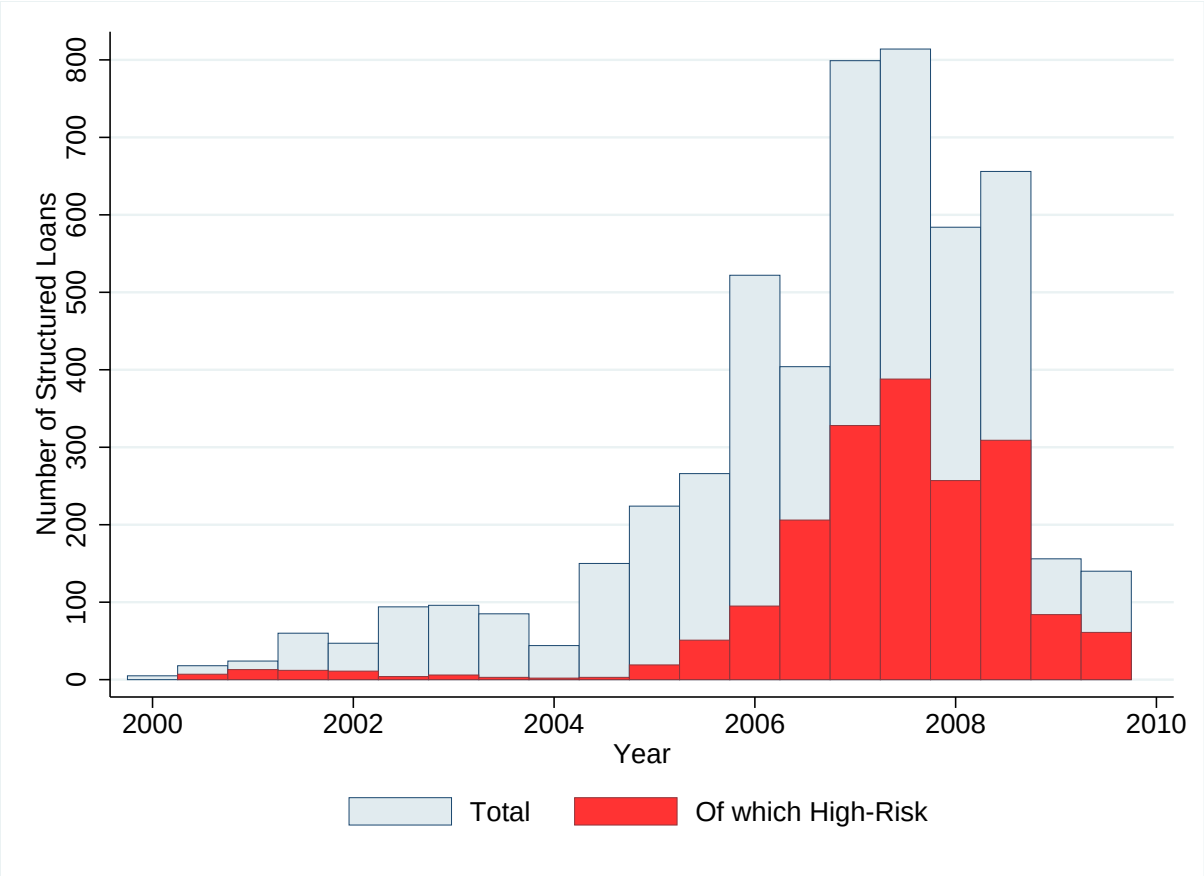


Figure 2: Number of Structured Debt Transactions per Semester

Note: This figure displays the number of structured loans initiated during a given semester by local governments in France for the 2000-2009 period. The data are obtained from Dexia's client portfolio (Dataset B). High-risk structured loans include structured loans indexed to the slope of the interest curve and to foreign exchange rates.

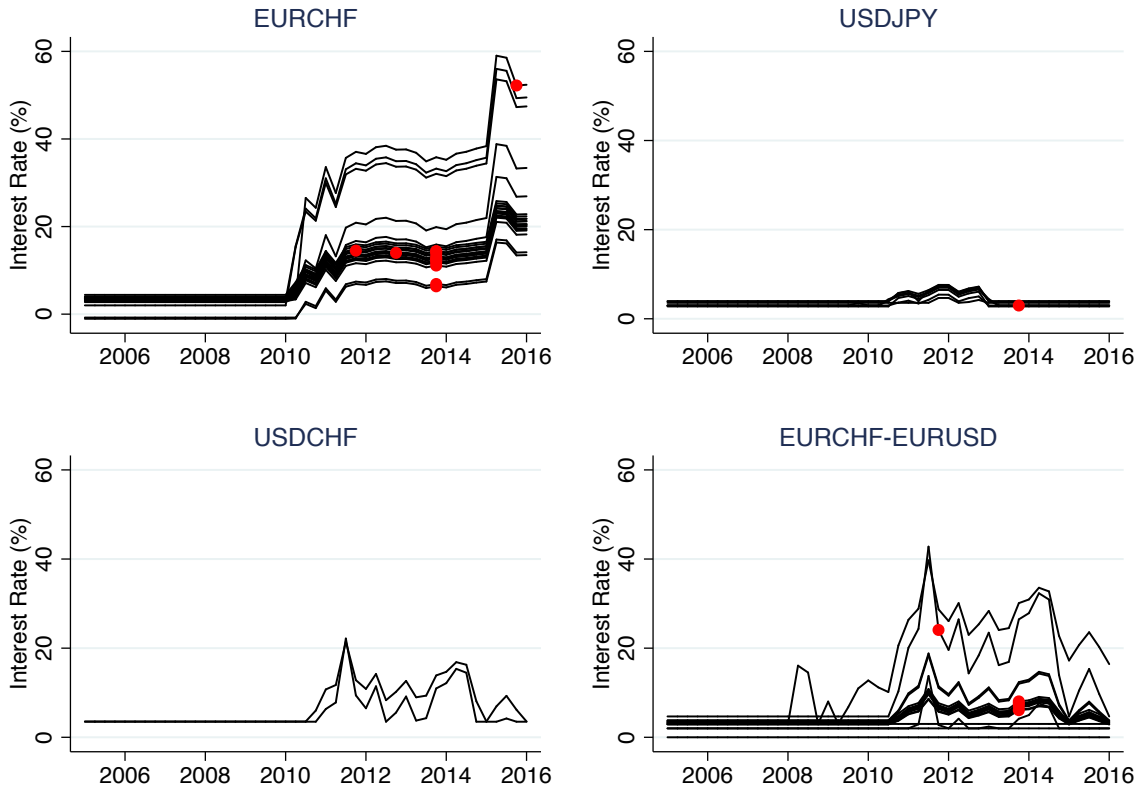
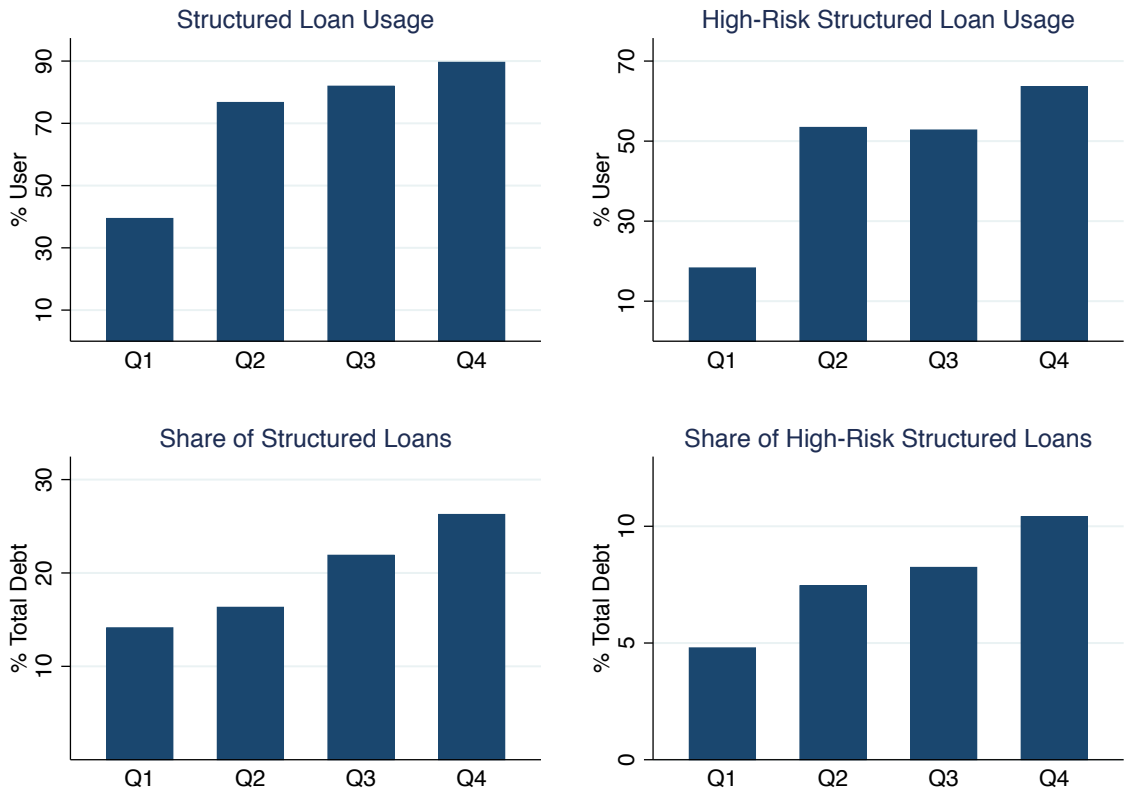


Figure 3: Interest Rate Charged on FX-Linked Structured Loans

Note: This figure displays the interest rate to be paid on a sample of 49 FX-linked structured loans. Red dots represent the time when a loan becomes subject to a court litigation. Structured loans term sheets are from `www.empruntstoxiques.info`.

Figure 4: Structured Loan Usage and Indebtedness



Note: This figure displays summary statistics on the frequency and the extent of structured and high-risk structured loan usage for dataset A. The local governments are ranked into quartiles of indebtedness, calculated as total debt / population. Quartile 1 represents the local governments with the lowest indebtedness, and quartile 4 the ones with the highest.

11 Tables

Table 1: Debt Profile of Local Governments

				Amount		% Total Debt	
(in Million Euros)	N	Aggregate	% Use	Mean	Max	Mean	Max
Dataset A: Local Government Debt Portfolios							
Total Debt	293	51,994.7	95.6%	177.5	1,850.5	-	-
Standard Loans and Bonds	293	34,611.5	94.9%	118.1	1,265.6	66.6%	100%
Revolving Facilities	293	6,953.2	58.4%	23.7	646.2	13.4%	100%
Structured Loans	293	10,429.9	72.4%	35.6	648.3	20.1%	95.5%
High-Risk Str. Loans	293	4,372.0	43.0%	14.9	509.9	8.4%	71.7%
Dataset B: Loan Level Data on Structured Loans							
Total Debt	1,579	33,423.1	100.0%	21.2	1,870.50	-	-
Structured Loans	2,742	23,680.0	100.0%	8.6	459.3	49.7%	-
High-Risk Str. Loans	2,742	13,462.0	42.7%	4.9	459.3	28.3%	-
Negative MtM	2,742	3,884.1	99.1%	1.4	147.4	8.1%	-
# Structured Loans	2,742	-	-	1.9	20	-	-

Note: This table contains summary statistics on debt profile for two samples of French local governments. All debt figures are expressed in millions of euros. Dataset A is obtained from a survey conducted by a specialized consulting firm as of December 31, 2007, and includes 25 regions, 96 counties, 76 intercities, and 96 municipalities. Dataset B is obtained from Dexia and covers the entire client portfolio of this bank as of December 31, 2009. The sample aggregated total debt represents 38% of all-local-government aggregated total debt. *High-Risk Str. Loans* are high-risk structured loans, as defined in Section 2. *Negative MtM* represents the unwinding costs for converting structured loans into market-rate vanilla loans.

Table 2: Mark-to-Market Summary Statistics

	Structured Loan Users	High-Risk Loan Users	FX Linked Loan Users
Mark-to-Market/Inhabitants (in EUR)			
Median	27.49	84.46	159.07
Top Decile	301.86	614.92	873.21
Mark-to-Market/Annual Tax Revenue			
Median	6.22%	15.69%	29.54%
Top Decile	61.76%	116.16%	221.84%

Note: This table provides summary statistics on the mark-to-market of the structured loan transactions at the local government level from dataset B. Mark-to-market represents the unwind cost for the derivative component of a structured loan, and is summed across all the transactions for a given local government. Positive number in this table represent a cost for the local government.

Table 3: Indebtedness and Structured Loan Usage

	Dataset A				**Dataset B**	
	Usage (Probit)		Magnitude (Tobit)		Usage (Probit)	
	Structured	High-Risk	Structured	High-Risk	Structured	High-Risk
	(1)	(2)	(3)	(4)	(5)	(6)
Debt/Population	2.081***	0.679***	0.182***	0.090***	0.285***	0.238***
	(0.485)	(0.090)	(0.029)	(0.009)	(0.065)	(0.046)
Equipment Expenditure/Pop.	-0.004***	-0.001*	-0.000**	-0.000**	0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Wages/Operating Exp.	3.809***	0.965	0.128*	0.043	0.228	1.402*
	(0.691)	(1.027)	(0.073)	(0.168)	(0.528)	(0.837)
Log (Population)	0.070***	0.085***	0.013***	0.012***	1.535***	1.525***
	(0.020)	(0.011)	(0.003)	(0.002)	(0.050)	(0.068)
Debt Average Maturity	0.075***	0.057***	0.016***	0.015***	-	-
	(0.025)	(0.019)	(0.005)	(0.003)		
Lender FE	Yes	Yes	Yes	Yes	-	-
Local Government Type FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	-	-	-	-	Yes	Yes
Observations	275	275	263	263	32,537	30,074
Pseudo R^2	0.304	0.181	0.522	0.475	0.433	0.442

Note: This table contains the probit and tobit regression coefficients using debt portfolio data from a sample of local governments (Dataset A) for columns 1 to 4, and data from Dexia's client portfolio (Dataset B) for columns 5 and 6. The dependent variable is an indicator variable for the use of structured products for columns 1 and 5, and an indicator variable for the use of high-risk structured loans (as defined in section 2) for columns 2 and 6. For columns 3 and 4, the dependent variable is equal to the ratio of structured debt over total debt, and high-risk structured debt over total debt. Local governments with no debt are excluded from the regressions of columns 3 and 4. We estimate tobit regressions with left-censoring at zero, and right-censoring at one. Standard errors of the coefficients are clustered by types of local government, and standard errors are reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 4: Indebtedness and Structured Loan Usage: IV Analysis

	Dataset B		
	Debt/Population	Probit	
	First Stage	Structured	High-Risk
	(1)	(2)	(3)
Affected (Floods)	0.148***		
	(0.056)		
Debt/Population		3.076***	2.512**
		(0.599)	(1.001)
Equipment Exp./Pop.	0.002	-0.005***	-0.004**
	(0.001)	(0.001)	(0.002)
Wages/Operating Exp.	-0.575*	4.837***	3.261***
	(0.313)	(0.524)	(0.934)
Population Category FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	32,699	33,739	31,151
Pseudo R^2 / R^2	0.026	0.334	0.379

Note: This table contains coefficients for an instrumental variable analysis. Column 1 presents the OLS coefficients of the first stage, using floods as an instrument for indebtedness. The floods indicator variable is equal to 1 if the municipality suffered from floods between 2002 and 2008. Columns 2 and 3 display the coefficients of the second stage of the IV analysis, where the dependent variable is an indicator variable for having implemented structured loans during the 2002-2008 period in column 2, and an indicator variable for having implemented high-risk structured loans during the 2002-2008 period in column 3. Indebtedness is instrumented as per the first stage. Sample is restricted to municipalities. Standard errors of the coefficients are clustered at the county level, and standard errors are reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 5: Politically Contested Areas

	Structured Loan Usage			
	(1)	(2)	(3)	(4)
Stronghold	-0.336**			
	(0.162)			
Years in Power		-0.124**		
		(0.060)		
Number of Swings			0.185*	
			(0.105)	
Close 2001 Election				0.524*
				(0.288)
Margin of Victory in 2001				0.305
				(0.374)
Equipment Spending/Population	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Wage/Operation Expenditure	0.151	0.102	0.331	0.198
	(1.253)	(1.252)	(1.273)	(1.321)
Log(Population)	0.408***	0.409***	0.405***	0.412***
	(0.127)	(0.128)	(0.125)	(0.129)
Observations	571	571	571	571
Pseudo R^2	0.018	0.018	0.017	0.018

Note: This table contains probit regression coefficients using data from Dexia's client portfolio (Dataset B). The dependent variable is an indicator variable for the use of structured products. *Stronghold* is an indicator variable equal to one when the local governments have been ruled by the same party for more than 12 years. $Yearsinpower$ refers to the number of years during which the political party of the incumbent (as of year 2001) has been managing the local government. $\#Swings$ is the number of changes in political color during the period 1983-2001. *Close 2001 Election* is an indicator variable equal to one if the margin of victory was below 5% in the 2001 election. Sample is restricted to municipalities with more than 9,000 inhabitants, for which elections results are available. Standard errors of the coefficients are clustered by types of local government, and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 6: Difference-in-Differences Estimation of Election Timing Effects

Panel A

	C-logit Structured Trade		Placebo C-logit	
	+\- 18 months	+ \- 12 months	+ \- 18 months	+ \- 12 months
	(1)	(2)	(3)	(4)
Pre-Election × Treatment	0.352***	0.335***	0.026	0.027
	(0.122)	(0.102)	(0.100)	(0.071)
Local Government FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Regression Type	Panel	Panel	Panel	Panel
Pseudo R^2	0.081	0.054	0.053	0.080
Periods	12	8	12	8
Local Governments	2741	2741	2741	2741
Observations	23,868	13,800	13,800	23,868

Panel B

	C-logit Structured Trade		Placebo C-logit	
	+\- 18 months	+ \- 12 months	+ \- 18 months	+ \- 12 months
	(1)	(2)	(3)	(4)
Pre-Election × Treatment	0.022*	0.028**	0.001	0.000
	(0.011)	(0.010)	(0.004)	(0.009)
Local Government FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Regression Type	Panel	Panel	Panel	Panel
R^2	0.096	0.124	0.096	0.124
Periods	12	8	12	8
Local Governments	2741	2741	2741	2741
Observations	32,892	21,928	32,892	21,928

Note: Panel A of this table contains the conditional logit (C-logit) regression coefficients that are estimated using data from Dexia's client portfolio (Dataset B). The dependent variable is an indicator variable of a structured trade for a given local government in a given quarter. In columns 1 and 2, the explanatory variable is an interaction variable between an indicator variable for the treatment group (local governments having an election at the end of 2008Q1) and an indicator variable for the pre-election period. Columns 3 and 4 present a placebo analysis in which the treatment group indicator variable that is used in the interaction term has been replaced by an indicator variable on a random sample of similar size. Panel B replicates Panel A using OLS regressions. Standard errors are clustered by type of public entity. The time window is 18 months before and after the election (end of March 2008) for columns 1 and 3, and 12 months for columns 2 and 4. Standard errors are clustered at the local government level and are reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 7: Financial Sophistication

	Probit							
	Structured	High-Risk	Structured	High-Risk	Structured		High-Risk	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
White-Collar			0.034	0.146*				
			(0.068)	(0.085)				
Blue-Collar			-0.927*	-0.377				
			(0.507)	(0.553)				
Farmer			-0.593***	-0.646***				
			(0.069)	(0.130)				
Senior Civil Servant					4.713***	3.391***	4.141***	2.776***
					(0.230)	(0.311)	(0.305)	(0.550)
Civil Servant, A-level					3.753***	3.302***	3.536***	2.936***
					(0.133)	(0.176)	(0.166)	(0.329)
Civil Servant, B-level					2.965***	2.889***	-	-
					(0.200)	(0.222)		
5000 <Pop $\leq$ 10000	1.516***	1.266***	1.474***	1.225***		1.589***		1.575***
	(0.053)	(0.082)	(0.053)	(0.081)		(0.306)		(0.561)
10000 <Pop $\leq$ 50000	1.901***	1.742***	1.855***	1.695***		2.491***		1.960***
	(0.083)	(0.105)	(0.083)	(0.105)		(0.255)		(0.401)
50000 <Pop $\leq$ 100000	2.333***	2.462***	2.332***	2.446***		2.109**		2.746***
	(0.244)	(0.225)	(0.245)	(0.225)		(0.905)		(0.950)
100000 <Pop $\leq$ 200000	2.056***	2.198***	1.999***	2.123***		-		2.906**
	(0.362)	(0.374)	(0.362)	(0.372)				(1.178)
200000 <Pop	2.912***	3.009***	2.872***	2.980***		-		-
	(0.620)	(0.519)	(0.621)	(0.518)				
County FE	Yes	Yes	Yes	Yes	-	-	-	-
Observations	36,529	31,482	36,529	31,482	768	765	414	413
Pseudo R^2	0.338	0.312	0.344	0.318	0.143	0.461	0.042	0.395

Note: This table presents coefficients from probit regressions, where the dependent variable is an indicator variable equal to one if the local government has borrowed with at least one structured loan in columns 1, 3, 5 and 6 and with at least one high-risk structured loan in columns 2, 4, 7 and 8, during the period 2002-2007. Explanatory variables X < Pop $\leq$ Y represents indicator variables on whether the local government population is between X and Y. Sample is restricted to municipalities. Columns 5 to 8 further restrict the sample to municipalities whose mayor is a civil servant. *White-collar* is an indicator variable for the mayor having a background profession requiring a college degree. *Senior Civil Servant, A-level and B-level* is an indicator variable for the mayor being a "Haut Fonctionnaire", a highly selective status associated with graduating from Elite schools. Standard errors are clustered at the county leve and presented below coefficientsl. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 8: Political Effects of Structured Loan Usage: IV Analysis

	Probit/OLS		First Stage	IV	
	Re-election (Probit)	Δ Local Tax per Inhabitant	Structured Loan Usage	re-election (Probit)	Δ Local Tax per Inhabitant
	(1)	(2)	(3)	(4)	(5)
Distance to Dexia Branch			-0.003***		
			(0.001)		
Structured Loan Usage	0.011	13.879***		1.596***	-55.045*
	(0.021)	(3.468)		(0.512)	(27.133)
Debt per Inhabitant	0.002*	0.418	0.136***	-0.005	1.000
	(0.001)	(0.503)	(0.037)	(0.005)	(0.637)
Dexia Branch FE	Yes	Yes	Yes	Yes	Yes
Population Bracket FE	Yes	Yes	Yes	Yes	Yes
Observations	24,948	25,527	25,439	24,669	25,406
Pseudo R^2 / R^2	0.119	0.037	0.339	0.082	0.037

Note: This table contains the coefficients for OLS and an instrumental variable analysis, using distance to the closest Dexia branch as an instrument for structured loan usage. Columns 1 and 2 display the Probit/OLS coefficients. Column 3 presents probit coefficients for the first stage, where the dependent variable is an indicator variable equal to one if the local government has borrowed with a structured loan between 2002 and 2007. Columns 4 and 5 display the coefficients of the second stage, where the dependent variable is an indicator variable equal to one if voters elect in 2008 a politician from the same party as the one elected in 2002 in column 4, and the variation in local tax per inhabitant between year end 2002 and year end 2007 in column 5. The variable structured loan usage is instrumented as per the first stage. Standard errors are clustered at the Dexia branch level and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

- For Online Publication -

Appendix A - Types of French Local Government

Regions ***(Régions)***: Metropolitan France is divided into 22 administrative regions, which are in turn divided in 2 to 8 counties *(Départements)*. Regions were created in 1982, and do not possess separate legislative authority. One of their primary responsibility is to build high schools, and regional transport infrastructures. In 2004, the median population of a region in metropolitan France was 2.3 million inhabitants. Regions are funded partly by the central government, partly by local taxes. Regions are governed by a directly elected council, the *Conseil Régional*, which in turn elects the council president.

Counties ***(Départements)***: Metropolitian France is divided into 96 counties. They were created in 1791 following the French Revolution, and do not possess separate legislative authority. One of their primary responsibility is to build junior high schools, and county-level transport infrastructures. In 2004, the median population of a county in metropolitan France was 520,000 inhabitants. Counties are funded partly by the central government, partly by local taxes. Counties are governed by a directly elected council, the *Conseil Général*, which in turn elects the council president.

Municipalities ***(Communes)***: Metropolitian France is divided into 36,681 municipalities. Municipalities were created in 1789, at the beginning of the French Revolution. Municipalities build primary schools, touristic equipments, and local transport infrastructure. Municipalities population varies widely, from 10 inhabitants to 2.2 million in Paris. Municipalities are funded partly by the central government, partly by local taxes. Municipalities are governed by a directly elected council, the *Conseil Municipal*, which in turn elects the mayor.

Intercities ***(Communautés d'Aglomération)***: Intercities are associations of municipalities. Intercities typically cover a commuting zone. Their primary motive is to finance infrastructures that cover several municipalities, for instance swimming pools and public transport. Intercities are mainly funded by its members, which are municipalities. Intercities are governed by a council that comprises the mayors and counsellors of the participating municipalities. The council in turn elects the intercity president.

Social Housing Entities ***(Organismes HLM)***: Social housing entities own and manage more than 4 millions housing units, or 17% of primary residences in France. The board members are appointed by local governments (counties or municipalities) and the French central government. The board nominates a CEO, who has a significant autonomy.

Hospitals ***(Centres Hospitaliers)***: Hospitals in France are state-owned, have a general interest mission, and are non-profit. Hospitals are funded by health insurance organisms, local governments, and the central government. Their CEOs are appointed by the Health Ministry.

Appendix B - Structured Loan Types

Products are presented by increasing level of risk according to the Gissler classification. For each type of products, summary statistics are provided in Table A1.

Barriers on Domestic Rate (Gissler Scale: 1)
These products lower cost of funding as long as the underlying index is above/under a predefined barrier. Subsidy comes from the premium of the options sold, which could be interest rate caps or floors. An example is the implicit sale of a floor:

$$Rate(t) = \begin{cases} US\ Libor(t) - x\ bps & if\ US\ Libor(t) > 3\% \\ 3\% & otherwise. \end{cases}$$

Coupon structure does not include any leverage effect. Both the subsidy offered to client and the bank margin are low ($\leq 0.50\%$ of notional). Barriers were the first products to enter the market in the late 1990s. Their interest rate formula can be broken down into its standard loan component and an embedded short put option:

$$\begin{array}{rl} Standard\ loan\ interestrate: & US\ Libor(t) \\ Sale\ of\ a\ put\ with\ a\ 3\%\ strike: & \begin{cases} -\ x\ bps & if\ US\ Libor(t) > 3\% \\ 3\% - US\ Libor(t) & otherwise. \end{cases} \end{array}$$

Inflation Products (Gissler Scale: 2)
This type of products is usually based on a barrier or on an inflation spread. They often include leverage to provide with sufficient subsidy, as inflation volatility is very low. A standard payoff is:

$$Rate(t) = Midswap(t) - 50\ bps + 2 \times Max(French\ Inflation(t) - Euro\ Inflation(t),\ 0\%).$$

This illustrates the client's view that the French inflation rate should remain below the European inflation rate, which could be caused by entrance of new EU members from Eastern Europe with higher inflation.

Steepeners (Gissler Scale: 3)
In a Steepener structure, the interest rate is indexed to the Constant Maturity Swap (hereafter CMS) curve slope and decreases the cost of funding when the slope of the curve is steep; but increases the cost when the curve is flat or inverted. The CMS curve is built with the equivalent fixed rates obtained when swapping Libor for all possible maturities. They are based on different measures of the slope: [20-year swap rate - two-year swap rate], [30-year swap rate - one-year swap rate], and in most cases [10-year swap rate - two-year swap rate]. An example of payoff is:

$$Rate(t) = 7\% - 5 \times (CMS\ 10Y(t) - CMS\ 2Y(t)).$$

Entering into a Steepener transaction represents a bet against the realization of forward levels, which typically anticipate a flattening of the swap curve. The risk profile of these

products is higher than the one of Barrier products. This is mainly due to the introduction of leverage in the interest rate formula, usually without any cap.

Quantos (Gissler Scale: 4)
They represent variable interest rate products that are indexed to a foreign interest rate with an affine formula. They exploit low spot rates and higher forward levels. Risk is moderate as leverage is generally low and the underlying foreign interest rate has low volatility. They are mainly structured on indices from countries with low interest rates, such as Japan or Switzerland. A standard Quanto payoff is:

$$Rate(t) = 2 \times JPY\ Libor(t) \quad or \quad Rate(t) = 1.5 \times CHF\ Libor(t) + 1\%.$$

FX Products (Gissler Scale: Out of Scale)
FX products are also based on an implicit sale of options. However FX option premiums are much higher due to the high volatility of foreign exchange rates and remain high even when strike levels are far from spot prices. This comes from the absence of mean-reversion of foreign exchange rates in banks' pricing models. This feature allows to structure products with seemingly unreachable strikes, especially when historical levels bias the client's view. An example of payoff for an FX product is:

$$Rate(t) = 3\% + 50\% \times Max(1.44 - EURCHF(t),\ 0\%).$$

These products offer very high interest rate subsidy, especially on long maturity loans when they bear no caps. One example is the 0% interest rate loan by Depfa with Ville de Saint Etienne on a 32-year maturity loan. The interest rate is set at 0% for 9 years and remains at this level afterwards as long as EURCHF is above EURUSD.

Cumulative Structures (Gissler Scale: Out of Scale)
Cumulative structures can be structured on any underlying index: domestic/foreign interest rates, FX rates, or inflation rates. They are based on an iterating interest rate formula. Rate degradations therefore add up to each other. The formula often includes a click feature that makes all degradations permanent; hence their nickname: snow balls. Cumulative instrument structuring is based on selling a portfolio of forward-start options. A typical interest rate profile is:

$$Rate(t) = Rate(t-1) + 2 \times Max(USD\ Libor\ 12M(t) - 6\%,\ 0\%).$$

Due to the iterating definition of the interest rate, frequency of interest rate payment is key for the risk profile of the product. For a given leverage level, a quarterly cumulative structure is four times more aggressive than an annual one. These products have been dramatically impacted by the increase in volatility during the financial crisis, as they bear no cap. They are usually more sensitive to volatility than to market direction (i.e., vega dominates delta).

Appendix C - Figures

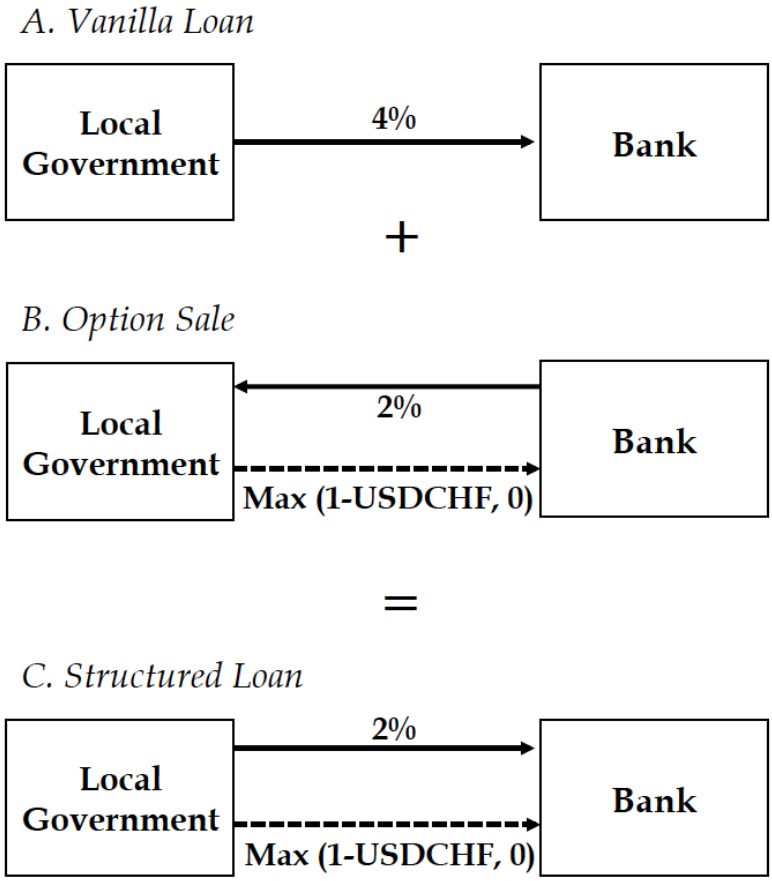


Figure A1: Structured Loan Flow Chart

Note: This figure represents the flows of a structured loan, broken down between the standard loan component, and the embedded derivative transaction resulting in the sale of options.

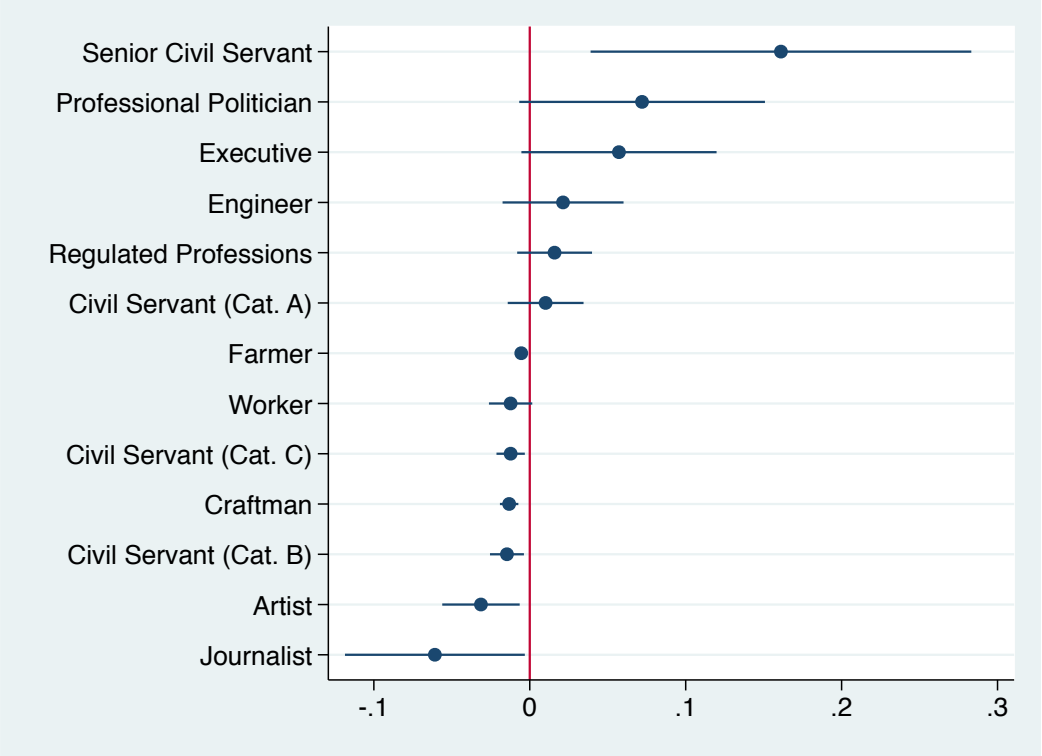


Figure A2: Occupation Fixed Effect

Note: This figure displays the estimated coefficients on mayor occupation title fixed effects from a probit regression of using structured loans on local government characteristics and elected mayor demographic variables. The data are from dataset B merged with data provided by the French Ministry of the Interior. The sample is restricted to municipalities. Dots represent the coefficient estimates, and lines the 95% confidence interval, using standard errors clustered at the county level.

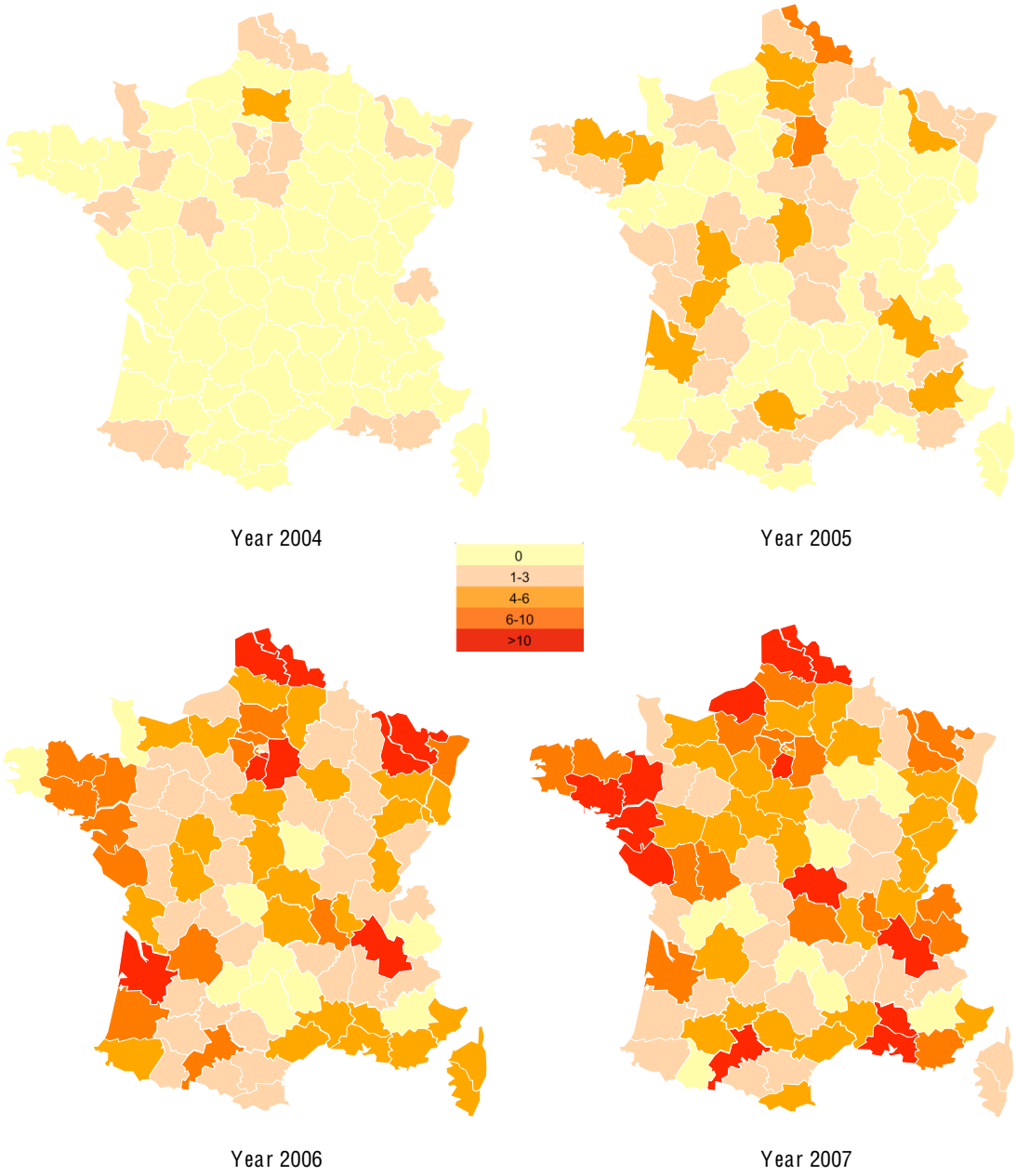


Figure A3: Geographical Evolution of Structured Debt Activity

Note: This figure displays the number of active local governments, which are defined as those that have implemented at least one structured debt transaction in the second quarter of the displayed years (from 2004 to 2007). Q2 is the period in which the recently voted budget is financed. Map division is at the French county level. The data are obtained from Dexia's client portfolio (Dataset B).

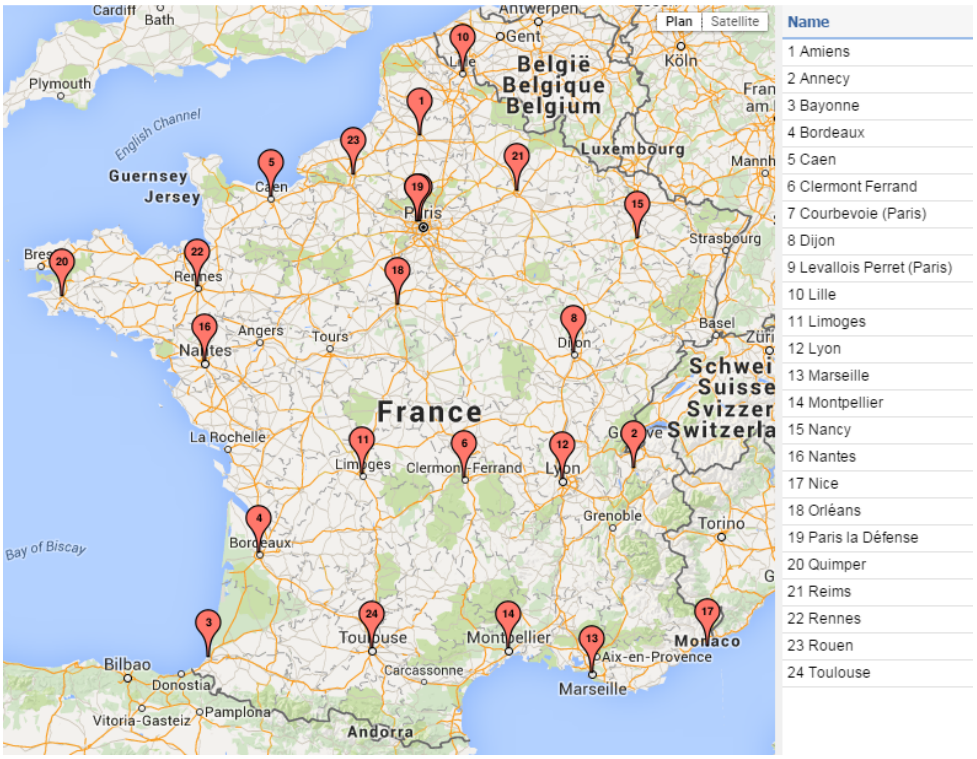


Figure A4: Map of Dexia Branches

Figure A5: EURCHF Exchange Rate

Note: This figure displays the exchange rate of EURCHF from 2005 to 2015. The vertical dotted line represents the date at which the mark-to-market are calculated by Dexia in Dataset B (December 31st, 2009). Source: Bloomberg.

Appendix D - Tables

Table A1: Structured-Debt Breakdown

	Notional					Notional / Local Gov. Total Debt				
	All	Regions	Counties	Intercities	Cities	All	Regions	Counties	Intercities	Cities
Aggregate	10429.9	1128.5	4801.9	1334.7	3164.9					
1. Barriers										
Aggregate	4970.7	532.3	1959.8	746.8	1731.8					
Share in %	47.70%	47.20%	40.80%	56.00%	54.70%					
Mean	17	21.3	20.4	9.8	18	10.20%	6.50%	8.80%	9.90%	12.70%
Stdev	33.3	29.2	33.3	24	39.7	14.10%	8.70%	11.90%	17.20%	14.60%
Max	342	99.2	161.7	167.9	342	95.50%	33.30%	67.90%	95.50%	69.90%
% of use	57.70%	56.00%	60.40%	44.70%	65.60%					
2. Steepeners										
Aggregate	2794.8	301.1	1417.5	329.4	746.7					
Share in %	26.80%	26.70%	29.50%	24.70%	23.60%					
Mean	9.5	12	14.8	4.3	7.8	5.20%	3.50%	5.80%	4.90%	5.30%
Stdev	25.4	33.8	33.5	10.1	21	9.70%	11.20%	8.80%	9.30%	10.50%
Max	275.8	162.4	275.8	54.4	151.4	70.50%	54.10%	41.60%	44.70%	70.50%
% of use	39.90%	32.00%	51.00%	31.50%	37.50%					
3. FX										
Aggregate	1543.9	87.2	968.3	152.5	335.8					
Share in %	14.80%	7.70%	20.20%	11.40%	10.60%					
Mean	5.3	3.5	10.1	2	3.5	2.10%	1.10%	2.50%	2.50%	1.80%
Stdev	24.1	11.4	38.4	7.2	14.2	7.40%	3.80%	7.70%	9.40%	6.20%
Max	240.8	52.9	240.8	47.4	112.6	66.70%	17.60%	44.00%	66.70%	36.80%
% of use	14.00%	12.00%	18.80%	13.20%	10.40%					
4. Inflation										
Aggregate	357.8	102.3	120.2	30.7	104.5					
Share in %	3.40%	9.10%	2.50%	2.30%	3.30%					
Mean	1.2	4.1	1.3	0.4	1.1	0.60%	1.40%	0.40%	0.30%	0.70%
Stdev	6.6	12.4	7	2.1	6.4	3.50%	5.50%	1.70%	1.50%	4.90%
Max	64.4	49	64.4	12.9	60	46.10%	27.00%	11.90%	8.70%	46.10%
% of use	7.20%	16.00%	8.30%	3.90%	6.30%					
5. Quantos										
Aggregate	249.4	33.5	89.4	28.6	98					
Share in %	2.40%	3.00%	1.90%	2.10%	3.10%					
Mean	0.9	1.3	0.9	0.4	1	0.50%	0.40%	0.40%	0.30%	0.80%
Stdev	3.5	4.2	3.4	2.4	4	1.90%	1.20%	1.30%	1.20%	2.70%
Max	33.2	15.8	25.6	20.7	33.2	16.40%	1.20%	8.10%	7.80%	16.40%
% of use	12.30%	12.00%	12.50%	6.60%	16.70%					
6. Cumulative										
Aggregate	33.4	13	7.4	0	13					
Share in %	0.30%	1.20%	0.20%	0.00%	0.40%					
Mean	0.1	0.5	0.1	0	0.1	0.00%	0.10%	0.00%	0.00%	0.00%
Stdev	1	2.6	0.8	0	0.8	0.30%	0.40%	0.30%	0.00%	0.30%
Max	13	13	7.4	0	7.1	3.20%	2.00%	3.20%	0.00%	1.90%
% of use	1.70%	4.00%	1.00%	0.00%	3.10%					
7. Others										
Aggregate	300.9	30	143.6	28.9	98.5					
Share in %	2.90%	2.70%	3.00%	2.20%	3.10%					
Mean	1	1.2	1.5	0.4	1	0.80%	0.30%	1.00%	0.50%	1.00%
Stdev	4	4.4	4.6	2	4.5	3.70%	1.00%	3.70%	2.90%	4.50%
Max	35.8	20	23.6	12.9	35.8	36.10%	3.40%	27.90%	22.10%	36.10%
% of use	8.50%	8.00%	11.50%	3.90%	9.40%					

Note: This table contains summary statistics on the different types of structured debt for a sample of French local governments, as of December 31, 2007 (Dataset A). The left panel of this table displays statistics on aggregated and local government-level amounts of debt. Figures are in millions of euros, except for share in % and % of use. Aggregate denotes the sum of the debt notional amount over all local governments. Share in % represents aggregated amount of a given debt instrument in the sample divided by aggregated total structured debt of the sample. The right panel displays statistics on the relative breakdown by debt instruments at the local government level. For instance, a local government whose debt consists in EUR70m of standard bank loans and EUR30m of FX linked debt will be considered as a local government with 30% of FX linked debt.

Table A2: Indebtedness and Type of Borrowing Instrument. Dataset A

	Probit		
	Revolving Loans	Bonds	Floating Rate Loans
	(1)	(2)	(3)
Debt/Population	0.000	0.000	0.002
	(0.000)	(0.000)	(0.002)
Equipment Expenditure/Pop.	-0.001	0.002***	-0.002
	(0.001)	(0.001)	(0.003)
Wages/Operating Exp.	2.118	6.421***	8.421***
	(1.792)	(0.909)	(0.460)
Debt Average Maturity	0.027**	0.021	0.198***
	(0.012)	(0.035)	(0.027)
Log (Population)	-0.006	0.663	-0.166
	(0.007)	(0.590)	(0.142)
Lender FE	Yes	Yes	Yes
Local Government Type FE	Yes	Yes	Yes
Observations	275	275	229
Pseudo R^2	0.185	0.526	0.682

Note: This table contains coefficents of probit regressions. The dependent variable is an indicator variable for the use of revolving loans in column 1, and an indicator variable for the use of bonds in column 2, and an indicator variable for the use of floating rate loans in column 3. Sample data are as of December 31, 2007. Standard errors of the coefficients are clustered by types of local government, and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table A3: Indebtedness and Structured Loan Usage. Dataset B

	Structured	High-Risk
	(1)	(2)
Debt/Population	0.271***	0.231***
	(0.058)	(0.040)
Equipment Exp./Pop.	0.000	-0.000
	(0.000)	(0.001)
Wages/Operating Exp.	0.065	0.930
	(0.692)	(0.844)
Log (Population)	1.479***	1.423***
	(0.051)	(0.058)
Local Government Type FE	Yes	Yes
Observations	32,699	32,699
Pseudo R^2	0.414	0.422

Note: This table contains the probit regression coefficients using data from Dexia's client portfolio (Dataset B) for columns 1 and 2. The dependent variable is an indicator variable for the use of structured products for column 1, and an indicator variable for the use of high-risk structured loans (as defined in section 2) for column 2. Standard errors of the coefficients are clustered by types of local government, and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table A4: Indebtedness and Structured Loan Usage: IV Analysis

	Dataset B		
	Debt/Population	Probit	
	First Stage	Structured	High-Risk
	(1)	(2)	(3)
Affected (Floods)	0.190***		
	(0.052)		
Debt/Population		1.367***	0.563
		(0.461)	(0.682)
Equipment Expenditure/Pop.	0.002*	-0.002**	-0.001
	(0.001)	(0.001)	(0.001)
Wages/Operating Exp.	-0.555*	3.834***	1.870**
	(0.295)	(0.529)	(0.823)
Population Category FE	Yes	Yes	Yes
Observations	32,699	33,901	33,901
Pseudo R^2 / R^2	0.009	0.301	0.354

Note: This table contains coefficients for an instrumental variable analysis. Column 1 presents the OLS coefficients of the first stage, using floods as an instrument for indebtedness. The floods indicator variable is equal to 1 if the municipality suffered from floods between 2002 and 2008. Columns 2 and 3 display the coefficients of the second stage of the IV analysis, where the dependent variable is an indicator variable for having implemented structured loans during the 2002-2008 period in column 2, and an indicator variable for having implemented high-risk structured loans during the 2002-2008 period in column 3. Indebtedness is instrumented as per the first stage. Sample is restricted to municipalities. Standard errors of the coefficients are clustered at the county level, and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table A5: Hedging

	Pooled Regression			Individual Regressions			
	Coefficient	St. Err.	P-value	Mean Coeff.	St. Dev. Coeff.	% Coeff > 0 at 10% signif.	% Coeff < 0 at 10% signif.
Euribor 3m	-0.0162	0.0168	0.436	0.0122	0.047	3.98%	0.00%
CMS 10y - CMS 2y	-0.0601	0.0504	0.355	-0.0193	0.0404	13.72%	1.33%
EURCHF	-0.112	0.0963	0.364	0.237	0.3277	15.49%	3.54%
EURUSD	0.1681	0.1577	0.398	0.0982	0.2713	3.98%	0.00%

Note: This table contains summary statistics on regression coefficients between the annual percentage change in revenues and the percentage change in several financial indices. The pooled regression is run on the four indices, controlling for inflation and with local authorities type fixed effects. Standard errors of coefficients are clustered by type of local authorities. Individual regressions are conducted for each local government on each individual index, also controlling for inflation. Euribor 3m is the 3-month Euro interbank offered rate and CMS stands for Constant Maturity Swap and corresponds to the fixed rate obtained by swapping a Euribor interest rate. For CMS 10y - CMS 2y, we use the first difference. The sample includes all French regions, departments, as well as the 100 largest cities (226 French local authorities in total) for which we have revenue data between 1999 and 2010. Index data are from Datastream and local authorities' revenues are from the French Finance Ministry.

Table A6: Local Correlation in the Borrowing Choices of Politicians

	C-logit Structured Trade	
	(1)	(2)
# of Active Neighbors (Previous Quarter)	0.018***	
	(0.003)	
# of Active Neighbors (Previous Semester)		0.006*
		(0.003)
Quarter FE	Yes	Yes
Regression Type	Panel	Panel
Pseudo R^2	0.155	0.149
Periods	40	39
Local Governments	2741	2741
Observations	109,160	106,431

Note: This table contains the conditional logit (C-logit) regression coefficients that are estimated using data from Dexia's client portfolio (Dataset B). The dependent variable is an indicator variable of a structured trade for a given local government in a given quarter (or semester) for the conditional logit regressions. The explanatory variable is the number of active local governments in the same geographical zone (county level), which is defined as the number of public entities that have implemented at least one structured transaction in the previous quarter (or semester). The regressions include individual local government fixed effects. Standard errors are clustered by type of local government and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table A7: Re-election and Tax Evolution

	Logit	
	Re-election	
	(1)	(2)
Local tax per Inhabitant	-0.0004**	-0.0003*
	(0.000)	(0.000)
Equipment Expenditure/Pop.		0.0000
		(0.000)
Wages/Operating Exp.		-0.4302**
		(0.200)
Log(Population)		0.0074
		(0.031)
Observations	26,181	25,884
Pseudo R^2	0.0001	0.0007

Note: This table contains coefficents of logit regressions. The dependent variable is an indicator variable equal to one if voters elect in 2008 a politician from the same party as the one elected in 2002. Standard errors are clustered at the Dexia branch level, and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table A8: Effects of Structured Loan Usage: Breakdown

	High-Risk				Non-High-Risk			
	OLS		IV		OLS		IV	
	Re-election	Δ Local Tax per Inhab.	Re-election (Probit)	Δ Local Tax per Inhab.	Re-election	Δ Local Tax per Inhab.	Re-election (Probit)	Δ Local Tax per Inhab.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Structural Loan Usage	-0.049	-4.173			0.045***	16.412***		
	(0.037)	(8.678)			(0.016)	(5.019)		
Structured Loan Usage (IV)			3.204**	-179.596**			4.276***	-62.242
			(1.280)	(81.078)			(1.165)	(50.611)
Debt per Inhabitant	0.003**	0.428	-0.004	1.523*	0.002**	0.359	0.013	0.623
	(0.001)	(0.429)	(0.012)	(0.795)	(0.001)	(0.401)	(0.011)	(0.395)
Dexia Branch FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Political Party FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population Bracket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,948	25,527	23,877	24,584	24,948	25,527	24,660	25,396
Pseudo R^2 / R^2	0.119	0.024	0.083	0.024	0.119	0.024	0.084	0.023

Note: This table contains the coefficients for OLS and an instrumental variable analysis, using distance to the closest Dexia branch as an instrument for structured loan usage. The specification replicates Table 8, using as the main explanatory variable an indicator variable for high-risk structured loan usage in columns 1 to 4, and an indicator variable for using non-high-risk structured loans only. Standard errors are clustered at the Dexia branch level and reported below the coefficients. *, **, and *** represent statistical significance at the 10%, 5%, and 1% confidence levels, respectively.