Taxing Vacant Dwellings: Can fiscal policy reduce vacancy?

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Abstract

Vacancy is a common phenomenon across developed countries. For policymakers, vacancy is undesirable as it challenges housing affordability, especially in large cities. The implementation of a tax on vacant housing is becoming a more popular tool among lawmakers, however this fiscal instrument has never been properly evaluated. This paper provides the first evaluation of a tax on vacant housing. First, I develop a model to understand the mechanisms of vacancy creation. Then, I use the quasi-experimental setting of the implementation of a tax on vacancy in France in 1999 to identify the causal direct effect of the tax on the vacancy rate. Exploiting an exhaustive fiscal data-set, which contains information on every dwelling in France from 1995 to 2013, I implement a Difference-in-Difference approach combined with a Propensity Score Matching strategy. Results suggest that the tax was responsible of a 13% decrease in vacancy rates between 1997 and 2001. The impact is specially concentrated in long-term vacancy. Results also suggest that most of the vacant dwellings moved to primary residences.[1]

Keywords: Housing, Vacancy Rate, Taxes, Impact Evaluation

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1 Introduction

Vacancies in the housing market are a relatively common phenomenon across Western countries. In 2005, vacancy rates amounted to 10% in the Euro Area (Eiglsperger and Haine, 2009) and 12.7% in the US.[2] While for economists, some level of vacancy seems intrinsic to the way markets work, politicians and activists have criticized this situation arguing that high vacancy rates are undesirable and need to be tackled to improve housing affordability. Indeed, access to housing has worsen in recent years, as suggested by the increasing proportion of households' disposable income spent on housing. Since, various interventions have been proposed to deal with vacancy which range from a tax on vacant dwellings to forced conversion into social housing. Assessing the effect of such interventions at the local market is crucial to understand the role played by governments and local authorities in shaping property owners' incentives in the housing market.

In this paper, I exploit a natural experiment in order to identify the causal effect of taxing vacant dwellings. I assess the French context where a tax on vacant dwellings was implemented in some municipalities in 1999. To my knowledge, this is the first evaluation of an implementation of a tax on vacancy and the first time that administrative data is used for this purpose. I use an exhaustive fiscal data-set to measure vacancy rates and I apply a matching difference-in-difference strategy to compare municipalities that were subject to the tax to those where the tax was not applicable.

Demand for housing has not ceased to increase in OECD countries in recent years as a result of net migration and reduction of credit constraints (Andrews, 2010). Similarly, other demographic aspects have also been pressuring housing demand such as ageing and the reduction of the average household size. In a context of low supply elasticity, like European countries,[3] increases in housing demand tend to capitalise into higher prices. This situation is further exacerbated by a high population density, land scarcity and rigid construction regulation.[4] Moreover, due to the concentration of population in urban areas, housing markets tend to be tighter in large cities.

It can seem paradoxical that a situation of increasing demand for housing and inelastic supply coexists with considerably high levels of vacancy in many European countries. As a matter of fact, it is crucial to understand why vacancy exists and whether it represents a market failure or an optimal outcome in equilibrium. Previous literature has identified market frictions as the primary source of vacancy. However, vacancy can also be a results of a rational decision of the owner. For instance, in a context of strong tenant protection like in the French rental market, an owner may prefer to keep an apartment vacant than to rent it if he fears rent default risk. Similarly, if the uncertainty about the evolution of house prices or rents is high, an owner can decide to wait before selling or renting keeping the unit vacant for a longer period.

The presence of frictional vacancy and inactive housing combined with a situation of tight housing markets, can prompt governments to intervene to improve housing affordability. Notably, policy makers can try to compensate the distortions caused by tenant regulation and the real option problem by taxing vacant units. As stated by Kline and

[2]Current Population Survey/Housing Vacancy Survey, Series H-111, U.S. Census Bureau, Washington, DC 20233

[3] Caldera and Johansson (2013) estimate the housing supply elasticity for various OECD countries and found France to be among the least responsive markets, with an elasticity of 0.363.

[4]In Paris, buildings can have a maximum height of 25m in the centric districts and 31m in the periphery.

Moretti (2014), the presence of pre-existing distortions is one of the arguments that can justify the implementation of placed-based policies. Moreover, focusing on vacancy reduction may be a faster and easier way to improve housing affordability than promoting construction of new housing units.

Nevertheless, the benefits of reducing vacancy might go beyond redistribution purposes. In fact, there is some empirical evidence showing other social consequences of empty housing due to negative externalities. Firstly, concentrations of vacant housing tend to reduce the value of the properties in the area (Lee, 2008; Fitzpatrick, 2012). Secondly, the increase in the perception of insecurity has also been identified as a consequence of the concentration of vacant houses, which can derive in an increase in the delinquency rate and damage social cohesion (Immergluck and Smith, 2006; Mummolo and Brubaker, 2008). Therefore, the justification for government intervention to reduce vacancy comes both from the potential redistributive effect of using more intensively current housing stock and from the reduction of negatives externalities entailed by vacancy.

Governments have historically intervened in the housing market in a number of ways. However, few have directly tackled the reduction of vacancy, one of the reasons being the limited set of tools available. Similarly, the difficulty to define and measure vacancy – where there is no consensus so far (de La Morvonnais and Chentouf, 2000) – is another important challenge. Nevertheless, there have been some initiatives across OECD countries aiming to decrease vacancy rates. The Netherlands has historically opted for decriminalising squatting.[5] In the US, local governments have enacted vacant property registration ordinances in order to keep a better account of vacant dwellings. They ask the owners for multiple notifications and for property maintenance requirements and they usually charge a fee at the time of registration (Schilling, 2009).

As the interest for a tax on vacant dwellings rises, there is an increasing number of countries that have implemented this policy. Since April 2013, municipalities in the UK can choose to charge up to 50% more of the Council Tax, a tax on housing properties, for vacant units. The reform is still very recent and, to my knowledge, no evaluation has taken place yet. Jerusalem has also implemented a kind of vacancy tax in the form of doubling the Arnona tax (a municipality tax on property) for properties that have been empty for more than six months.

In France, a vacancy tax called *Taxe sur les Logement Vacants* or TLV was introduced in 1999 in urban municipalities of more than 200,000 inhabitants that had a substantial disequilibrium between housing supply and demand. The tax was then extended to other municipalities in 2006 and modified again in 2013. Although the policy has been in place for a long time, there is still no robust empirical study assessing the impact of this tax.

To my knowledge, the only attempt to asses the impact of a tax on vacant housing is the one conducted by Blossier (2012) in the context of France. He exploits the extension of the tax in 2006 to some cities to identify the effect through a Propensity Score Matching strategy. He uses data from the national census which provides data on vacancy every 9 years and finds that the tax is ineffective in reducing the vacancy rate. Unfortunately, the spaced frequency of the census data challenges the identification strategy.

Desgranges and Wasmer (2000) propose a theoretical model to assess a tax on vacancy in which equilibrium rents are determined as the result of a Nash bargaining equilibrium between home seekers and homeowners on a housing market with stochastic search

[5]Vacant Property Act in 1981 Priemus (2011)

frictions on both sides. In their setting, vacancy can result from a stochastic mismatch by the owners, who can maintain a bargaining power to fix higher rents levels by rationing stocks. In this context, taxing vacant housing units increases the incentive of the owners to rent their housing unit at a lower rent because it increases their opportunity cost to keep it vacant. Moreover, such policy should increase the home seekers' bargaining power on the housing market and allow them to extract some extra surplus by exerting downward pressures on rent levels.

However, in their model, the possibility of owners voluntarily keeping their units out of the market is not contemplated. In this paper, I develop a theoretical model to better understand voluntary vacancy and the potential impact of a tax by introducing a participation constraint in the Desgranges and Wasmer (2000) model. In particular, I allow apartments to be inactive and I assess how a tax on vacancy can affect the stock of inactive housing. The model predicts that a tax on vacancy will increase the number of housing units that are offered in the market by increasing participation while decreasing rents in the short term.

Then, I empirically test these predictions by exploiting the fact that the tax on vacancy in France was introduced only in some municipalities to perform a Difference-in-Difference strategy combined with a Propensity Score Matching. I construct a control group out of the non-taxed municipalities that shared only one of the two criteria of the taxed group and I weight them according to their similarity to the municipalities in the taxed group.

The results suggest a negative and significant impact of the implementation of TLV equivalent to a decrease of 0.8 percentage points of the vacancy rate, which implies a 13% decrease in vacancy. This result is robust to the use of different specifications, the change of control group and several other robustness test. I also find that the effect is 50% higher in municipalities with an initial high level of vacancy. My results contradict the ones of Blossier (2012) which showed a limited impact of the tax in reducing vacancy.

The effect is concentrated in long term vacancy, which suggests that indeed a tax on vacancy can be an efficient tool to reintroduce into the market dwellings that had been unused for a long time. Finally, I find that most of the vacant units seem to have shifted to primary residences while I do not find any significant impact on new construction at the medium term.

This paper also relates to the abundant branch of literature that empirically evaluate the impact of housing policies. One strand of the literature focuses on demand-side policies, usually housing allowances. Recent evidence shows that housing allowances can have inflationary effects due to the low elasticity of supply (in France, Laferrère and Le Blanc (2004); Fack (2005); Grislain-Letrémy and Trevien (2014) and elsewhere, Gibbons and Manning (2006); Kangasharju (2003); Susin (2002)). In particular, due to the short-term rigidity of the supply, part of the benefit from the government is directly shifted to the owner through an increase in price. Another strand of the literature investigates the efficiency of supply-side policies, such as subsidised construction. Several authors in the US have assessed the spillover effects of the Low-Income Housing Tax Credits (LIHTC) on property value resulting in mix evidence (Ellen et al. (2007), Nguyen (2005) and (Di and Murdoch, 2013)).

As per the empirical evidence concerning vacant housing, the amount of research is more scant. In Cheshire et al. (2015), the authors identify the role played by urban

planning on determining vacancy rates in local housing markets. They point out the net effect of two opposite forces at stake: an opportunity cost effect and a mismatch effect. Their findings suggest that the local planning restrictiveness results in higher vacancy rates, meaning that the mismatch effect dominates over the opportunity cost effect.

The paper is organised as follows, in Section 2, I develop a theoretical model to better understand vacancy creation. In Section 3 I describe the institutional setting and the particularities of the tax implementation. In Section 4 I present the data, in Section 5 the empirical strategy used. Section 6 reports the main results, Section 7, the robustness tests and Section 8 provides the results on other outcome exploring the existing mechanisms behind the effect. Section 9 concludes.

2 Theoretical Model

Vacancy occurs due to the existence of several market frictions (Merlo and Ortalo-Magne, 2004; Han and Strange, 2015). First, houses are heterogeneous which implies that consumers and sellers need to spend time in a costly searching process. In fact, given the dependance of the housing market on current housing stock (due to immobility, long construction time and high costs), supply may fail to match demand in the sense that it does not meet the desired quality or location characteristics of the demand. Therefore households might be forced to search even longer for a suitable match. Second, there are significantly high transaction costs such as taxes or agency fees. And third, transactions are made under uncertainty, which implies that some negotiation takes place. As a result of these factors, there will be frictional vacancy in the housing market, which is an involuntary kind of vacancy. Indeed, landowners would like to rent/sell their units but are struggling to find a tenant/buyer due to frictions. This implies that units that are vacant due to frictions are open vacancies; they are by some means advertised. Given that frictions can never be fully eliminated, in equilibrium, there is a positive level of structural vacancy (Wheaton, 1990) equivalent to the natural rate of unemployment in the labour market.

However, owners can also decide to voluntarily leave their units out of the market due to two main reasons. First, real options in the housing market can play an important role. Cunningham (2006) shows that house-price uncertainty delays home construction and raises the value of vacant land. Similarly, in the presence of price uncertainty, an owner can choose to delay a transaction if he expects that prices will increase. In fact, one could expect in the housing market a similar mechanism than the one observed in the second generation of job search models in which unemployed workers searching for a job can decide not to accept some offers, even above their reservation wage, expecting to find better ones by continuing to search the market (see Pissarides (1986)). For example, vacancy can be an opportunity to restore or improve the quality of a depreciated housing unit or to better search the demand side to extract more surplus of a rent or a sale. In this case, the opportunity cost of vacancy can be compensated by an anticipated increase in housing prices or rents.

Second, Gabriel and Nothaft (2001) suggest that in the presence of restrictions on rents adjustment (such as tenant regulations), there may be some strategic holding of vacant units. Indeed, high levels of tenant protection can result in voluntary or strategic vacancy. For instance, if an owner cannot terminate a rent contract at particular time nor freely adjust the rent price, he might rationally decide to take the unit out of the

rental market. In France, regulation is strongly pro-tenant: the minimum length of rental contracts is three years, the owner can ask for a maximum of one month deposit and the average time to evict a tenant is significantly high.[6] Therefore, in the French context vacancy can indeed be a result of a rational decision of the owner facing either the option problem or a strong tenant regulation. In this case, voluntary vacancies are inactive stock, meaning they are not advertised to be rent or sold. In equilibrium, the optimal level of vacancy can be a positive level that includes frictional vacancy and inactive stock, provided the conditions for the latter to be a rational choice hold.

Desgranges and Wasmer (2000) – DW henceforth – develop a model of search and matching in rental housing markets to assess the impact of a tax on vacant units. They use the matching function developed by Pissarides (2000) to describe labor markets and translate it to the housing market. In their model, DW assume that that all owners participate in the housing market and hence their properties are either rented or looking for a tenant. Given the French context, I believe it is pertinent to develop a model that allows owners to voluntarily keep their unit vacant. In this paper, I introduce a participation constraint in a simplified version of DW model to account for the fact that owners can rationally decide not to participate in the rental market – hereinafter Participation (P) model–.

The basic framework of the model is as in DW. There is a continuum $[0, A]$ of apartments uniformly distributed in a city and a continuum $[0, W]$ of workers. Apartments are owned by the same continuum $[0, A]$ of owners and decide whether to participate in the rental market. If they do, they either look for a tenant (V) or already have a tenant (O). Workers either look for an apartment (S) or are already in one (T).

Following the standard hypothesis of search and matching models, I define $x(s, v)$ as the matching function with s being the number of people looking for an apartment and v the number of vacant units on the market. Noting $\theta = v/s$ as the market tightness we find the following matching probabilities:

$$q(\theta) = x(s, v)/v = x(1/\theta, 1) \tag{1}$$

$$\lambda(\theta) = x(s, v)/s = x(1, \theta) \tag{2}$$

where equation (1) gives the probability of finding a tenant while equation (2) is the probability of finding an apartment.

I can now define the present-discounted utilities of each of the four possible states in a form of four Bellman equations:

$$rS = z + \lambda(\theta).(T_j - S) \tag{3}$$

$$rT_j = u - R_j + \delta(S - T_j) \tag{4}$$

$$rV_j = -t + q(\theta).(O_j - V_j) \tag{5}$$

$$rO_j = R_j + \delta(V_j - O_j) \tag{6}$$

where r is the discount rate, $z > 0$ is the utility flow independent from housing, $u > z$ is the fixed utility of living in an apartment, t is the tax on vacant units and R_j is the rent. I can then compute the gains from renting as:

[6] estimated to be around 226 days by Djankov et al. (2002)

$$O_j - V_j = \frac{R_j + t}{r + \delta + q(\theta)} \tag{7}$$

To determine the rent, I use the Nash bargaining solution like in DW (see their paper for calculation details). The optimal rent is obtained after maximising total surplus $(T_j - S)^{\beta}(O_j - V_j)^{1-\beta}$ where β is tenant's bargaining power. From the solution to this problem I obtain the following *Rent Bargaining* curve in the (θ, R^*) plane:

$$R^* = K_1(\theta)[u - z + t] - t \tag{RB}$$

with equation K_1 equal to

$$K_1(\theta) = \frac{(1-\beta)(r + \delta + q(\theta))}{r + \delta + \beta\lambda(\theta) + (1-\beta)q(\theta)} \in [0,1] \quad \text{with} \quad \frac{dK_1(\theta)}{d\theta} < 0 \quad \forall\theta \tag{8}$$

In order to include a participation dimension, I add a fifth present-discounted utility:

$$rV_j \geq b_j - t \tag{9}$$

Equation 9 indicates that owners offer their apartment in the housing market if the discounted value of having a vacant unit on the market is greater or equal than the utility of having an empty unit (b_j) minus the tax (t). b_j can be interpreted as the utility derived from being able to use the apartment at any time or as the lack of rent default risk. There is then a cutoff value b^* such that all owners with a $b_j > b^*$ do not participate in the rental housing market. When replacing equations 5, 7 and RB into 9, we can obtain the optimal b^* as a function of θ:

$$b^* = q(\theta)\frac{K_1(\theta)(u - z + t)}{r + \delta + q(\theta)} \quad \text{with} \quad \frac{b^*}{d\theta} < 0 \quad \forall\theta \tag{10}$$

The proportion of inactive apartments can be writen as $i/A = 1 - F(b^*)$. Note that a tax on vacant apartments reduces inactivity by increasing the optimal b^*.

Like in DW, in the steady state, market tightness θ, the number of vacant units v, the number of searchers s and the number of occupied units o are constant. Moreover, in the steady state there are no transition in and out of inactivity, hence the number of inactive units i is fixed. Then, noting that $o = W - s = A - i - v$, the stationarity conditions needed to close the model are:

$$\lambda.s = \delta.o \tag{11}$$

$$q.v = \delta.o \tag{12}$$

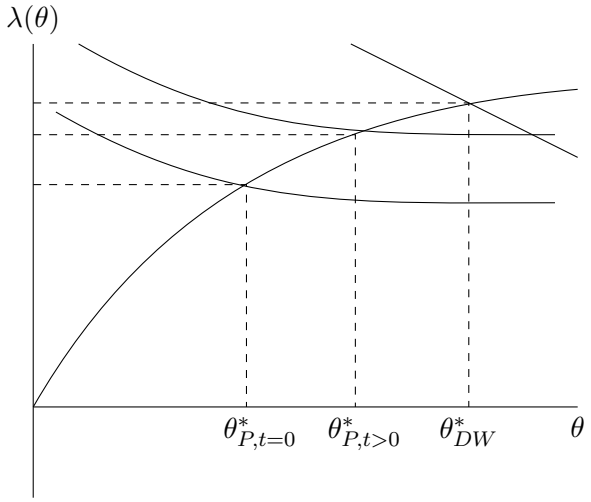
From the stationary conditions and using the relation $\theta = \lambda/q$ I obtain the following steady state conditions:

$$\begin{aligned} \lambda(\theta) &= \delta\frac{A - i - \theta W}{W - (A - i)} = \delta\frac{AF(b^*) - \theta W}{W - AF(b^*)} \\ q(\theta) &= \frac{\delta}{\theta}\frac{A - i - \theta W}{W - (A - i)} = \frac{\delta}{\theta}\frac{AF(b^*) - \theta W}{W - AF(b^*)} \\ o(\theta) &= \frac{A - i - \theta W}{1 - \theta} = \frac{AF(b^*) - \theta W}{1 - \theta} \end{aligned} \tag{13}$$

In the short term, both the stock of housing and the total number of workers are fixed. Hence the optimal market tightness can be obtained by plotting equation 2 and the first steady state condition in 13. While in the DW model the first steady state condition is a linear function of θ, in the Participation model it depends on the model parameters. I calibrate this curve by giving different plausible values to the parameters and I find that, when $W > A - i$, the curve is decreasing and convex in θ[7]. Figure 1 plots first equation in 13 for different scenarios. One can notice that introducing the participation dimension reduces the optimal level of market tightness ($\theta^*_{P,t=0} < \theta^*_{DW}$). Moreover, while the introduction of a tax on vacancy does not change the equilibrium level of θ in the DW model, it does affect θ in the Participation model. In fact, introducing a tax on vacant units brings the equilibrium θ closer to the DW level where full participation is assumed.

It is important to take into account the effect of t in θ when assessing the effect of a tax on inactivity i. Knowing that i depends negatively on b^*, I am interested in determining the impact of the tax on $b*$ (directly and also through θ). Again, I calibrate this equation with plausible values of the model parameters and I find that $\partial b^*/\partial t > 0$. Hence, when a tax on vacancy is introduced inactivity decreases.

Figure 1: Equilibrium level of θ

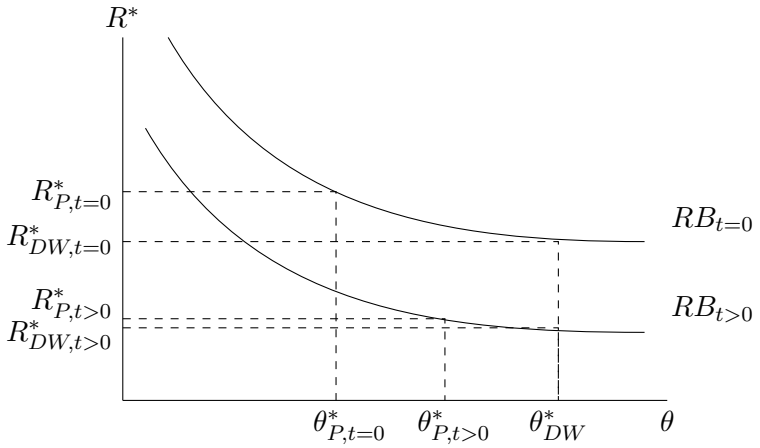


I then plot in Figure 2 two *Rent Bargaining* curves – with and without tax – with the optimal level of θ to obtain the optimal rent. We observe that the introduction of a tax reduces rents in both models although the reduction is larger in the Participation model since it also comes from the fact that θ^* has increased. In fact, in DW model, rents decrease because owners are willing to accept lower prices in order to reduce their vacancy duration and hence pay lower taxes. In the Participation model, the rent reduction is caused not only by the previous mechanisms but also by the fact that more apartments that were previously inactive are reincorporated into the market.

Like in DW, two last equations in the (v, s) plane complete the model: $v = \lambda^*.s$ and the stationary condition – SS – (9), which is a *Beveridge* curve

[7]In order to do the calibration I assume a matching function in the form of $x_0\theta^\alpha$ and an $F(.)$ in the form of the uniform cumulative distribution. The range of values used for calibration are $x_0 \in (0, 10], \alpha \in (0, 1), z \in [0, \infty), u \in [0, \infty), r \in [0, 1], \delta \in (0, 1], t \in [0, \infty)$ and $\beta \in [0, 1]$.

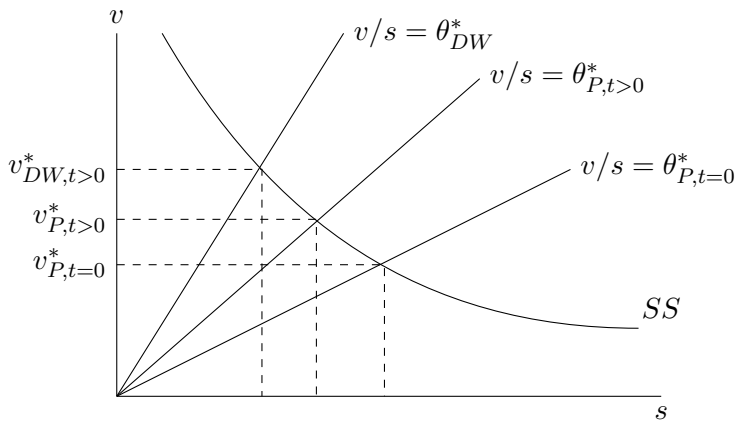
Figure 2: Steady State of θ^* and R^*



$$\lambda(v/s).s = \delta.(W - s) \tag{SS}$$

Figure 3 shows that the equilibrium level of vacancies increases with the introduction of a tax, bringing it closer to the equilibrium of the full participation model (DW).

Figure 3: Steady State of v^* and s^*



In the housing market, the number of vacancies on the market is rarely separated from non-participation in the market. Hence, total vacancy is usually defined in official records as:

$$\mathbb{V} = v + i \tag{14}$$

In order to determine the impact on $\mathbb{V}$ of the introduction of a tax, it is necessary to know if the decrease in i is larger or lower that the increase in v. One way is to look at the alternative state o. Knowing that the total stock of housing A is fixed in the short term and equal to $i + v + o$, if part of the decrease in i translates also into an increase in o it would mean that total vacancy decreases since $\Delta i > \Delta v$. When I calibrate the third equation in 13, I find that $\partial o(\theta)/\partial t > 0$. Hence, when the tax on vacancy increases, the number of occupied units increases as well (since θ increases) and therefore $\mathbb{V}$ decreases.

In conclusion, this simple model helps us to understand the consequences of the implementation of a tax on vacant units. The introduction of impartial participation in the model allows us to separate the impact on the flow of apartments offered in the market (positive) from the impact on inactive housing units (negative). The model predicts that the decrease in inactive units will translate both in an increase of vacant and occupied apartments and hence total vacancy, as defined by official record, will decreases. For the remaining of the paper, I use the term *vacant* to refer to the sum of the stock of vacant units on the market plus the inactive units. In the following sections, I take these predictions to the data to evaluate to what extend they can be validated empirically.

Unfortunately, the model does not allow us to evaluate the impact of the tax in the long term, where A and W are no longer fixed. Intuitively, one could think of more complex forces in the long term that make predictions on price effects more ambiguous. On the one hand, there is the negative incentive for new construction in taxed cities, which could lead to higher equilibrium housing prices and rents. There can also be positive effects on equilibrium prices if I consider that high vacancy rates come with some negative amenities (urban crimes, increased fire risks, reduced social interactions at a local level, etc.) which are capitalised into lower housing prices and rents. A reduction of vacancy will then reduce as well such negative amenities and hence translate in higher prices. On the other hand, a long term deflationary price effect could be expected if I consider the impact of vacancy periods on housing quality. By reducing the frequency and the length of vacancy, this type of policy could reduce the speed of regeneration or quality improvement of the actual housing stock, which could lead to lower long run equilibrium prices. In the empirical part, I assess the impact of a vacancy tax on housing prices in the medium term.

3 Institutional setting

In France, where 3,6 million people are housed under unsatisfactory conditions (*Fondation Abbé-Pierre*, 2014), housing is a sensitive topic. The intervention of the government on the housing market is substantial, corresponding to a 2% of the budget in 2010, twice the EU25 average, 0.9% (EUROSTAT, 2010). The implementation of a tax on vacancy changed incentives of the owners both directly and through its interaction with other existing housing taxes. Hence, it is important to take into account the fiscal environment when the tax was implemented.

Like in many other countries, in France there is a property tax (*Taxe Foncière*) charged on owners of habitation, commercial or industrial dwellings. It is a municipal tax whose base is one half of the rental value[8] and whose rates are decided at the local level, with an average of 29% at the national level in 2004.

A part from a tax on property, there is also another tax on housing (*Taxe d'Habitation* or TH) to be paid by every individual living in a dwelling, either in ownership or tenancy regime and both for primary and for secondary residences. Therefore, this tax is charged to all dwellings but empty ones. It is as well a municipal tax; hence tax rates are decided by local authorities. In 2003, the average tax rate of the TH for all municipalities in France was 8.8% and for the municipalities in the group of analysis it was 14.5%, this is equivalent to 513€ on average.[9] All primary residences are subject to tax allowances, some of which are

[8] Estimated yearly rent income.

[9] Unfortunately, the information on tax rates from before the implementation of the tax on vacancy is

imposed by the central government and others are decided at the council level. Moreover, there are also full exemptions for low-income households, disabled individuals and people over 60 years old who are under a certain income threshold. On average, households pay for their primary residence an effective tax rate which is 1.5 percentage points lower than the level established by the municipality. Hence, the TH is only fully paid by owners of secondary residences and by high income households on their primary residences.

On July 29th 1998, the French government passed a law to create a tax on vacant dwellings (Taxe sur les Logements Vacants or TLV), which was then implemented on January 1st 1999. The rationale behind the introduction of TLV was to encourage owners of empty dwellings to re-introduce their properties into the market in order to improve the efficiency of the current housing stock in areas with a high demand for housing. The tax concerned only those municipalities belonging to *urban units*[10] of more than 200,000 inhabitants and with a "substantial disequilibrium" between supply and demand at the expense of low-income people. The list of the concerned municipalities was published in the Décret Numéro 981249 on December 29th 1998. It included 680 municipalities in eight urban units (Paris, Lyon, Lille, Bordeaux, Toulouse, Montpellier, Nice and Cannes-Grasse-Antibes).

The tax concerned all those dwellings with a minimum level of comfort that had been vacant, i.e. empty of furniture, for more than 2 years. A vacant dwelling is defined as a unit that has been inhabited for less than 30 consecutive days during the previous two years. The TLV has an increasing tax rate which base is the rental value, this is, the potential annual rent that the property could produce had it been rented.[11] In particular, the tax rate of TLV is equal to the 10% of the rental value during the first year when the tax is due (after 2 years of vacancy), 12,5% for the second year (between 3 and 4 years) and 15% for longer periods (more than 4 years of vacancy). This means that the TLV is in average lower than the TH for the first and the second year but higher for longer periods of vacancy. The average rental value for the group of taxed municipalities is 3,543€, hence the amount of the tax will be 354€, the first year, 443€ for the second year of vacancy and 532€ onward. Public housing, dwellings requiring important reconstruction works or affected by urban plans of rehabilitation or demolition and involuntarily vacant units are exempted from the tax. Involuntary vacant units include dwellings that are on the market but cannot find a renter or a buyer.

Each household can have only one primary residence, which is defined as the dwelling where they usually live and where they have the center of the professional and material interests. Any other dwelling owned by the same household will be considered either a secondary residence (if it pays the TH) or a vacant dwelling. In the latter case, the tax authorities will collect the vacancy tax, provided that the dwelling is in one of the municipalities concerned by the tax. Households can then contest the payment of the tax through different ways. First they can prove that the dwelling is in fact occupied providing electricity or water bills and a copy of the payment of the TH. Second, they can prove that

not available

[10] INSEE defines a "urban unit" as an area of continuous construction (without a separation of more than 200 meters between buildings) with at least 2,000 inhabitants.

[11] Rental value does not properly represent the value of the house. This is due to the fact that the methodology applied to compute it uses a fixed rate to update the value of the rental value from 1970. While the law that established such methodology in 1974 expected an update every two years and a general revision every six years, neither of them have taken place. As a result, there is a widening gap between rental value and real renting prices.

the dwelling is in the process to be rented or sold by showing that the price asked is reasonable i.e. close to the rental value. Third, they can show the dwelling is not habitable by providing a proof of the state of the dwelling.

Owners faced with the tax can react in multiple ways. On one side, they can decide to do nothing and keep paying an increasing amount of the tax in subsequent periods. Otherwise, they can decide to mobilise the dwelling which includes, offer the unit for sell or rent, use it as a secondary residence or give it to a family member. Shifting the unit to a secondary residence is the most costly option since the dwellings have to be furnished and the owners have to start paying the TH for secondary homes, which as stated before, is higher than for primary residences. Therefore, the system of incentives of taxes on housing was changed when the TLV was introduced in a way that owners were encouraged to move their dwellings out of vacancy while keeping the swift to secondary residences as the most costly option.

In 2006 a new tax was implemented, the *Taxe d'Habitation sur les Logement Vacants* or THLV that allowed the rest of the municipalities to vote the implementation of the tax in the municipal council. Contrary to the TLV, the THLV only concerned those dwellings that have been vacant for more than five years (instead of two for the TLV) and the tax rate is decided at the municipality level (the average is 10%). Given that the THLV applies to dwellings and charges a lower tax rate, only municipalities where TLV was not in place could choose to introduce THLV.

Finally, in 2013, the TLV was reinforced with an increase in the tax rate (to 12,5% of the rental value for the first year and 25% for the second year and onwards) and the reduction of the threshold for compulsory implementation from 200,000 to 50,000 inhabitants. A second decree was published with the list of the municipalities where the implementation of the TLV was compulsory. It included 1151 municipalities from 28 urban units. The period of vacancy accepted before paying the tax was as well reduced from two to one year.

4 Data

I exploit the fiscal data-set FILOCOM (FIchier des LOgements par COMmune) containing information on the payments of the *Taxe d'Habitation* (TH) for every dwelling in metropolitan France from 1995 to 2005. The data-set consists of around 30 million observations per year distributed in 36,170 municipalities. For the analysis I aggregate the data at the municipality level. [12]

FILOCOM is available from 1995 to 2013, every odd year. However, I only use it up to 2005 because in 2006 there was an extension of the tax (THLV) and in 2007 the beginning of the financial crisis which could blur my results. This data-set, created by the General Direction of Public Finances (DGFIP), contains information on the characteristics of the housing stock (surface, level of comfort, building characteristics), on household's characteristics (income, household's size, age of the members) and on the status, the mode and the length of occupation and vacancy. The variable status of occupation classifies dwellings into three categories according to usage: inhabited by the owners, inhabited by renters — either in private, collective or social housing regime — or others uses — such

[12] Unfortunately, I cannot use panel data at the housing unit because observations do not have an identifier and hence it is impossible to track them over time.

as free occupancy or rural lease —. There is also a variable that allows us to identify three[13] categories of occupancy (primary residence, secondary home or vacant). Even if only primary and secondary homes pay the TH, vacant dwellings are still kept in the data-set. Other interesting variables are the length of occupancy (or vacancy) and the rental value, which is the tax base for both the TH and the vacancy tax (TLV). Nevertheless, one needs to be cautious when evaluating the rental value since there is a widening gap between rental value and real renting prices.[14]

The status of vacancy is measured in FILOCOM according to the situation of the dwelling on the 1st of January of a given year. This is, if an dwelling was non-occupied and empty of furniture on the 1st of January 1997 it did not pay the TH in 1997 and hence is considered as vacant. Then, the vacancy rate is computed by dividing the total number of vacant dwellings in a municipality over the total number of dwellings in such municipality. It is important to notice that not all vacant dwellings are subject to the tax, only those that have been vacant for at least two years. Given that social housing institutions (HLM and SEM in the French government's terminology) are not subject to the TLV, I do not consider the vacancy on the social sector. Hence, the outcome of interest will be the private vacancy rate.

I also use other data-sets from INSEE for the basic characteristics of a municipality. Namely, population census, growth and density are going to be used as controls for the regression models. Data on prices comes from the Chamber of Notaries of France.

5 Empirical Strategy

I implement a Difference-in-Difference (DID) estimation strategy exploiting the fact that not all the municipalities were subject to the tax in 1999. The DID strategy is a mean comparison design that consists in creating a counterfactual outcome for the treatment group using the outcome of the control group (Lechner et al., 2011).

The treatment group for the DID approach includes all taxed municipalities, those that belonged to urban units of more than 200,000 inhabitants in 1999 and with a significant imbalance between housing supply and demand. The group of urban units was chosen by the central government and the tax was imposed into the local authorities, which had no decision power in the implementation nor on the choice of the tax rate. Hence, one should not be concerned about municipalities selecting themselves into or out of the treatment group. In total, 672 urban municipalities, belonging to 7 urban units (metropolitan areas) were taxed. For the treatment group, I use 300 municipalities, from 6 urban units because I exclude the urban unit of Paris (region of Île-de-France).[15] Indeed, Île-de-France has a very unique housing market as far as demand pressure and prices are concerned. Keeping it in the sample would make the common trend assumption less believable since the evolution of market prices and housing variables in Île-de-France can very well be affected differently

[13] There is actually a forth category as well that includes part of commercial properties which are partially accommodated to live, they represent less than 0.5% of the sample and are therefore excluded from the sample.

[14] See footnote 11

[15] Given that housing market in the region of Île-de-France is under much more pressure than the rest of the country, I exclude it from the sample. Such higher pressure can be observed in average price per square-meter, which is as high as 5,470€/m^2 for Île-de-France while roughly around 3,000€/m^2 for the rest of large cities (3,210€/m^2 in Lyon and Toulouse, 2,930€/m^2 in Bordeaux, 3,070€/m^2 in Lille and around 2,500€/m^2 in Marseilles, Nantes and Rennes) (Chambre de Notaires de Paris, June 2013.)

by external factors and hence, experience a trend in outcomes different from the one in other French cities. Although removing Île-de-France implies a reduction of the treatment group by half (to 300 municipalities instead of 672) results are still significant since the sample is large enough. In fact, this exclusion does not change the magnitude nor the significance of the coefficients in any of the results tables (see Table A3 in Appendix 2). It only changes the placebo test coefficients that become positive and significant in one of the specifications, which indicates that indeed the treatment group including Paris could have experienced a different trend than the control group.

Figure 4: Distribution of treatment and control urban areas across France

Notes: Blue areas represent urban units with the tax (treated) and orange areas urban units without the tax (control).

Figure 4, shows the distribution of treatment and control urban units across the country. It can be seen that the sample is made of urban units spread among all the country. Most regions have either treatment or control urban units and only three of them — Nord Pas de Calais, Rhône-Alpes and Provence-Alpes Côte-d'Azur — have both.

As for the control group I use the rest of the municipalities belonging as well to urban units of more than 200,000 inhabitants but that according to the central government did not have a substantially large enough "disequilibrium between supply and demand" and hence, were not affected by the tax on vacancy. In this group there are 623 municipalities belonging to the other 23 urban units of more than 200,000 inhabitants.[16]

Even though the context of the implementation of the TLV could look like the optimal context for a Regression Discontinuity Design, it is actually not the case. First of all, it would require taking the analysis at the unit urban level which would substantially decrease

[16]This includes Avignon, Béthune, Saint-Etienne, Metz, Douai-Lens, Toulon, Marseille-Aix-en-Provence, Dijon, Brest, Rennes, Tours, Grenoble, Nantes, Orléans, Angers, Reims, Nancy, Valenciennes, Clermont-Ferrand, Strasbourg, Mulhouse, Le Havre and Rouen.

observations (only 7 urban areas were taxed). Secondly, the forcing variable, in this case, population at the urban area is not continuous around the 200,000 threshold. There are 8 urban areas between 150,000 and 200,000 inhabitants and 6 between 200,000 and 250,000. Thirdly, the threshold is not binding to the treatment assignment, which would require a fuzzy RDD strategy, but most importantly, none of the urban areas right after the threshold is treated. Actually, the first treated urban area had 290,000 inhabitants. These issues make the implementation of an RDD strategy not feasible.[17]

The main advantage of the DID strategy is that it allows for the two groups to start from a different level of outcome as long as they experienced a similar change over time in the absence of the treatment. The DID strategy relies on one very important assumption: the common trend assumption. It implies that both groups, conditional on observables, should have experienced the same trend on the outcome variables had there been no treatment. Hence, if the common trend assumption holds, any deviation of the trend of the treated group from the trend of the non-treated can be directly attributed to the effect of the treatment.

$$E[V_{0t'} - V_{0t} \mid TLV = 0] = E[V_{0t'} - V_{0t} \mid TLV = 1]. \tag{15}$$

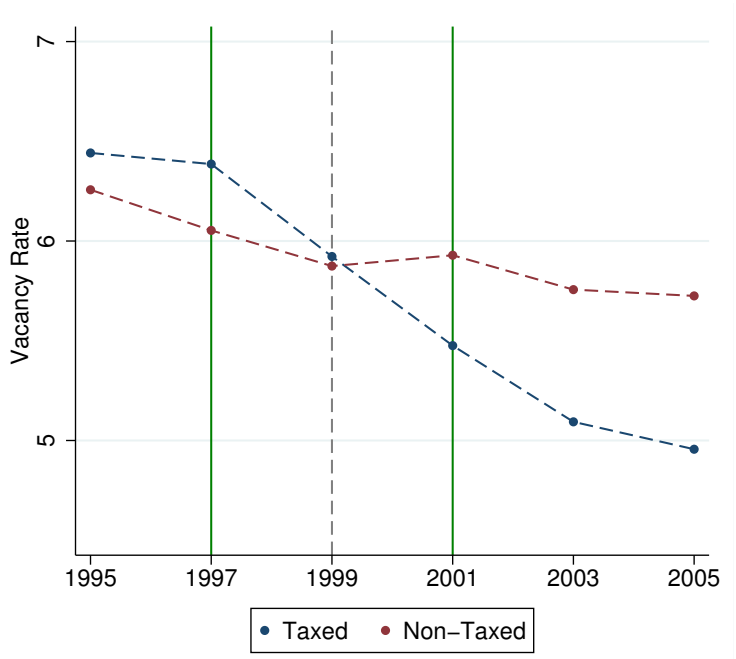
In other words, the evolution of the vacancy rate in the treatment group – right part of equation 15 – would have been the same than the one in the control group had it not been treated. Moreover, I also need to assume that the treatment had no effect whatsoever before its introduction (or announcement). This is indeed plausible in this case, since the owners of vacant dwellings could not have predicted the approval of the tax before its announcement in 1998.

As for the choice of the time period, ideally, one would like to have information from the point immediately before any sort of treatment and then compare it with a point in time when the tax is already in place. In the data-set, I have two points in time before the implementation: 1995 and 1997. Technically, data from 1999 contains information on the very first day of the implementation of the tax, January 1st, 1999. Consequently, it is ambiguous whether the point 1999 should be considered as pre- or post- treatment. Moreover, given that the tax was already announced in July 1998, it would be reasonable to expect some anticipation from the households. This is, some households might have been affected by the tax even before its implementation and might have changed their behaviour already during the second half of 1998. Ideally, I would like to use 1998 as a pre-treatment point but since data is only available every odd year, I use 1997 instead. This way, I make sure I am capturing the entire effect of the tax (anticipation and direct effect) while I still have two periods before the implementation of the law to check the common trend assumption.

Figure 5 shows the evolution of vacancy rate for taxed municipalities (in blue) and for non-taxed ones (in red). First, one can notice that the starting level of vacancy in 1995 for the treatment group is higher than in the control group, which could justify the choice made by the French administration when determining the municipalities with a "higher disequilibrium between supply and demand". Secondly, it can be seen that the vacancy rate decreases only slightly for non-taxed municipalities, less than 0.5 percentage points

[17] I tried also a geographical selection of treatment and control by selecting the municipalities just outside of taxed urban units. The issue with this strategy is that control municipalities were generally more rural and differed much more with the treatment ones than when using a DID strategy.

Figure 5: Evolution of vacancy rate



Notes: This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities. Each observation has a weight of 1 (weighted results are available under demand). Taxed municipalities include all taxed urban units except Paris (300 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from FILOCOM data-set for years 1995 to 2005.

in a 10-years period whereas it decreases significantly in taxed municipalities, going from 6.5% to 5%, and reaching a level below the control group. The gray dashed line indicates when the tax was officially implemented and the green vertical lines, the pre and the post time points compared, 1997 versus 2001.

Figure 5 also allows to visually check the common trend assumption by looking at the slope of the outcome between 1995 and 1997. The trends for the treated and the control group are both slightly decreasing and almost parallel, which makes the common trend assumption fairly plausible. At worst, the fact that the treatment group is decreasing less then the control group could lead to an underestimation of the true effect, which would make the estimates a lower bound.

Even if the pre-trends look fairly similar, the two groups may still systematically differ due to the discretionary nature of the selection rule applied by the government. Indeed, the descriptive statistics displayed in Table 1, show that most of the observable characteristics (except private vacancy rate and total population) are statistically different in the two groups. Treatment municipalities tend to have a higher vacancy rate, higher average income and be under higher demographic pressure. Despite not being a required assumption for the DID model, the fact that the groups were different before the implementation of the tax makes the common trend assumption slightly less plausible. Specially, the differential trends in population growth might be an underlying sign of differential trends in economic factors. Hence, I tackle this issue first by including controls and control-specific time trends and after by combining the DID strategy with a Propensity-Score Matching strategy, which weights observations in the treatment and the control group according to observable characteristics. I further address the question of selection of the treatment group in the

Robustness Test section.

Table 1: Descriptive statistics 1997

	Taxed		Non-Taxed				
	Mean	Std Dev.	Mean	Std Dev.	Difference	t-value	p-value
Vacancy Rate	6.32	3.18	5.87	2.88	-0.45	2.14	0.03
Private Vacancy Rate	6.39	3.25	6.05	2.99	-0.34	1.54	0.12
Av. Income (€/year)	22,463	5,587	19,027	5,427	-3,435	8.92	0.00
Population	15,485	42,171	13,090	40,436	-2,395	0.83	0.41
Population Growth	7.3	11.86	3.96	9.06	-3.34	4.73	0.00
Density	1,194	1,499	918	985	-276	3.33	0.00
Rental Value (€)	18,200	5,055	15,156	4,487	-3,044	9.26	0.00
Surface (m^2)	90.24	13.71	84.63	11.40	-5.61	6.55	0.00
Primary Residence	89.21	9.81	91.60	5.83	2.39	-4.62	0.00
Social Housing	10.36	12.40	12.86	11.93	2.50	-2.95	0.00

Notes: Data comes from FILOCOM data-set for year 1997 plus INSEE data-sets on demographic characteristics of the municipalities. Treatment group has 300 observations while Control group has 623.

For that purpose, I first estimate the probability of having been assigned to the tax as a function of a set of observable variables with a Probit Model (equation 16) and obtain a propensity score for each observation. The variables that I use to estimate the model are total population and density, average yearly income of the household, average surface, percentage of social housing, the initial level of vacancy in 1997, the initial level of rental value, the proportion of primary residences and the population growth between 1990 and 1997.

$$PS(TLV_m = 1|X_m) = \Phi(\beta X_m). \tag{16}$$

For the matching strategy to be valid I need to check that there is Common Support, meaning that for each level of X there is a positive probability of being assigned to treatment (equation 17).

$$0 < PS(TLV_m) < 1. \tag{17}$$

Figure A6 in Appendix 2 shows that for each observation in the treatment group there is at least one in the control group with a similar level of propensity score. Hence, I do not have to remove any observation of the sample to ensure a common support.

Then I match observations according to their propensity score using the Kernel method, which matches observations in the treatment group to a weighted average of the observations in the control group. Weights depend on the distance between observations with respect to propensity score, the closer, the higher the weight. The main advantage of using a Kernel method is that all observations are used, which reduces the variance of the estimators. Figure A7 in the Appendix 2 shows the evolution of vacancy weighted by the Propensity Score. It shows that while trends were parallel before the treatment, the introduction of the tax caused a negative change in the trend of the vacancy rate of taxed municipalities.

Finally, I perform another test to check that the matching strategy has been appropriately computed. In particular, I want to make sure that the Kernel algorithm has

Table 2: Balancing Test for the covariates

	Unmatched /Matched	Mean T	Mean C	Difference	t-value	p-value
Vacancy Rate	U	6.32	5.87	0.45	2.14	0.03**
	M	6.32	5.91	0.40	1.53	**0.13**
Private Vacancy Rate	U	6.39	6.05	0.33	1.54	0.12
	M	6.39	6.04	0.35	1.29	**0.20**
Av. Income (€/year)	U	22,463	19,027	3,436	8.92	0.00***
	M	22,463	23,488	-1,025	-1.91	**0.06***
Population	U	15,485	13,090	2,395	0.83	0.41
	M	15,485	13,669	1,816	0.60	**0.55**
Population Growth	U	7,30	3,96	3,34	4,73	0.00***
	M	7,30	7,29	-0,01	-0.00	**0,99**
Density	U	1.194	918	276	3.33	0.00***
	M	1.194	1.099	95	0.80	**0.43**
Rental Value	U	2,775	2,310	464	9.26	0.00***
	M	2,775	2,832	-58.4	-0.86	**0.39**
Surface (m^2)	U	90.24	84.63	5.61	6.55	0.00***
	M	90.24	91.74	-1.50	-1.21	**0.23**
Primary Residence	U	89.21	91.60	-2.39	-4.62	0.00***
	M	89.21	90.19	-0.98	-1.38	**0.17**
Social Housing	U	10.36	12.86	-2.50	-2.95	0.00***
	M	10.36	10.16	0.20	0.21	**0.84**

Notes: The unmatched rows provide the means for the treatment and the control group as in Table 1. The matched rows take into account the matching weight for the control group. Data comes from FILOCOM data-set for year 1997 plus INSEE data-sets on demographic characteristics of the municipalities. Treatment group has 300 observations while Control group has 623.

weighted observations in a way that descriptive statistics of the resulting groups are similar to each other. For that purpose, I report in Table 2 the balancing test for the matching strategy. I report as well the p-value resulting from a means different t-test between the two groups both for the unmatched and the matched sample. It can be seen, that once the matching is performed, the treatment and control group are much more similar in terms of descriptive statistics. All means appear to be not statistically significant between treatment and control once the matching is applied, except for some statistically differences in the average income. Therefore, differential trends in population growth are no longer an issue with the DID Matching given that the two groups have now non-significantly different levels of population growth.

In the traditional DID model one would regress the outcome to a treatment dummy, a dummy indicating the time (before or after the treatment) and the interaction of these two. However, I need to use the first difference of the outcome to implement the matching strategy, since it does not allow for interaction terms. Hence, to be consistent with the matching strategy I implement the simple DID using as well the first difference of the outcome and regressing it against a treatment dummy and the first difference of the controls. This is identical to the implementation of the traditional DID with individual fixed effects.

Formally, the model I estimate is:

$$\Delta V_{m,t} = \delta TLV_m + \gamma_1 \Delta X_{m,t} + \varepsilon_{mt} \tag{18}$$

where $V_{m,t}$ is the ratio of vacant dwellings over the total stock of housing defined in municipality m at time t, TLV_m is a dummy equal to 1 if the municipality was concerned by the tax and zero otherwise, $X_{m,t}$ is a vector of time changing housing and demographic characteristics at the municipality level and ε_{mt} is the error term. I use the first difference of the vacancy rate and of the controls, where $t-1$ represents the period before the implementation of the tax and t the moment where the tax is in place. The use of the first difference allows us to cancel out the effect of all time invariant characteristics, hence I only need to control for the variables that change over time. In further regressions I use also the difference in the outcome for subsequent years to see the yearly effect of belonging to the taxed group up to 6 years after its implementation. In some specifications, I estimate equation 19 which includes a specific time trend for each covariate ($\gamma_2 X_{m,t-1}$).

$$\Delta V_{m,t} = \delta TLV_m + \gamma_1 \Delta X_{m,t} + \gamma_2 X_{m,t-1} + \varepsilon_{mt} \tag{19}$$

I include all observable variables that could lead to a differential time trend. This is, I have selected the covariates X whose evolution differed between treatment and control. I include a group of demographic variables such as total population and density and a group of housing controls with the average yearly income of the household, the average surface and the percentage of social housing.

Given that observations are grouped into 29 different urban units, it is reasonable to think that municipalities are not independent from one another. Hence, standard errors are block bootstrapped at the urban unit level.[18]

6 Results

Table 3 presents the main results of the DID strategy of the effect of the TLV on the private vacancy rate, two years after its implementation. It is the result of estimating equation 18 and 19. I compare the number of vacant dwellings over the total stock of housing for taxed and non-taxed municipalities in 1997 and 2001. Columns (1) to (4) report four different OLS specifications while columns (5) and (6) report the matching results.

Column (1) is the direct DID estimator without any other controls, in column (2), I include the two sets of controls described above (housing and demographic controls). In column (3) I add specific time trends for all baseline characteristics. and in column (4) I check the heterogeneous effects according to the initial level of vacancy.[19]. This means, I include a dummy for high initial vacancy rate and I interact it with the treatment.[20] The coefficient TLV represents the average impact of the tax on those municipalities where TLV was implemented. Columns (5) and (6) present two matching regressions that differ in the way propensity score is estimated. In column (5) I use housing and demographic controls and in column (6) I add the previous trend of the vacancy trend (between 1995 and 1997) to account for similarities between municipalities that are due to the pattern of vacancy. The effect is negative and statistically significant in all specifications, both for the

[18] Given that the number of clusters is considerably low (30 urban units) a block bootstrapped treatment of the standard errors is preferred to the standard clustering method.

[19] See Table A4 for the coefficients of each of the controls.

[20] HighVac equals 1 if vacancy rate is higher than 7.46%, which corresponds to the percentile 75 of the distribution

Table 3: Effect of TLV on vacancy rate, comparing 1997 to 2001

	OLS				Matching	
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	-0.910***	-0.640***	-0.647***	-0.310*	-0.745***	-0.759***
	(0.154)	(0.136)	(0.136)	(0.188)	(0.140)	(0.143)
HighVac				0.175		
				(0.202)		
TLV*HighVac				-0.694***		
				(0.190)		
Housing Controls		X	X	X	X	X
Demographic Controls		X	X	X	X	X
Vacancy Pre-Trend						X
Specific Time Trends			X	X		
N	923	923	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. Controls are included in its first difference form. Specific time trends are the controls at the baseline level, 1997. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-97 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities. Treatment group has 300 observations in 6 clusters while Control group has 623 in 23 clusters per year.

OLS and for matching. The resulting effect size is a reduction of 0.8 percentage points.[21] Considering that the average vacancy rate for taxed municipalities in 1997 was 6.32% a decrease of 0.8 percentage points is equivalent to a 13% reduction. In absolute terms, there were 40,000 less vacant dwellings in treated municipalities than there would have been without the implementation of the tax. These results confirm the model predictions that a tax on vacancy decreases total level of vacancy, this is, the sum of vacant units on the market plus inactive units.

The magnitude of the coefficient might seem surprising given the relatively small tax payment associated with the TLV. However, there is accumulating evidence suggesting that individuals are inattentive to some types of incentives (Chetty et al., 2009). In this context, a tax on vacancy is more salient than the forgone revenue from renting a dwelling. Hence the introduction of the tax changes the incentives of the owners not only by the tax liability but also by making more salient the cost of keeping a property vacant.

In terms of policy implications it is interesting to look at the heterogeneity of the effect with respect to the initial level of vacancy. I check for this in column (4) where the interaction coefficient appears to be significant and negative. The magnitude of the interaction is -0.7 which means that the effect of the tax is twice as high for cities with an initially high level of vacancy.

[21] The effect of the tax is much higher if I weight municipalities by the number of housing units (see table A5). Indeed, when accounting for the size of the city, the reduction of vacancy rate due to the TLV equal 1 percentage points. This means that the tax was more effective in large cities.

Table 7 provides the yearly effect of TLV taking 1995 as a reference year. Here, I compute the first difference for every available year taking 1995 as a baseline. This allows us to see how the vacancy rate changed in treatment versus in control municipalities every period. Columns (1) to (3) report the impact of the tax on the difference in vacancy rate for different periods in an OLS regression. Column (1) is the standard DID, in column (2) I include the two groups of controls and in column (3) I include a specific trend for each baseline characteristic. Columns (4) and (5) provide the results of the matching strategy.

Table 4: Vacancy rate, yearly effect

	OLS			Matching	
	(1)	(2)	(3)	(4)	(5)
TLV	-0.056	-0.014	0.170	0.081	-0.036
95 - 97	(0.141)	(0.133)	(0.197)	(0.118)	(0.144)
TLV	-0.519***	-0.210	-0.077	-0.265*	-0.338***
95 - 99	(0.086)	(0.143)	(0.230)	(0.154)	(0.162)
TLV	-0.966***	-0.583***	-0.453***	-0.730***	-0.778***
95 - 01	(0.073)	(0.146)	(0.214)	(0.181)	(0.153)
TLV	-1.348***	-0.839***	-0.641**	-1.012***	-1.040***
95 - 03	(0.175)	(0.218)	(0.312)	(0.185)	(0.158)
TLV	-1.485***	-1.032***	-0.878***	-1.269***	-1.315***
95 - 05	(0.116)	(0.138)	(0.285)	(0.186)	(0.178)
Housing Controls		X	X	X	X
Demographic Controls		X	X	X	X
Vacancy Pre-Trend					X
Specific Time Trends			X		
N	923	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each cell represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. The numbers such as 95 - 97 indicate the years compared in the first difference. All controls are as well first differentiated. Specific time trends are the controls at the baseline level, 1995. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-97 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1995 to 2005. Treatment group has 300 observations in 6 clusters while Control group has 623 in 23 clusters per year.

Coefficients of the variable TLV for the difference between 1995 and 1997 are not significant. These results indicate that the vacancy rate did not evolve in a statistically significant way for treated and non-treated municipalities before the implementation of the tax. Therefore it can be interpreted as a placebo test of the common trend assumption. Although the common trend assumption can never be really tested, the fact that the coefficient of the difference in vacancy rate before the tax was implemented are not significant indicates that the two groups evolved similarly before and hence suggest that they might have evolve equally had the tax not been implemented.

As for the difference between 1995 and 1999, coefficients are already negative and significant for some of the specifications. It suggests that there had been some anticipation effects of the tax. In Figure 5, the anticipation effect can already be seen since the vacancy

rate starts to decrease after 1997. Interestingly enough, there is also a decrease in non-taxed municipalities, which could indicate an anticipation effect happened as well in the control group, given that the list of concerned municipalities was not public until December 30^{th} 1998. Nevertheless, results suggest that anticipation effect was stronger in treated municipalities. One possible explanation is that very large urban units had a much higher probability to be treated and hence reacted more strongly to the announcement of the tax.

Lastly, the coefficients for the difference with 2001, 2003 and 2005 are negative and highly significant. The highest decrease occurred in 2001. The long term effect of the tax can be observed with the interaction with 2005 and it is equivalent to a decrease of 1 percentage points of the vacancy rate.

As in the labor market there is a *natural rate* of unemployment, in the housing market there is, likewise, a *natural rate* of vacancy (Wheaton, 1990). This means that there is an incompressible level of vacancy that will never disappear due to market frictions. When a dwelling becomes vacant, it is likely that it will remain vacant for at least a specific period of time due to frictional costs. Although the existence of a *natural rate* is generally accepted in the housing market literature, few are the estimations of its magnitude. There is, however, a report by the Economics Affaires Commission of the French Senate that reports a "generally accepted" rate of vacancy ranging between 4% and 5% (Cleach, 2003). If I take this into account, the magnitude of the estimated coefficients is very relevant since such natural vacancy rate would have been reached by the treatment group in 2005.

7 Robustness Tests

Given that the government selected the municipalities to be taxed in a non-random way, I provide a series of robustness test to show that the effect of the tax can nonetheless be properly identified.

First of all, I restrict the sample to only those regions in France that have both taxed and non taxed urban units. The reason of doing so responds to an effort to try to find two comparison groups where the common trend assumption would be even more plausible. Indeed, the fact that treatment and control urban units belong to a same region makes it more likely that they will be affected in a similar way by external factors. There are only three regions in France with treated and control urban units: Nord Pas de Calais, Rhone Alpes and Provence Alpes Cote d'Azur.[22]

I provide the results in Table 5. Columns (1) and (2) report the OLS regressions, whose coefficients are statistically significant and remain of the same magnitude. Column (3) reports the results of the Matching strategy, with a similar coefficient and the same level of significance. This indicates that results are not driven by the differential location of treated and control cities across regions.

In a second robustness test, I choose a different methodology to select the control group to check the validity and magnitude of the coefficients. An alternative control group can be constructed with urban municipalities that implemented the tax after the first reform of the law in 2006. This reform allowed municipalities not concerned by the

[22]In Nord Pas de Calais there is one treated urban unit (Lille) and three control (Béthune, Douai-Lens and Valenciennes). In Rhone Alpes there is also one treatment urban unit (Lyon) and two control (Saint-Etienne and Grenoble). And finally, in Provence Alpes Cote d'Azur there are two treatment urban units (one composed by Nice and Cannes altogether and Marseille) and three control urban units (Avignon, Aix-en-Provence and Toulon)

Table 5: Robustness Test: Testing the impact of TLV on different samples

	Regions with both T and C units			Adoption of THLV in 2008		
	OLS		Matching	OLS		Matching
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	-0.685***	-0.710***	-1.111***	-0.578***	-0.883***	-0.738***
	(0.151)	(0.158)	(0.225)	(0.126)	(0.124)	(0.127)
Housing Controls	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Vacancy Pre-Trend			X			X
Specific Time Trends		X			X	
N	515	515	515	901	901	901

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are robust for columns 1 and 2 and block bootstrapped at the urban unit level for 4 and 5 (439 clusters per sample), for the Matching, they are bootstrapped. Each column represents a different regression with first difference of the vacancy rate as the dependent variable (period 1997-2001). We use a propensity score matching strategy to weight control observations. All controls are as well first differentiated. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. Specific time trends are the controls at the baseline level, 1997. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-97 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

TLV to vote and approve the THLV (a local tax on vacancy). In 2008, there were 1,938 municipalities that had adopted the tax among which 608 were in urban areas.

The idea behind this second choice of control group is that municipalities that implemented the tax in 2008 may share some characteristics with the ones that were forced to adopte it in 1999. It is likely that municipalities that adopted the tax were also experimenting a tight housing market. In fact, those cities had as well a high level of vacancy in 1999 (7.96%), which may explain why they implemented the tax when they were authorised to do so.

When I replicate the results with this new choice of control group (Table 5 columns 4 to 6), we see that the coefficients TLV are significant and of a similar magnitude than in my main estimation, both for the OLS and the matching strategy. Hence, this alternative strategy shows that my results are not tied to the choice of the control group.

Thirdly, one could think that the reason why I find a significant effect of the tax is because the group of municipalities that were taxed had a more dynamic housing market right after the implementation of the tax. This would invalidate my empirical strategy given that I would be unable to say whether the reduction of the vacancy rate was due to the introduction of the tax or by the more active housing market.

In order to test this, I decomposed the vacancy rate according to its duration. I identify three categories: less than one year vacant, between one and two years and more than two years, which represent, respectively 43%, 14% and 42% of total vacant apartments.[23] If the group of tax municipalities had a more dynamic housing market we would expect a decrease in vacancy, regardless of its duration. Conversely, knowing that when the tax was first implemented it concerned solely those dwellings that had been vacant for at least

[23] A more detailed and continuous decomposition is not possible due to data constraints

two years, we would expect the third category to be the most affected by the introduction of the tax.

Table 6: Effect of TLV on vacancy rate, results by duration

	OLS			Matching		
Vacancy Rate by Duration	$<$ 1 year (1)	1-2 years (2)	$\geq$ 2 years (3)	$<$ 1 year (4)	1-2 years (5)	$\geq$ 2 years
TLV	-0.171**	-0.093	-0.376***	-0.145	-0.157**	-0.488***
	(0.079)	(0.060)	(0.061)	(0.095)	(0.067)	(0.074)
Mean of C in 1997	2.62	0.86	2.57	2.62	0.86	2.57
Housing Controls	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Vacancy Pre-Trend				X	X	X
N	923	923	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Last three columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. All controls are as well first differentiated. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population, population growth 90-97 and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

In table 6 we can see that, indeed, coefficients of columns (3) and (6) report a high, negative and significant coefficient. As for the other categories of the matching strategy, there is also a small and negative significant in column (5). In fact, short term vacancy seems to have been as well somehow impacted by the tax through the mechanism of anticipation. However, these results suggest that the tax did not decrease mobility in a out of vacancy but was especially effective in reducing long term vacancy. The fact that only targeted long-term vacancy decreased while short-term vacancy remained fairly constant provides some evidence against the argument of the more dynamic housing market.[24]

Finally, I perform a last robustness test to further dissipate the endogeneity concerns of the selection into treatment. So far, I was comparing a treatment and a control group which, while they shared similar trends in housing market variables, they were in different urban units. In an attempt to find two groups that are even closer to each other, I exploit the exogeneity of the timing of the release of a new definition of the urban units with respect to the timing of the tax, which allow us to identify control units that were not treated but included in the same urban units than treated municipalities.

The French government used the 1990 definition of urban units to select the municipalities to be taxed on December 1998. Then, only a few months after the introduction of the tax, the French Statistics Department released a document with the new composition of urban units. This new definition added 73 municipalities into the taxed urban areas that were not included into the decree with the list of taxed municipalities. Hence, the fact that these municipalities were not taxed is somehow random and only due to the timing of the documents releases, which is not something that municipalities could have

[24] I perform a similar robustness test comparing social and private vacancy, see Section A in Appendix

manipulated. This provides us a source of exogeneity and allows us to compare two groups of municipalities that are more similar to each other, given that they all belonged to the same urban unit.

I use these 73 municipalities and I compare them with a group of bordering taxed municipalities (See Figure A9 for the example of Bordeaux). I select only those treated municipalities that share a border with at least one of the 73 recently incorporated municipalities in order to make sure that the two groups are as similar as possible; this adds up to 108 treated and bordering municipalities. In Table A6 I compare the characteristics of treated and control municipalities in 1997 and we observe that at least half of the baseline characteristics are not statistically significant any more. The two groups differ in terms of population and average rental value but they started initially with similar vacancy rates and average income.

Table 7: Effect of TLV on vacancy rate, bordering municipalities

	OLS			Matching	
Vacancy Rate	(1)	(2)	(3)	(4)	(5)
TLV	-0.762***	-0.389***	-0.339***	-0.531*	-0.551*
	(0.238)	(0.140)	(0.137)	(0.303)	(0.310)
Housing Controls	X	X	X	X	X
Demographic Controls	X	X	X	X	X
Specific Time Trends			X		
Vacancy Pre-Trend					X
N	181	181	181	181	181

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (7 clusters), for the Matching, they are bootstrapped. Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. All controls are as well first differentiated. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population, population growth 90-97 and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

Then, I apply the DID strategy on the new sample and provide the results in Table 7. The coefficient of the variable of interest is still significant in the OLS columns but lower in magnitude. This might be due to the fact that tax is less effective in the surrounding municipalities than in the center ones. For the matching strategy I find as well significant coefficients although at the 10% significance level, most likely due to the sample size reduction. Hence, the vacancy level of the periphery municipalities where the tax was implemented was reduced by 0.5 percentage points more than in those other periphery municipalities that were, by chance, not included into the list of taxed municipalities.

Given the geographic proximity of the municipalities in the treatment and in the control group, one may worry about displacement effects. Notably, if owners affected by the tax put their dwellings to rent, this may attract renters from neighbour municipalities and hence the impact I identify may be just due to displacement of the renters. I show in Figure A9 that the vacancy rate of the control municipalities has not increased due to the tax and therefore, the effect that I identify does not seem to be driven by displacement

effects.

Through the use of this strategy I compare yet another control group to a very similar group of taxed municipalities to find similar, although slightly lower coefficients, as I can only estimate a local effect in the periphery of urban units. Hence, this robustness test is another confirmation of the main results.

8 Understanding the effect of TLV

So far, I have attempted to assess the first direct effect of TLV after its implementation in 1999. I find that there is a strong, negative and significant effect of the tax on the vacancy rate. The assessment of the direct effect is a first and necessary step to investigate the role of fiscal policies on housing outcomes. Now, I am interested in the effect of the tax on different outcomes.

Firstly, I aim to assess how have the two complementary status of vacancy evolved due to this decrease in vacancy. This is, has it translated into an increase of the primary residence ratio or in the secondary residence ratio[25]? One could think that owners can have interest to act strategically by transferring vacant dwellings into secondary residences in order to keep them at their disposal and avoid renting or selling. To do so, they need to furnish them and to pay the Habitation Tax (TH). Hence, the decision of moving the dwelling away from vacancy depends on the relative cost of the TH compared to the TLV. Given that average tax rate of TH for treated municipalities is 14.5%, it is only inferior to TLV for those dwellings that have been vacant for five or more years, for which the tax rate is 15%. Therefore, such a strategic behaviour is only optimal for those dwellings in long term vacancy.[26]

In Table 8 I look at what happened with the primary and the secondary residence ratio (columns 3 to 6), we see that the entire decrease in vacancy seems to be translated into an increase in primary residence ratio, for both the short and the long term effects. However, the secondary residence ratio is also somehow affected by the tax; see columns (5) and (6). These results show that there was indeed some strategic behaviour in shifting dwellings to secondary residences. Appendix Figure A10 plots the evolution of the two ratios; it can be seen that the common trend assumption hold as well for these two outcomes.

Secondly, I look at the impact of the tax on other housing market outcomes. According to the model in Section 2, we would expect an increase in the active housing stock right after the implementation of the tax due to the higher mobilisation of the current stock. As a consequence, rents should decrease at the short term if the volume of mobilised housing stock is high enough. On the contrary, in the long term, since the cost of investment has increased due to the tax we could expect a reduction in investment and hence an increase in rents. To assess the theoretical predictions one can look at three different outcomes: prices (due to data constrains, I cannot look at rents), a measure of mobility and rate of

[25]It is also important to consider the possibility of demolition. The French Ministry of Housing has computed an approximate figure of the dwellings that have been destroyed using the FILOCOM database. In a 10-years period, from 1999 to 2009 the rate of disappearance has been estimated to be around 1%, i.e. 0.1% per year in average. Hence, this possibility can be deemed negligible for the analysis.

[26]I would like to test for heterogeneous effects by the different tax rates of TH with respect to the fixed tax rate of TLV, however, I only have data at the municipality level from 2002 onward. Even though we would not expect the tax rate of TH to change a lot from one year to the other, it could be the case that municipalities who got taxed behaved in a different way as far as the tax rates of the TH are concerned.

new construction.[27]

When I assess the impact on prices I find no significant effect for the short term and a positive and significant effect in the long term (see columns (7) and (8) of Table 8). If we apply the same theoretical predictions for rents to prices, which is not necessarily appropriate, my results would be contradicting the theory. However, several factors could explain the lack of a negative effect in prices in the short term. First, the mobilisation of the current stock due to the tax may not have been high enough to affect prices. Second, the mobilised stock could have been offered for sale or for rent which would reduce even more the intensity of the shock in both markets. Third, an effect on prices could occur at a very local level. If this is the case, I would not be able to capture this effect since the data is observed at the municipality level.

As for the long term impact in prices, I do find a positive impact although this effect does not seem to be driven by the shrunk of the supply. Indeed, we see in columns (11) and (12) that the rate of new construction was not statistically different in the treatment than in the control group, neither in 2001 nor in 2005. Hence, six years after the implementation of the tax, housing supply does not seem to have shrunk. This result could be explained by the fact that the tax was implemented in dense urban units where land is scarce and hence possibilities for new construction are low. The long term positive impact on prices might also be capturing other confounding factors.

To measure mobility, I use the proportion of ownership changes over all dwellings. This measure includes dwellings that have been sold but also any kind of transfer or donation implying a change in name on the ownership documents. Hence, it is not a perfect measure of mobility as it includes transfers that do not imply a market transaction. I find a positive and significant coefficient, columns (9) and (10) which is higher in the short term. This suggests that, as theory would predict, there is more mobility in the housing market after the implementation of the tax.

Finally, I would like to identify the composition effects of the tax. This means, to identify who benefited from the tax on vacancy and who occupied the formerly vacant dwellings. Given data constraints, I can only look at aggregated measures[28] of welfare such as average yearly income of the household or income distribution (income of the bottom 20, or bottom 40). However, these effects are challenged by identification issues if the assessment is not done at a very small level of observation. In the data, I do not find any significant effect of the tax on those measures.[29] A more detailed and local analysis is needed to be able to draw conclusions about the total welfare effects of the tax on vacancy.

[27] Unfortunately, I cannot test the common trend assumption for these three outcomes since data only starts at 1997.

[28] Our dataset is not a panel at the housing unit level but at the municipality level

[29] I also look at other variables such as household size, proportion of tenants or concentration of vacancy and I find no effect. Results are available upon request

Table 8: Effect of the tax on different outcomes

PS Matching	Vacancy Rate		Primary Residence		Secondary Residence		Ln(m^2 Price)		Ownership Changes		New Construction	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TLV	-0.799***	-1.311***	0.509***	0.868***	0.163*	0.264**	0.025	0.080***	0.535***	0.612***	0.412	0.040
	(0.146)	(0.231)	(0.144)	(0.237)	(0.097)	(0.125)	(0.016)	(0.022)	(0.167)	(0.235)	(0.305)	(0.295)
Mean of C in 97	6.05		91.60		2.40		998.37		8.36		2.05	
Post Period	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Housing Controls	X	X	X	X	X	X	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X	X	X	X	X	X	X
N	923	923	923	923	923	923	725	725	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors, in parenthesis, are bootstrapped. Each column represents a different regression which dependent variable is indicated every two columns, the first difference of the outcome is used. We use a propensity score matching strategy to weight control observations. In the short term effect, we compare year 1997 with 2001, in the long term, we compare 1997 with 2005. The crosses indicate the variables that have been used for the matching procedure. Housing controls include rental value from 1997, the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population in 1999, population growth 90-99 and density in 1999. Data comes from FILOCOM data-set for years 1997, 2001 and 2005 plus INSEE data-sets on demographic characteristics of the municipalities for 1999.

9 Conclusion

In well-functioning urban housing markets, vacancy can occur due to frictions in the searching process or due to voluntary withholding of housing units. In large cities, where the demand pressure on the housing market is high, vacancy can be seen as problematic as it implies an inefficient use of the housing stock. Policy makers have historically tried to reduce vacancy through different instruments in order to improve housing affordability in cities. This paper is the first attempt to rigorously evaluate the impact of one of this instruments: a tax on vacant housing.

I assess the context of France, where a vacancy tax was implemented in some municipalities in 1999. The setting of the implementation of the tax in a subgroup of municipalities allows for a clean identification of a treatment and a control group, which are then compared using a Difference-in-Difference approach combined with a Propensity Score Matching. I find that the introduction of the tax represented a decrease of 0.8 percentage points of the vacancy rate for treated municipalities with respect to control ones. In other words, in a four years period vacancy rate was reduced by 13% in taxed municipalities. The effect is higher in municipalities with an initially higher level of vacancy. Results are robust across specifications, sample reduction and choice of control group. The tax seems to have been especially effective in reducing long term vacancy. Finally, my results also suggest that most of the vacant dwellings moved to primary residences while there is some evidence suggesting a strategic behaviour of moving vacancy dwellings into secondary residences.

I contribute to the literature on the role of fiscal policies in the housing market by providing evidence of the direct effect of taxing vacancy. While I have managed to shed light on the main starting question, many new interesting questions have arisen during the course of the evaluation whose answers would provide a better understanding of the effect. There is still a need for further research to continue investigating about the implications of housing policies. To name a few issues, future investigation could help determine to what extent tenant protection can be identified as a source of vacancy. Similarly, further empirical research could be useful to better identify the beneficiaries of the tax and draw conclusion about the total welfare effect of the tax.

In terms of policy implications, these results indicate that a municipal tax on vacancy can indeed influence the behaviour of owners of vacant dwellings. While it might not be the best instrument to collect public revenues, it does play a role in shaping the incentives in the housing market. Given that the tenancy protection system and the legal environment of the housing market in France is, in general, not very different from other countries in Europe, like Germany or Switzerland, we could think about the tax on vacancy as a potential public tool to be used in other contexts.

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Appendices

A Appendix 1: Additional Robustness Tests

We perform another falsification test using social vacancy as an outcome of the regression. Given that the institutions that provide social housing were not concerned by the vacancy tax, we would not expect social vacancy to be affected by the introduction of the tax. In table A1 we can see that the coefficient of TLV, even if it is negative and of a similar magnitude, is not significant for social vacancy. The number of observations is lower for social vacancy due to missing information, hence, we drop the same observations for the private vacancy for a matter or comparison. We do that to show that even with the sample reduction the coefficients of private vacancy are still significant while the coefficients of social vacancy are not. Here again, if the two groups were intrinsically different in terms of housing market, in the sense that the treatment group had a more dynamic trend during the period of the implementation, we would see such pressure reflected also on the social vacancy rate. Not having significant coefficients for social vacancy, undermines this argument.

Table A1: Effect of TLV on vacancy rate, results by type of ownership

	Private Vacancy			Social Vacancy		
	OLS		Matching	OLS		Matching
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	-0.640***	-0.647***	-0.759***	-0.179	-0.465	-0.598
	(0.136)	(0.150)	(0.162)	(0.761)	(0.846)	(0.961)
Mean of C in 1997		6.12			5.44	
Housing Controls	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Vacancy Pre-Trend			X			X
Specific Time Trends		X			X	
N	923	923	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Columns (3) and (6) use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. All controls are as well first differentiated. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population, population growth 90-97 and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities. Treatment group has 300 observations in 6 clusters while Control group has 623 in 23 clusters per year.

Similarly, we want to test that our results are not affected by another law that was passed during the same period. This law imposed municipalities of more than 3,500 inhabitants to have at least 20% of social housing (Law SRU for its initials in French). While this law encouraged local governments to build more social housing, it did not set any rule regarding the level of occupation. Yet, occupation in social housing may still have been affected by SRU. This however does not invalidate our previous falsification test because the group of municipalities concerned by SRU differs from the municipalities

affected by TLV (50% and 40% in the treatment and the control group respectively). We test that the simultaneous implementation of the two laws (TLV and SRU) does not challenge our results by adding in our regression a dummy for whether the municipality was affected by SRU and its interaction with the proportion of social housing. Results remain unaffected by this inclusion both in terms of magnitude and significance. They can be seen in Table A2.

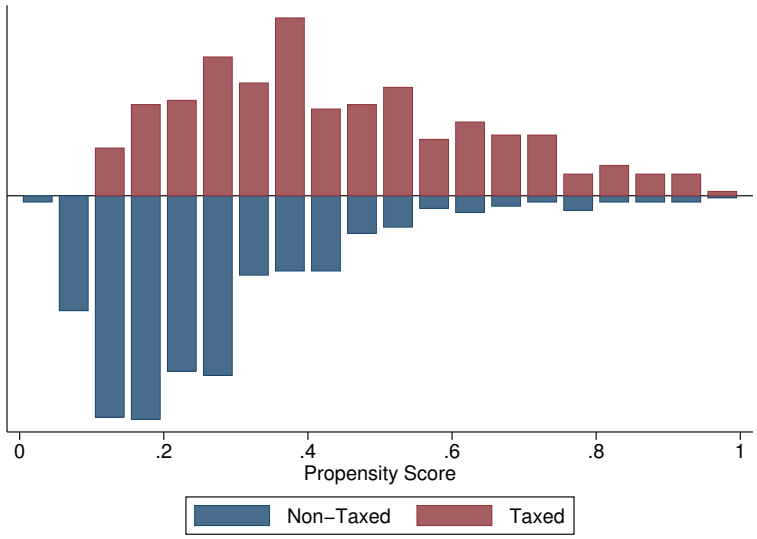
Table A2: Testing the effect of Loi SRU

	OLS			
	(1)	(2)	(3)	(4)
TLV	-0.910***	-0.660***	-0.548**	-0.583**
	(0.061)	(0.095)	(0.217)	(0.235)
SRU	-0.106	0.038	-0.172	-0.358
	(0.104)	(0.139)	(0.179)	(0.287)
Tax*SRU	0.105	0.024	0.082	0.232
	(0.228)	(0.243)	(0.296)	(0.411)
% Social				0.000
				(0.000)
TLV*Social				-0.003
				(0.010)
Tax*SRU*Social				-0.011
				(0.018)
Housing Controls		X	X	X
Demographic Controls		X	X	X
Specific Time Trends			X	X
N	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, they are block bootstrapped at the urban unit level (29 clusters). Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. Variable SRU equals 1 if the municipality is concerned by the law and 0 otherwise. Social is the percentage of social housing. All controls are as well first differentiated. Specific time trends are the controls at the baseline level, 1997. Housing controls include average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

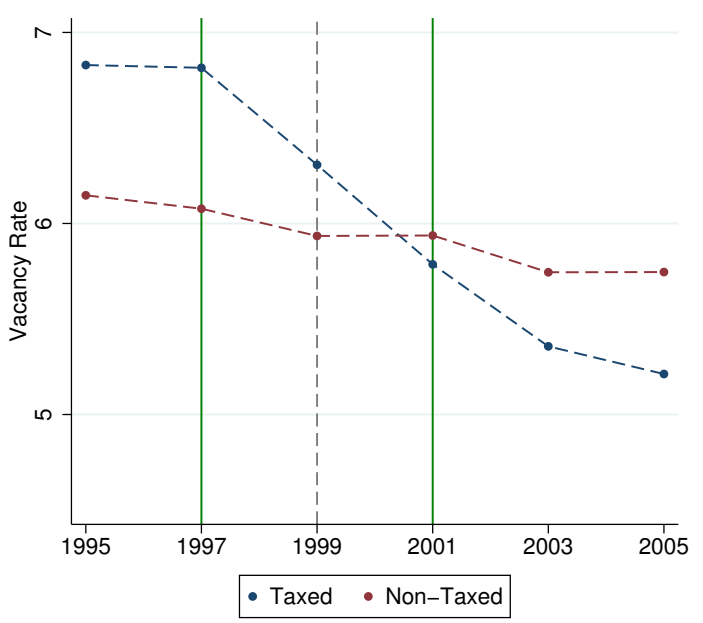
B Appendix 2: Additional Tables and Figures

Figure A6: Common Support



Notes: This graph plots the frequency of municipalities according to the estimated propensity score. Data comes from FILOCOM data-set for year 1997.

Figure A7: Evolution of vacancy rate weighted by PS



Notes: This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities weighted by population. Taxed municipalities include all taxed urban units except Paris (299 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from FILOCOM data-set for years 1995 to 2005.

Figure A8: Urban Unit of Bordeaux

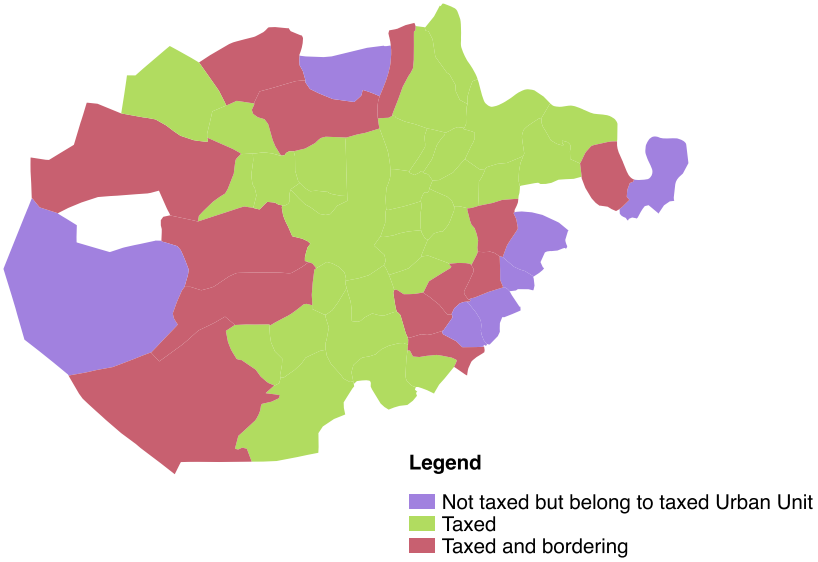
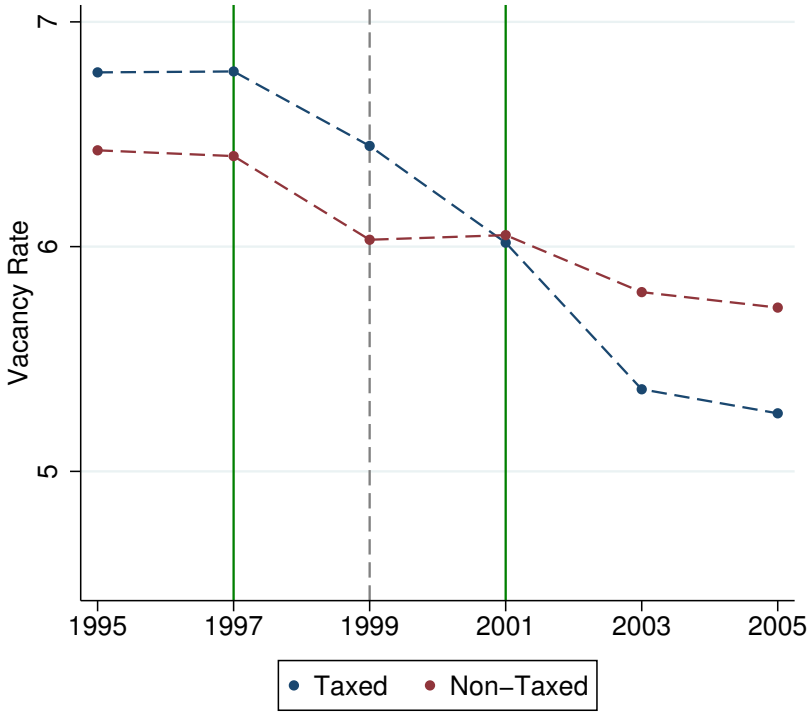
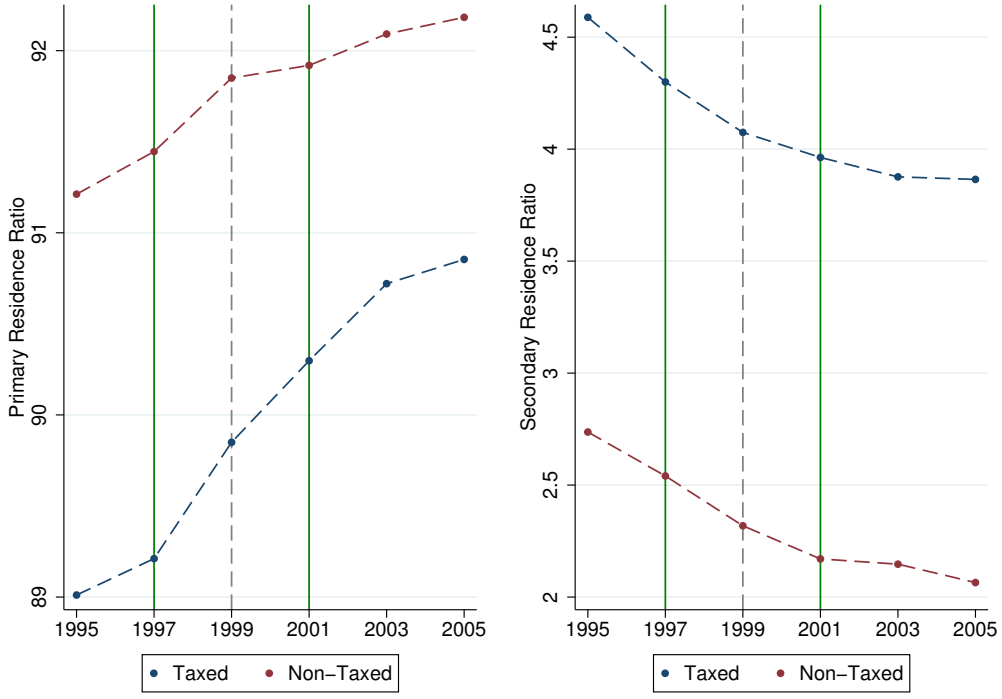


Figure A9: Evolution of vacancy rate in Bordering Municipalities



Notes: This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities. Taxed municipalities include 106 municipalities. Control municipalities include 73 municipalities. Data comes from FILOCOM data-set for years 1995 to 2005.

Figure A10: Evolution of primary and secondary residence ratios



Notes: This graph displays the mean of the primary residence ratio and the secondary residence ratio for taxed and non-taxed municipalities. Taxed municipalities include all taxed urban units except Paris (299 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from FILOCOM data-set for years 1995 to 2005.

Table A3: Robustness Test: Yearly effect without excluding Paris urban unit

	OLS			Matching	
	(1)	(2)	(3)	(4)	(5)
TLV	0.108	0.142	0.297*	0.077	-0.075
95 - 97	(0.148)	(0.151)	(0.174)	(0.157)	(0.172)
TLV	-0.192	0.056	0.192	-0.166	-0.289
95 - 99	(0.227)	(0.251)	(0.285)	(0.203)	(0.222)
TLV	-0.726***	-0.382*	-0.229	-0.666***	-0.734***
95 - 01	(0.157)	(0.201)	(0.252)	(0.217)	(0.215)
TLV	-1.354***	-0.911***	-0.565**	-1.292***	-1.328***
95 - 03	(0.110)	(0.208)	(0.270)	(0.228)	(0.217)
TLV	-1.585***	-1.142***	-0.795***	-1.817***	-1.839***
95 - 05	(0.106)	(0.199)	(0.243)	(0.212)	(0.268)
Housing Controls		X	X	X	X
Demographic Controls		X	X	X	X
Vacancy Pre-Trend					X
Linear Time Trend			X		
N	1295	1295	1295	1295	1295

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (30 clusters), for the Matching, they are bootstrapped. Each cell represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. The numbers such as 95 - 97 indicate the years compared in the first difference. All controls are as well first differentiated. Specific time trends are the controls at the baseline level, 1995. For the matching columns, the crosses indicate the variables that have been used for the matching procedure.Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-97 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1995 to 2005. Treatment group has 672 observations in 7 clusters while Control group has 623 in 23 clusters per year.

Table A4: Effect of TLV on vacancy rate, comparing 1997 to 2001

	OLS				Matching	
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	-0.910***	-0.640***	-0.640***	-0.460***	-0.799***	-0.801***
	(0.154)	(0.136)	(0.148)	(0.172)	(0.146)	(0.147)
HighVac				0.051		
				(0.203)		
TLV*HighVac				-0.738***		
				(0.207)		
Δ Av. Income		0.001*	-0.0001	-0.0001		
(in hundreds)		(0.000)	(0.001)	(0.001)		
Δ Surface		-0.136***	-0.107***	-0.104***		
		(0.034)	(0.029)	(0.030)		
Δ Population		0.005	0.004	0.005		
(in hundreds)		(0.004)	(0.007)	(0.007)		
Δ Population Density		-0.005***	-0.004***	-0.004***		
		(0.001)	(0.001)	(0.001)		
Δ Social Housing		0.023	-0.008	-0.013		
		(0.048)	(0.051)	(0.053)		
Av. IncomeTrend			-0.153	-0.132		
(in ten thousands)			(0.169)	(0.184)		
Surface Trend			0.015***	0.013***		
			(0.004)	(0.005)		
Pop. Growth Trend			-0.002	-0.003		
			(0.007)	(0.006)		
Population Trend			0.005*	0.004		
(in thousands)			(0.003)	(0.003)		
Density Trend			0.006	0.007		
(in hundreds)			(0.006)	(0.006)		
Rental Value Trend			0.076	-0.104		
(in hundreds)			(0.093)	(0.109)		
Social Housing Trend			0.005	0.004		
			(0.005)	(0.005)		
Vacancy Rate Trend			-0.208***	-0.188***		
			(0.037)	(0.048)		
Housing Controls		X	X	X	X	X
Demographic Controls		X	X	X	X	X
Vacancy Pre-Trend						X
Specific Time Trends			X	X		
N	923	923	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. Controls are included in its first difference form. Specific time trends are the controls at the baseline level, 1997. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-97 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

Table A5: Effect of TLV on vacancy rate, weighted vacancy

	OLS			
	(1)	(2)	(3)	(4)
TLV	-1.303***	-1.040***	-1.087***	-0.607***
	(0.323)	(0.302)	(0.228)	(0.204)
HighVac				-0.277
				(0.293)
TLV*HighVac				-1.075**
				(0.382)
Housing Controls		X	X	X
Demographic Controls		X	X	X
Specific Time Trends			X	X
N	923	923	923	923

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, they are block bootstrapped at the urban unit level (29 clusters). Each column represents a different regression with the first difference of the vacancy rate as the dependent variable. All regressions are weighted by the number of housing units. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. All controls are as well first differentiated. Specific time trends are the controls at the baseline level, 1997. Housing controls include average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Data comes from FILOCOM data-set for years 1997 and 2001 plus INSEE data-sets on demographic characteristics of the municipalities.

Table A6: Descriptive statistics - Bordering Groups

	Treatment		Control				
	Mean	Std Dev.	Mean	Std Dev.	Difference	t-value	p-value
Vacancy Rate	6.81	3.20	6.35	3.01	-0.46	0.96	0.34
Private Vacancy Rate	6.78	3.12	6.40	3.07	-0.38	0.80	0.42
Av. Income	25008	7377	25734	7601	725	-0.64	0.52
Population 99	19445	49653	4900	6950	-14545	2.48	0.01
Population Growth	13.6	19.65	18.92	33.77	5.32	-1.34	0.18
Population Density	1317	1518	606	840	-710	3.64	0.00
Rental Value	23087	7185	20076	6011	-3010	2.95	0.00
Surface	89.92	15.15	97.61	17.98	7.69	-3.1	0.00
Primary Residence Ratio	90.05	5.68	89.47	7.03	-.58	.61	0.54
Social Housing	11.46	12.49	7.5	11.48	-3.96	2.16	0.03

Notes: Data comes from FILOCOM data-set for year 1997 plus INSEE data-sets on demographic characteristics of the municipalities. Treatment group has 108 observations while Control group has 73.

Table 7: Vacancy rate, yearly effect

	OLS			Matching	
	(1)	(2)	(3)	(4)	(5)
TLV	-0.186**	-0.158*	-0.078	-0.217**	-0.143
95 - 97	(0.082)	(0.092)	(0.120)	(0.111)	(0.116)
TLV	-0.388***	-0.133	0.014	0.038	0.011
95 - 99	(0.114)	(0.183)	(0.176)	(0.199)	(0.168)
TLV	-0.335**	0.003	0.058	0.086	0.058
95 - 01	(0.132)	(0.226)	(0.206)	(0.234)	(0.183)
TLV	-0.516***	-0.101	0.120	0.087	0.048
95 - 03	(0.129)	(0.277)	(0.222)	(0.256)	(0.208)
TLV	-0.550***	-0.156	0.137	0.074	0.044
95 - 05	(0.134)	(0.241)	(0.160)	(0.246)	(0.198)
Housing Controls		X	X	X	X
Demographic Controls		X	X	X	X
Vacancy Pre-Trend					X
Specific Time Trends			X		
N	1012	1012	1012	1012	1012

Notes: Significance is indicated by * p<0.1, ** p<0.05, *** p<0.01. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for the Matching, they are bootstrapped. Each cell represents a different regression with the first difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equal 1 for taxed municipalities and 0 for non-taxed. The numbers such as 95 - 97 indicate the years compared in the first difference. All controls are as well first differentiated. Specific time trends are the controls at the baseline level, 1995. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average surface, the average yearly income of the household and the proportion of social housing. Demographic controls include population and density. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trend are for all the variables in controls plus the population growth 90-99 and the initial level of vacancy. Data comes from FILOCOM data-set for years 1995 to 2005. Treatment group has 300 observations in 6 clusters while Control group has 623 in 23 clusters per year.