Is taxing *in*habitation effective?
Evidence from the French tax scheme on vacant housing

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A dissertation written under the guidance of Pr. Etienne Wasmer and submitted in partial fulfillment of the requirements for the Master's degree in 'Economics and Public Policy' jointly delivered by Sciences Po Paris, the Ecole polytechnique and the ENSAE.

June 2012

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June 26th, 2012

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Abstract: The recent real estate crisis as well as the dire situation of the housing market in Western countries brought attention on the vacant housing issue in France. It is frequently asserted that the vacancy rate in France (7% for 2 million units) is above its frictional level and that it could be decreased through fiscal programs incentivizing homeowners to put their empty dwellings on the market. This dissertation aims to evaluate the tax program started in France with the introduction of the *Taxe sur les logements vacants* and the *Taxe d'habitation sur les logements vacants*. Section 1 introduces the issues at stake while section 2 provides both a typology of housing vacancy and a description of the legal environment and section 3 briefly reviews the literature. Section 4 presents the methodology used, relying on propensity score matching to evaluate the effect of the tax program and on an OLS estimate of vacancy drivers. Section 5 exhibits the empirical findings of this dissertation and draws conclusions from them.

Keywords: Housing market, real estate, vacancy, empty dwellings, inhabitation tax, propensity score matching.

Acknowledgements: It gives me great pleasure in acknowledging the support and help of my advisor, Pr. Etienne Wasmer. I am also grateful to Thomas Billet, Pr. Denis Fougère and Pr. Pauline Givord for the advices and information they gave me. I would finally like to convey thanks to my fellow graduate student Arthur Waller, with whom I started to study this topic, and to the *Département des études et statistiques locales* of the *Direction générale des collectivités locales* and the *Réseau Quetelet* for giving me access to their data-sets.

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"At a time when this Nation's housing supply is falling far short of existing needs and we have not begun to honor the goal of 26 million new units by 1978, we cannot permit the abandonment of usable structures to take place."

Edward S. Brooke[1].

1 Introduction: preliminary words on the French housing market

This introduction briefly recalls the housing market's situation in France and its evolution over the past few years in order to better apprehend the importance and the role played by vacant housing in the French real estate market.

1.1 A market in dire conditions

The recent real estate crisis shed light on the issues faced by this very specific market. As in most developed countries, housing prices in France grew faster than the inflation rate and skyrocketed between 2000 and 2007. However, while these prices sharply dropped in 2007-2008 in many European countries and in the United States, the increase continued in France. Estimating the proportion of income devoted to housing is a difficult task, especially for homeowners (one then needs to infer the opportunity cost of occupying a dwelling from its price) but most studies show that the proportion of income devoted to housing dramatically and continuously increased since the 1950s. Indeed, after World War II, the representative household in France spent a higher share of its income on tobacco than on housing[2] and according Fabre (2011) using INSEE[3] data, housing expenditures in France reached 18% of income in 2009 from 7% in 1959. This is due to

[1] Edward S. Brooke is an American Senator. This sentence was pronounced at the Subcommittee on Housing and Urban Affairs of the Senate Committee on Banking and Currency, 91st Congress, 1970.

[2] "Editorial", *Regards croisés sur l'économie*, 2011 n°9, p. 6-7.

[3] *Institut National de la Statistique et des Etudes Economiques*, the French National Institute for Statistics and Economic Studies, which is also the French branch of Eurostat.

an increase in housing market prices and, to a lesser extent, to the growing prices of utilities and energy.

Several factors are at the root of this trend in housing market prices. A part of the trend can be explained by a "quality effect" that is hardly measurable and by the increasing number of households, due to population growth and "household loosening" (i.e. the reduction of the size of the average household due to divorces, decreasing birth rates and fewer household regrouping three generations). As a result, the average surface per person increased from 22m^2 in 1970 to 40m^2 in 2006 according to INSEE data presented by Geerolf (2011). Public aid can also be at the root of this increase; this topic will be debated in the next subsection. A final explanation brought up, amongst others, by Friggit (2011) is the fact that, over recent years, the financial environment incentivized heavy investments, through decreasing interest rates and the increase of loans' maturities.

This trend has to be put in perspective with the fact that a growing part of the French population faces difficulties obtaining a home. According to the Fondation Abbé Pierre[4], an NGO, more than 3.6 million persons are either in a situation of homelessness or live in dire housing conditions, an all-time high. Such an issue can hardly be overemphasized; housing problems extend far beyond the scope of this market. Indeed, they impact such various domains as the environment, job market access, social diversity or even academic performances, as shown by Goux and Maurin (2005).

1.2 The failure of demand-side policies

The French government allocates more than half of its housing policies budget to "demand-side" policies, that can either take the form of direct transfers (e.g. *Aide personnalisée au logement, Allocation de logement familiale, Allocation de logement sociale*, etc.) or tax reductions (e.g. VAT cut for minor construction work), amounting to a total of 15.5 billion euros in 2008. These policies that are supposed to facilitate access to housing for impoverished households seem however to be inefficient at best and can possibly have negative consequences on the housing market. Fack (2011) summarizes the limits of such policies; on top of possibly disincentivizing labor supply, such policies have inflationist bias. By distorting demand and in a market where supply is inelastic (at least in the short-run), demand-sided policies have often resulted in an increase of housing prices, as shown by Laferrère and Le Blanc (2002) and Fack (2005) in France and by Susin (2002) in the United States.

[4]Rapport mal-logement, 2012.

1.3 Inherent problems to supply-side policies

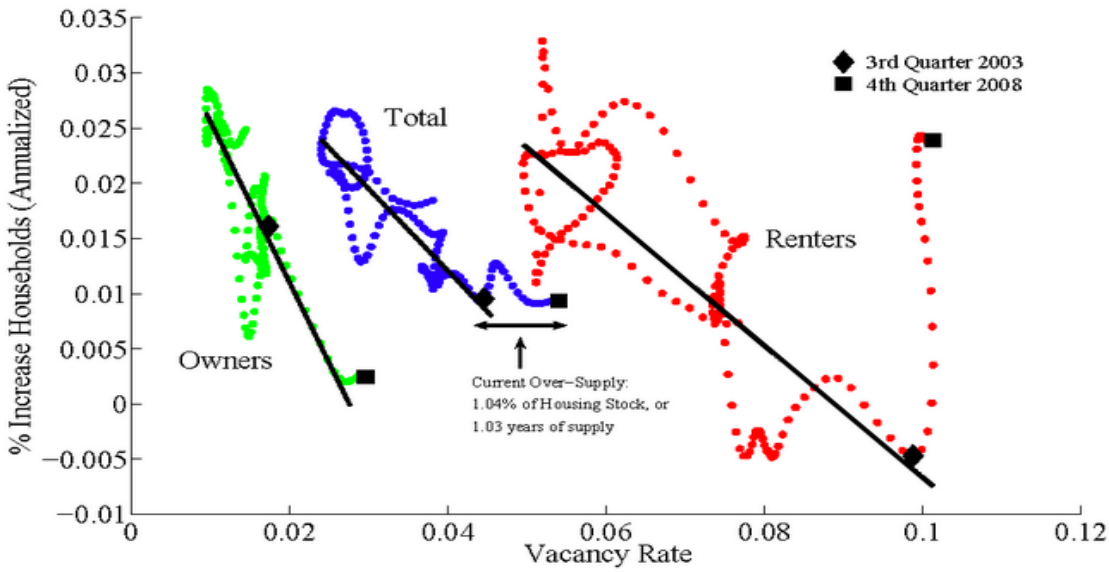
As Jacquot (2011) recalls, the housing stock by population ratio in France is the highest of Western Europe and each year, more housing units are built in France than in Germany and Great-Britain combined together. The situation of the French housing market can therefore not entirely be explained by a lack of supply. Furthermore, supply-side policies can be efficient but they face several limits. Indeed, incentives to increase the supply of housing units, whether they are financial or legal, take a long time to impact the number of dwellings available. Such policies can also have negative effects such as urban sprawl, ecological footprint, and a windfall effect for construction and real estate companies.

1.4 The question of vacant housing

In such a context, vacant housing can appear as a manna, especially knowing that there are more than 2 million vacant housing units in France and that there are important cross-city differences. For instance, there are 3 cities with more than 100,000 inhabitants and a vacancy rate above 13% (Lille, Perpignan and Nice) and as many cities with above 100.000 inhabitants and a rate below 6% (Rennes, Angers and Caen). In such a context, vacant housing was used by many politicians as a campaign argument and in the United States, the "Occupy Wall Street" movement was followed by "Occupy houses", a similar movement willing to denounce the housing vacancy issue.

However, if this issue is often debated, little is known about the factors of housing vacancy. First and foremost, the debate is still open on determining what is the frictional vacancy rate and on deciding if the vacancy rate in Western economies can be significantly reduced. Indeed France's rate (slightly below 7%) is at its lower level in modern history and several authors such as Peterson (2009) assert that housing market vacancy could only be marginally reduced in the United-States. Then come the questions of the drivers of housing vacancy and the effectiveness of the instruments used to make more dwellings available, such as the recent French tax scheme implemented in 1999 and reinforced 2006.

Figure 1: The housing market Beveridge curve. This figure is from Peterson (2009) and suggests that the American housing market is currently in over-supply, thus limiting the possibility to reduce housing vacancy.



This master's dissertation aims at shedding light on the housing vacancy issue and more precisely on the effects of the French tax program. In this perspective, it recalls a detailed typology of housing vacancy and the legal and fiscal framework on this issue (section 2). It then reviews the literature, in order to present stylized facts on vacant housing as well as propensity score matching methods (section 3). Indeed, the methodology used to evaluate the impact of this tax program (detailed in section 4) mainly relies on matching. The results are presented and analyzed in section 5, along with recommendations for policy-making and concluding remarks.

2 Typology and legal environment

2.1 Definition and typology

According to the definition of the INSEE, there are several types of vacant housing units. A dwelling is considered vacant when:

- It is proposed for rental or to sell;
- It has already been attributed to a buyer or a renter but is not occupied yet;
- It is in the succession of property's administrative process;
- It is kept by an employer for the future use of one of his employees;
- It is kept vacant and without any affectation by the owner.

Thus, while it seems that the proportion of empty dwellings could be reduced by a more flexible administrative process (tackling units under definitions ii and iii), most of the instruments used to fight against vacancy focus on the last case (or on the first case when the price asked by the owner is abnormally above the market). The underlying aim is to affect the trade-offs faced by owners, for instance between repairing the dwelling they own and leaving it as is, and between renting it and leaving it without any affectation.

Thanks to this definition and to insights provided by a report from a local cooperation structure between French cities[5], one can establish a precise typology of housing vacancy. Vacancy can either be due to:

1. **Frictions** in the housing market: before a successful match between a buyer and a seller occurs, when the dwelling is seasonally on the market, etc.
2. **Depreciation** : the unit is or could potentially be on the market but does not attract buyers (it is in a run-down state, in an unattractive area or the reservation price of the owner is abnormally high). One will notice that the limit between frictions and depreciation is not clear for a certain category of dwellings;
3. **Transformations** that can either be administrative (the house is in the inheritance administrative process, it has been sold but is not occupied yet, etc.) or physical (construction work);

[5] Pays de l'Albigeois et des Bastides, Etude sur le parc de logements vacants de 15 bourgs du territoire, 2009.

4. **Expectations**, when the owner keeps the dwelling vacant in order to lend it to his family members, employees or to use it himself in the future;

5. Lack of interest or **indifference** from the owner.

According to Wyatt (2008), approximately half of the empty dwellings are due to owners that are unwilling to sell (that are mainly in the last category of our typology) or unable to sell due to devalorization or depreciation. This figure might vary from a country to another and is debatable since, as suggested above, one can hardly classify a dwelling on the market with an abnormally high price. However, the figures provided by Mistral et al. (2008) are in line with Wyatt's finding (more than half of France's vacant housing units being vacant for more than three months).

2.2 The tax scheme and the French legal framework

In order to tackle vacant housing, two tax schemes have recently been implemented, they are presented in the next two sub-subsections. The last sub-subsection will recall other specificities of the French legal environment.

TLV (Tax on vacant housing). On July 29th 1998, the law n°98-657 "relative to the fight against social exclusions" created the tax on vacant housing (*Taxe sur les logements vacants*, also referred to as TLV). This tax concerns "urban areas of more than 200,000 inhabitants where there is a substantial disequilibrium between housing supply and demand at the expense of low income persons". Six months later a bill detailed the cities concerned (i.e. most of the urban areas of more than 200,000 inhabitants). This tax concerns units that have been vacant for more than two years and that are empty (since units with furniture are already subject to the *taxe d'habitation*). A unit is not considered as vacant if it has been inhabited during more than 30 consecutive days over the last two years. Finally the law mentions that "the tax should not be paid when vacancy is not voluntary" meaning that if the dwelling is in a run-down state[6] or already on the market, the tax is not due.

The tax should be paid by the landlord and amounts to 10% of the rental value[7] the first year, 12.5% the second year and 15% starting from the third year. The amount collected by the tax is transferred to the *Agence nationale de l'habitat*.

[6]Such is the case when an invoice specifies that the house needs construction works amounting to at least 25% of its market value in order to be habitable.

[7]This value being determined according to the article 1409 of the *Code général des impôts*. Quite surprisingly, the rental value is still estimated from the *Valeur cadastrale* that dates back to 1970.

On the overall, out of the 570,000 housing units estimated in the cities concerned by this tax, only 187,500 correspond to the criteria set by the law[8]. According to the *Direction générale des impôts*, the number of households that paid the tax went from more than 180,000 in 1999 to 127,000 in 2003 to 96,837 in 2007. At first glance, it is hard to estimate if this decline is due to a drop of the vacancy rate of simply the fact that owners learn to avoid the tax. The tax administration further asserts that the yield of the tax is disappointingly low but increasing: 44 million euros of taxes were asked in 2000 and only 6 millions were received against 15 millions out of 43 in 2003. Finally, according to a parliamentary report[9], the administrative costs of the tax represent 10% of its revenues against an average of 1.5% for other taxes. These disappointing results can be explained by the blurry definition of housing vacancy and the relative lack of information of the tax administration on vacancy.

THLV (habitation tax on vacant housing). This tax scheme was reinforced by the law n°2006-872 "National commitment for housing" passed on July 13th, 2006. This law gives any city council the ability to implement an oddly called habitation tax on vacant housing (*Taxe d'habitation sur les logements vacants*, THLV). When the tax is voted in year n it starts to be collected in year n+1. This tax is similar to the TLV with two exceptions: it only concerns units that are vacant for more than 5 years (i) and the tax rate is the communal rate (the city-level component of the *taxe d'habitation* rate) which is roughly lower than 10% (ii). Since the conditions of this tax are stricter than the TLV due to the 5 years of vacancy condition and the slightly lower rate on average, it can only be voted in cities that are not concerned by the TLV. More than 3,000 cities chose to implement the THLV and so far the program has not been aborted in any city.

Table 1: Year when the THLV was voted. Source: DGCL, 2010.

Year when the THLV was voted	Frequency	%
The THLV was never voted	33,420	91.12
2006	2,147	5.85
2007	305	0.83
2008	394	1.07
2009	205	0.56
2010	205	0.56

[8]Haut Comité pour le logement des personnes défavorisées, Rapport, 2000.

[9]Marcel-Pierre Cléach, Rapport d'information, au nom de la commission des affaires économiques et du Plan sur le logement locatif privé, Sénat, October 15th 2003.

Other legal aspects. Amongst other legal aspects, one needs to stress that the vagueness of the definition of housing vacancy has often been criticized (namely by the *Médiateur de la République*[10]) as a source of legal insecurity. Because of this vagueness, taxpayers can adopt an opportunistic behavior and lie on their vacancy status. For instance, according to an interview with Thomas Billet, a fiscal expert from GFI Fiscalité, there is a hardly quantifiable but significant fraud that uses fake invoices to pretend that a vacant unit is not habitable and can therefore not be subject to the tax. Fraud can also upwardly bias vacancy. For instance the French fiscal system reduces the income tax as a function of the number of persons living in the household. Parents that lend a dwelling they own to their children can thus decide to declare this dwelling as vacant, in order to pay the TLV or the THLV and have lower income taxes to pay. This would explain the relatively high vacancy rate in several student-cities such as Vincennes or Villeurbanne.

Also, even if this rarely occurs, it is important to note that a city can impose the requisition of a vacant housing unit. Indeed according to the article L.641-1 of the *Code de construction* the local representative of the State (*préfet* or *sous-préfet*), under the proposal of the city council, can perform a requisition of a vacant housing unit for less than a year, at the benefit of people living in dire housing conditions.

[10]Rapport, 2004.

3 Literature review and stylized facts

In this section are reviewed two papers; a descriptive paper published by Accordino and Johnson in the *Journal of Urban Affairs* in 2000 and a 2005 IZA working paper by Caliendo and Kopeinig providing some insights on the implementation of propensity score matching. The literature review follows a brief recall of stylized facts on housing vacancy in France.

3.1 General stylized facts

Using French data from official organisms, one can draw several stylized facts on housing vacancy in France. On the overall, vacant housing units are equally distributed across the French territory: the average vacancy rate is the same in both urban and rural areas, large and small cities. Furthermore the vacancy rate is relatively independent from the average income or from local housing prices.

There are however several differences at the unit level between vacant housing and the rest of housing units (i.e. primary, secondary and occasional housing). Half of empty dwellings were constructed before World War II (against 33% for primary housing). A quarter of vacant units have only one room and a surface below 35m^2 (i.e. vacant units are usually smaller than average). Also, persons that are over 75 years old are 25% more likely than the rest of the population to be the owner a vacant housing unit. Finally, the council housing vacancy rate is lower than the national average (2.5%).

As they provide the answers from a detailed interview of vacant households' owners, the *Enquêtes logements* provide interesting insights on the reasons why houses are kept vacant. However one should note that the results from this source might not be fully representative of the overall phenomenon. Indeed, in these databases, vacant housing units are under-represented (i) since their owners sometimes lie when they are asked if they possess a vacant housing (by fear of fiscal repression or social stigmatization) and (ii) since units that were recently built are not represented in the sample (and these units are more likely to be vacant). On top of that, the number of observations is quite limited. Despite these limits, we can draw interesting insights from this source; for instance, the reasons of the vacancy (and their evolution) as presented by vacant homeowners are displayed in table 2.

Table 2: Reasons of vacancy. Source: *Enquêtes logements* 1996, 2001 and 2006. In the 1996 and 2001 survey, there were four categories of answers. For simplification

and in order to draw a comparison with the 2006 survey, the answers "totally" and "somewhat" where merged into "yes" while "not really" and "not at all" were merged into "no". The different reasons of vacancy are not mutually exclusive. One of the answer is lacking from the 2006 survey database.

The dwelling is currently vacant because...	1996 (%)	2001 (%)	2006 (%)
it is a purely frictional vacancy	10.77	22.2	10.45
of difficulties to finance a construction work	34.81	24.0	8.41
of the time taken by the construction work	20.17	33.8	11.85
of familial indecision	6.91	8.6	N/A
of troubles to find a buyer	30.39	14.6	11.21
of troubles to find a renter	9.94	10.6	3.31
Sample size	362	549	785

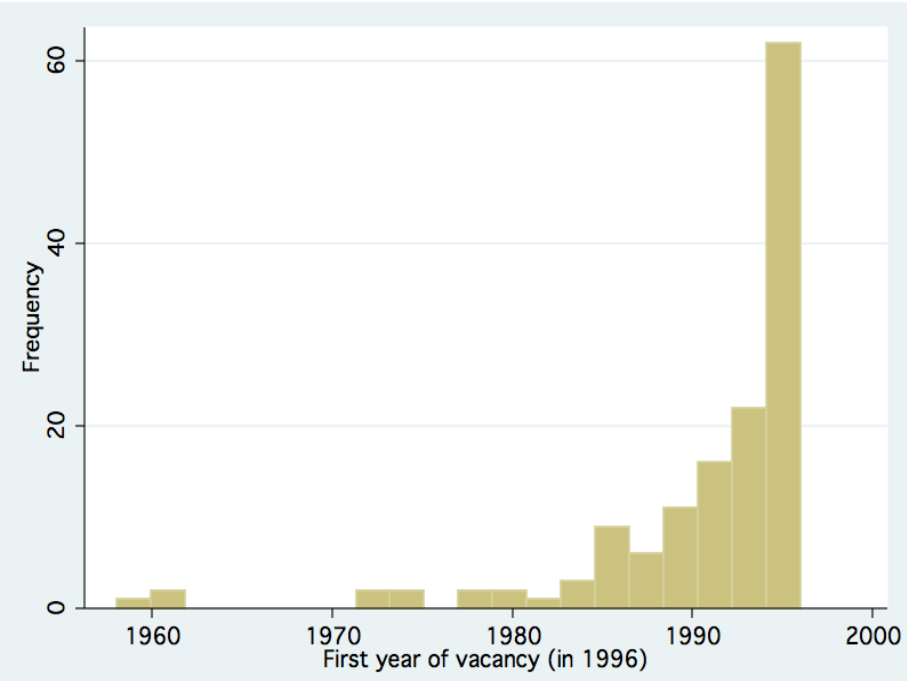
In 1996[11], in 61.05% of the cases the housing has always been vacant. Otherwise it was used by the former occupant as a primary dwelling in 89.36% of the cases and as a secondary housing in 10.64% of the cases. The intentions and projects of the landlords concerning their vacant housing units are detailed in table 3.

Table 3: Intention of homeowners of empty dwellings. Source: *Enquêtes logements* 1996 (N=362).

What do you intend to do with the dwelling in the short run?	(%)
Remain the owner	50.28
...in order to rent it	8.83
...for family...	41.44
...to turn it into my primary household	12.43
...to turn it into my secondary or occasional household	4.14
...for someone else in my family	11.60
...for a friend or employee	12.15
...for other purposes	1.10
Sell it	32.32
No idea	17.40

[11] All the figures until the end of this subsection now concern 1996, as it is the most comprehensive survey on housing vacancy.

Figure 2: First year of vacancy in 1996. Source: *Enquêtes logements* 1996 (N=362).



Finally, the 1996 data informs us that more than 60% of vacant housing units were vacant during less than a year (see figure above), a figure in line with Mistral et al. (2008)'s findings on the proportion of frictional vacancy. Nevertheless, some of these observations are volatile and sometimes puzzling when compared to the predictions of most micro-econometric models. For instance there is little evidence to explain high cross-city differences in both the rate of vacancy and in its recent evolution nor the Gabriel and Nothaft puzzle (an empirical observation according to which, in the United States, the vacancy rate increases with the price of land). The insights conveyed by these stylized facts should be used with caution, given the limits of the source, but will guide some of the policy recommendations mentioned in section 5.

3.2 Accordino and Johnson (2000)

In a paper published in 2000 in the *Journal of Urban Affairs* and called "Addressing the vacant and abandoned property problem", John Accordino and Gary T. Johnson realize a survey of the chief administrative officers of 200 large American cities in order to describe how housing vacancy is perceived (i) and to summarize the main policy tools used to tackle this issue (ii). This survey was conducted between 1997 and 1998 using a modified version of Dillman's "Total Design Method."

First of all, one should bear in mind that there are several differences between the French and the American situations. Namely, United-States housing policies are mainly supply-oriented, American households are more mobile than French ones, and the legal environment differs much more between American cities (even within the same state) than in France. Furthermore, housing vacancy in the United States is often associated with the loss of homeownership and with a high risk of criminality. Also, unlike in France, most units are subject to an habitation tax in the U.S, however, cities can choose to modify this general rule by voting a tax exemption or reduction (for either occupied or vacant houses). Another difference to note is that, in this paper, the authors consider properties in general (both personal and professional) and not only housing units; their paper therefore goes beyond the scope of this dissertation. One will note that they only focus on dwellings that are vacant for more than 2 years, a condition that coincides with the definition of the 1999 tax in France. Despite these differences, this paper is extremely useful as it brings new evidences of the problems caused by housing vacancy and presents a comprehensive panel of the policy instruments used to fight against housing vacancy.

The authors start by explaining the "vicious circle" mechanism of vacant and abandoned property (described for instance by Sternlieb and Burchell, 1973): in some neighborhoods or cities the demand decreases for some external reason and the rent that landlords can ask evolves in the same direction. Because of these falling revenues, owners start to delay and stop nonessential repairs, which negatively impacts the value of their house but also of the neighborhood and so on. The authors then detail the negative externalities causes by vacant housing: they increase vandalism, crime (Spellman, 1993, qualifies empty houses as "magnets for crime") but also fires. Interviewing stakeholders and city officials[12], the authors obtain an idea of the extent to which vacant housing is perceived as a problem and, when such is the case, the factors that are the most affected by housing vacancy. Vacancy is considered as a big problem in 32% of the cases and as the city's biggest problem in 6% of the cases. Western cities tend, on the overall, to consider housing vacancy as a minor problem. These cities might be less concerned by housing vacancy since they have not suffered from population declines in recent years. The factors the most affected by housing vacancy according to the persons interviewed are reproduced in table 4. These finding should however be interpreted with caution as housing vacancy can reflect an external factor that would drop demand and thus affects other community quality factors. In other words, the correlation observed by the Chief administrative officers could be, to some extent, spurious.

[12]As the authors mention such individuals can be biased in their answers, since they are involved in the issue. They however constitute a large sample of extremely well informed persons.

Table 4: Community Quality Factors most Affected by Vacant and Abandoned Property. This table is reproduced from Accordino and Johnson (2000). Scores were determined as follows: Respondents were asked to state whether the effects of vacant and abandoned properties are (i) Highly negative; (ii) Somewhat negative; or (iii) Have no effect. Responses were weighted: Highly negative: 1; Somewhat negative= .5; No Effect: -1 an summed. N = 159.

Factor	Score
Housing/Neighborhood vitality	108.5
Crime prevention efforts	108
Commercial district vitality	108
Overall quality of life	107.5
Fire prevention efforts	76.5
Industrial District Vitality	4.5

One can also learn from these surveys that some properties tend to be more problematic than others when vacant (see table 5). Personal properties tend to be more problematic since they are often located near other houses that they impact negatively and since, unlike offices, they are not likely to be protected by security services.

Table 5: Most problematic types of Vacant and Abandoned Property. This table is reproduced from Accordino and Johnson (2000). The scores are the mean of the answers given by the respondents, going from 1 (least problematic type) to 6 (most problematic type).

Type of property	Score
Single-Family Homes	4.3
Multi-Family Complexes	3.8
Retail Buildings	3.5
Land	3.3
Industrial buildings	2.9
Office building	2.7

In the second part of their paper, Accordino et al. summarize the different policy responses chosen by the surveyed cities. The most commonly used tools are:

- A building maintenance code that imposes a set of rule that must be respected by the owner of the vacant housing in order to limit its negative externalities on the neighborhood. These codes include obligations that can go from mowing the

lawn when the grass is above a certain height to making sure the dwelling is not illegally occupied.

- Tax acquisition and sale for tax delinquent properties.
- Cosmetic improvements (i.e. lawn mowing, exterior facade painting, installing porch lights) organized directly by the city. Here, the goal is also to limit the negative externalities of housing vacancy, especially crime.
- Tax incentives and disincentives, such as the French tax program described in the previous section.
- More comprehensive incentives programs. For instance, the city of San Diego created a specific program for owners of vacant units. The city offers a training for landlords in high crime neighborhoods on how to prevent vandalism. When a house is declared vacant, the owner has to submit a Statement of Intent in which he should describe his plans for the maintenance of the house and an expected timeline of the vacancy. Finally, these landlords can seek the help of coordinators (this help mainly takes the shape of financial and legal counseling: for the inheritance administrative process, the financial loans to repair or rebuild a dwelling, etc.).
- Demolition, when it is believed that the city will not recapture its former population level, such as is the case in Baltimore.
- Rehabilitation incentives: for instance, the city of Saint Paul, Minnesota subsidizes up to $40,000 of the rehabilitation cost when a low-income household buys a dwelling that used to be vacant. A similar program exists in Detroit, if the households commit to stay in the formerly vacant housing for more than three years.

Unfortunately, very few of these policies have been properly evaluated (except San Diego's program that yielded positive results so far), they will still be put in perspective with one's findings in section 5.

3.3 Caliendo and Kopeinig (2005)

In their 2005 IZA discussion paper, Caliendo and Kopeinig present "Some Practical Guidance for the Implementation of Propensity Score Matching". Here, one will briefly present their main points and adapt them to our case. Thus, this subsection will justify and describe our matching method implemented in subsections 4.3 and 4.4 on top of reviewing the literature.

Using propensity score matching. As the authors put it: "inference about the impact of a treatment on the outcome of an individual involves speculation about how this individual would have performed had he not received the treatment". When willing to evaluate the impact of a treatment several issues might emerge, due to the absence of proper counterfactuals and since participants and non participants to an experiment might differ even in the absence of treatment. Matching methods are one way to overcome these limits and they will be used in our case in order to evaluate the effect of the THLV (the treatment) on housing vacancy (the outcome variable) by matching on a set of cavoriates (the list of the covariates used is available in subsection 4.2).

Several conditions must be fulfilled in order to implement propensity score matching. The conditional independence assumption (CIA) states that, given a set of background variables that are not affected by the treatment, potential outcomes are independent of treatment assignment. The assumption is not perfectly intuitive in our case and its justification will be left to subsection 4.2.

Another condition to perform propensity score matching is that there is a common support between the treated and the non treated. In our case, given the size of the sample, the common support condition will not be a major issue. Indeed, with more than 36,000 observations, one will easily be able to "find" untreated cities with similar propensity score than treated cities. This assumption will be supported thanks to visual analysis when the propensity score matching will be implemented, in subsections 4.3 and 4.4.

It is also implied that the treatment effect for each individual is independent from the participation of other units. This condition is called the stable unit-treatment value assumption (SUTVA). This assumption seems reasonable in our case. Indeed housing units are not mobile (i.e. the owner cannot choose to move them to another city as a response to the tax) and in the short run, the tax is not likely to impact the attractiveness of a city and therefore its housing demand.

Estimating the propensity score. In order to implement the Propensity Score Matching, one should choose a discrete model and a set of covariates. Given the shortcomings of the linear probability model, the authors advise for a probit or a logit model. In our case, the probit model was chosen. However, regressions were also performed using a logit and yielded very similar results.

Concerning the choice of the background variables, one must choose variables that affect the participation decision (i), the outcome (ii) and that are independent for the

treatment assignment (iii). This is why only variables dating from 1999 will be used in our model: they are measured before the experiment and it is highly unlikely that 1999 socio-demographic and real estate variables were influenced by the anticipation of a tax implemented in 2006.

Concerning the optimal number of variables to include in the model, the debate is still ongoing. Dorsett and Purdon (2002) assert that variables should be picked with parsimony, since too many variables can strengthen the common support problem and uselessly increase the variance of the estimates. On the other hand, Rubin and Thomas (1996) adopt an opposite position and argue that only variables that are completely unrelated to the treatment and the outcome should be excluded from the model.

Several methods have been developed to overcome this issue, such as hit-or-miss methods or the statistical significance method, consisting in starting with a model containing a limited number of variables and then "testing up" the model by adding new variables (Heckman, Ichimura, Smith and Todd, 1998). One can also choose to overweight some variables that seem to be more important. For instance, Heckman, Ichimura, Smith and Todd (1998) carry out matching on subsets of the entire population. Indeed, the sample can be divided in several groups according to the most significant variable in order to implement a propensity score matching for each group. One will use this method in section 4.4.

Choice of the matching algorithm. Once the propensity score is estimated, one needs to choose the most adapted matching algorithm. Here, one will choose the most basic estimator, the nearest neighbor estimator: a treated and an untreated unit are simply matched in terms of closest propensity score. This choice is justified for the clarity of our methodology and has been preferred to caliper and radius matching since our high number of observations limited the risk of a "bad match". Kernel matching was also implemented as a test, to see if the results differ, which was not the case in any of our implementations. We will also perform this matching without replacement since we have a high number of observations and the distribution of the propensity scores are not widely different between the treated group and the rest of the population. Our estimates will thus slightly depend on the order in which observations are matched.

4 Methodology

This section details the data-set that was used, addresses the question of what pushes cities to adopt the THLV in order to implement a propensity score matching. Finally we use an OLS regression to have more information on vacancy drivers and on the TLV.

4.1 The data-set

The data-set used was created in two steps that are described below. The third subsection details the additional sources used while the fourth subsection highlights the limits of the data-set used and explains why other sources were not used.

Step 1: Creating a comprehensive file with city-level observations. The results of the national census (*Recensement général de la population*) constitute the basis of this data-set. These results are provided by the INSEE. The census is conducted every nine years[13] on the entire French territory (including overseas departments). It offers an extremely reliable city-level snapshot on a comprehensive set of hundreds of variables. One limit to this survey is that, as the INSEE warns us, data concerning cities with less than 200 housing units can possibly be biased and should be used "with caution".

The last census was conducted in 2008 and the result files also include the complete data of the 1999 census as well as the observation from previous censuses (dating back to 1968) on several key variables. The six thematic results files (namely "Employment characteristics", "Households", "Academic training", "Active population", "Evolution and structure of the population" and "Housing") were merged into a single file. Since at that point our data-set contained hundreds of variables, all the variables that were either redundant, of little interest for our study or that were incomplete (more than a 100 missing values) were dropped from the file. The idea was to gather information on numerous aspects of the each city (social, demographic, relative to the housing market, etc.) with a reduced number of variables.

Step 2: Refining the data-set Fiscal variables were then added to this file. A dummy to indicate if the TLV is enforced in each city was added, using the information provided at the article 232 of the *Code général des impôts*. Another dummy was added to the file for the cities that have voted the THLV, as well as another variable indicating

[13] Although the INSEE started the project to update the census data every year.

the date at which the THLV was voted for these cities. These variables were obtained from the ministry of Interior's *Direction général des collectivités locales* and date back to December 31st, 2010.

In addition, an electoral variable was created. This variable corresponds to the majoritarian party at the 2002 legislative elections. If the elections stopped at the first round the winning party was taken, if not, the majoritarian party at the second round was used. This variable serves as a proxy for the political color of the municipal council at the time when the THLV was created. The 2002 data was chosen as the municipal council in power at the time of the creation of the THLV was elected in 2001 in most cases. The results of the legislative elections were preferred to those of the municipal elections as they can be compared at the national level. Indeed, the winners of the municipal elections are not often affiliated to a specific party and it is hard to create a typology or to conduct comparisons using this variable, given the important number of mayors running as independents.

Once this first file was ready, it has been subject to a few modifications in order to proceed to its analysis. First of all, most of the variables have been normalized, in order to be compared between cities and the variables have been classified into major categories ("elections", "housing", "demographic", etc.) for simplicity. The six *villages mémoire*[14] that still exist administratively but do not have any inhabitants as they were destroyed during World War I were removed from the sample. A second THLV dummy variable was also created specifically for cities that implemented the tax before the 2008 census in order to properly evaluate the effect of the tax with the census data we have. Finally, several additional variables were created when a variable was likely to have a non linear behavior and in order to make sure our key variables were normally distributed, one used the `ladder` command of Stata to determined what changes should be maid. NB: The distribution of the identity, the logarithm and the square root for the vacancy rate are respectively represented in appendix A. A full list of the variables is presented in appendix B.

One could note that, as surprising as it may seem, it has been extremely complicated to obtain this data, due to the lack of transparency of the fiscal administration and the reluctance of the administration to provide such basic information. Furthermore, matching these variables was a fastidious task given the high amount of typos (even in the *Code général des impôts*) and homonymic cities. Also, one can stress that the list

[14] Beaumont-en-Verdunois, Bezonvaux, Cumières-le-Mort-Homme, Fleury-devant-Douaumont, Haumont-près-Samogneux and Louvemont-côte-du-Poivre

of the variables presented in the website granting access to the "enquêtes logement" is misleading at best, since it mentions variables (the city of each surveyed household for instance) that are not in the file. Since gathering the data was timely and fastidious, I was extremely cautious during this phase and made several verifications in order to ensure the veracity of the data contained in the file so that it can be used beyond the scope of this dissertation.

Limits of the data-set and difficulty of access to some data. The main limit of our data-set is inherent to the study of housing vacancy and is caused by the vagueness of the legal definition of the phenomenon. Thus, figures from the INSEE slightly differ from other sources. The *Atlas 2008 de l'habitat privé* mentions that, among reliable sources, the number of vacant housing units still varies between 1.8 and 2.5 millions.

The other limit of this data-set is the absence of yearly observations, and the fact that the 1999 census was performed shortly after the implementation of the TLV, making it harder to determine if the 1999 figures already reflected the impact of this tax scheme. Indeed, the law creating the tax was voted during the summer 1998, was enforced starting January 1st 1999 and the reference date for this census is March 1999.

One could not obtain the *taxe d'habitation* rate for each city. Intuitively, one can think that this rate impacts the effectiveness of the THLV (since it is based on it). It is however likely to play a minor role. Indeed, the tax was implemented in order to balance the trade-off faced by empty dwelling owners between keeping it vacant, selling it or renting it. If the house is rented or sold, the buyer or the renter will have to pay the *taxe d'habitation* and this price is often taken into account while negotiating the price of the dwelling. Thus, *ceteris paribus*, a higher tax rate will translate into stronger incentives to rent or sell but also reduce the price of the dwelling. Most importantly, the variations of the rate at stake (*taux communal*) are extremely low.

Having access to a more precise data-set such as the FILOCOM was impossible. An access to such a file in the future could be helpful to better understand vacant housing because it is updated every two years and contains data on the duration of the vacancy, thus making it possible to better approximate the frictional vacancy rate.

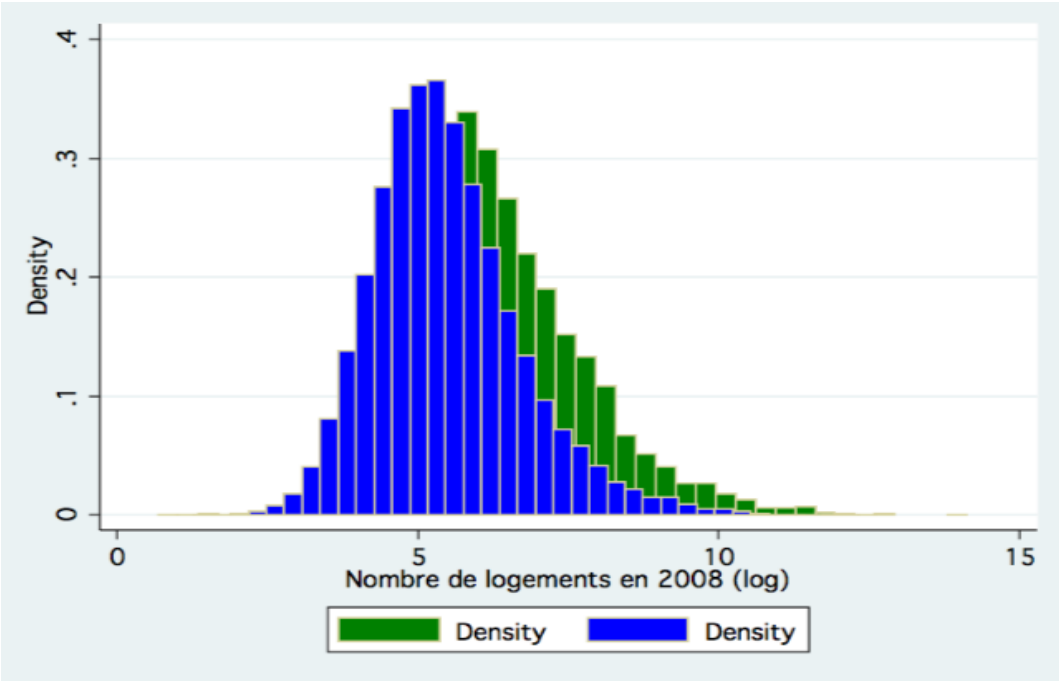
Finally, if for the reasons mentioned above, one was unable to use the "enquêtes logement" as a main source, the results of these surveys were still useful and were preseted in subsection 3.1 to provide further insights on vacant housing.

4.2 What pushes cities to implement the THLV?

At first sight, one might think that several factors might strongly push for the implementation of the THLV. Indeed, one might expect the THLV to be voted in cities that exhibit a high vacancy rate: where housing vacancy is a strong issue and where the tax could bring significant revenues to the city council. One might also think that left-wing city councils are more favorable to fiscal transfers, and therefore to the THLV.

In order to confront these impressions with the data, descriptive statistics of the cities that voted the THLV and the rest of the cities were compared, using the file described in the previous subsection. The variables compared were from 1999, i.e. before the implementation of the tax. The major difference is that the cities that implemented the THLV are on average three times bigger than other cities (see appendix C for further details). This can easily be explained by the poor information of small city councils (on the juridical and legal instruments in their hands) but also by the red-tape that represents a new tax for a small city with little means (and unavoidably few vacant vacant housing unit in absolute terms). One also observes other differences between the two types of cities. These differences concern the share of council housing, the proportion of the population working in the agricultural sector and the natural population growth. However these factors only reflect the fact that cities implementing the THLV are bigger than others.

Figure 3: Distribution of the number of units per city. The distribution of the cities that voted the THLV is in green. The label of the X-axis reads "Number of households in 2008 (log)". By paying close attention, one will notice that the density when the THLV is not voted is higher in the upper tail of the distribution. That is because most of the very large cities are subject to the TLV and cannot implement the THLV.



Finally, the geographical distribution of the two types of cities differ (without any correlation with the geographical distribution of income or political characteristics). This can be explained, once again, by the difference of size between the two categories of cities (some departments are more rural than others and exhibit and higher proportion of small towns). Another explanation is that some departmental or regional institutions might do a better job in informing the cities on the THLV. Also a type of "word of mouth" phenomena can be at stake and cities can be tempted to imitate their neighbors. These observations are confirmed by a probit regression such as the one depicted in table 6 and in appendix D.

Unobservable factors are therefore at stake, however, one might think that these factors are particularly randomly spread. Indeed, according to the interview with the fiscal expert Thomas Billet, cities tend to implement the tax because they benefit from better information (a lot of city councils do not seem to know that the tax exists), or

personal conflicts in the council or the city. Other factors, such as the fiscal health of the city do not seem to be at stake. The major unobservable factor that could bias our estimates is that a city council would vote the tax because it anticipates and increase of housing vacancy due to an expected drop in housing demand (e.g. when the closure of a plant is announced, etc.).

Table 6: Factors pushing cities to implement the THLV. Column 1 shows the results from a probit regression on the full sample while column 2 concerns cities with less than 200 dwellings, column 3 (respectively 4) exhibits the results for cities with between 200 and 399 housing units (respectively 400 and 999). Finally, column 5 concerns cities of more than 1000 dwellings. Results from similar regressions including departmental and electoral fixed effects are provided in appendix D. Here, the explained variable is dummy indicating if the THLV is enforced before the 2008 census. Also note that the division in subgroups of cities has been done using the 2008 number of dwellings per city and that the variables of the share of dwellings constructed before 1949 and between 1949 and 1974 are from 2008. One used such figures as they seemed extremely unlikely to be different from their 1999 counterparts. Some variables were dropped because of collinearity.

	(1) Full sample	(2) [1;199]	(3) [200;399]	(4) [400;999]	(5) ≥1000
v99_log	0.000	0.002***	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
v99_prors	-0.425***	0.055	-0.518*	-0.414	-0.352
	(0.108)	(0.178)	(0.261)	(0.285)	(0.307)
v99_provac	0.357	0.961**	0.036	0.521	-2.330*
	(0.277)	(0.371)	(0.669)	(0.834)	(1.166)
v99_rpmaisons	0.196	0.242	0.384	0.436	-0.080
	(0.121)	(0.357)	(0.406)	(0.328)	(0.244)
v08_pro49	-0.151	0.438**	0.227	0.165	0.514
	(0.102)	(0.166)	(0.247)	(0.277)	(0.374)
v08_pro4974	-0.151	0.309	-0.875	-0.728	-0.306
	(0.177)	(0.335)	(0.476)	(0.434)	(0.383)
v99_prorp1	0.306	0.380	-0.347	1.007	-1.540
	(0.520)	(1.014)	(1.314)	(1.086)	(1.230)
v99_rpsdb	0.063	-0.271	-0.483	-0.736	0.370
	(0.247)	(0.319)	(0.586)	(0.813)	(1.438)
v99_deltapop	-0.281	-0.074	-0.472	0.193	0.661
	(0.251)	(0.337)	(0.704)	(0.886)	(1.453)

v99_proproprp	1.089***	1.062**	1.612*	0.218	1.160
	(0.289)	(0.401)	(0.740)	(0.944)	(0.980)
v99_prolocrp	2.390***	1.650***	2.512**	0.810	3.525**
	(0.314)	(0.444)	(0.782)	(1.010)	(1.124)
v99_prohlmrp	0.041	-0.032	-0.319	0.852	-1.813***
	(0.228)	(0.702)	(0.661)	(0.552)	(0.496)
v99_pro014				6.149**	5.740*
				(2.227)	(2.528)
v99_pro1529	-1.130*	-0.370	0.384	3.068	2.888
	(0.494)	(0.648)	(1.322)	(1.658)	(2.586)
v99_pro3044	-2.618***	-1.464	-1.260		3.560
	(0.615)	(0.802)	(1.615)		(3.339)
v99_pro4559	-1.579***	-1.243*	-1.384	3.567*	6.283*
	(0.431)	(0.575)	(1.107)	(1.563)	(2.941)
v99_pro6074	-0.945*	-1.021	-0.886	5.277*	
	(0.443)	(0.578)	(1.248)	(2.133)	
v99_pro75plus	-0.117	-0.046	-0.669	5.148*	-0.063
	(0.533)	(0.702)	(1.512)	(2.057)	(2.890)
v99_chom1564	0.783**	0.529	-0.025	0.059	0.958
	(0.301)	(0.424)	(0.791)	(0.933)	(1.113)
v99_cs1	-2.385***	-1.217*	-2.708**	-3.113*	-3.090
	(0.406)	(0.516)	(1.020)	(1.347)	(2.980)
v99_cs2			-1.008	-1.930	
			(1.321)	(1.765)	
v99_cs3	-0.578	-0.337			-4.581
	(0.478)	(0.639)			(2.460)
v99_cs4	-1.037*	-0.294	-3.126**	-2.637	-2.163
	(0.431)	(0.553)	(1.183)	(1.531)	(2.446)
v99_cs5	-0.981*	-1.215*	-1.490	-1.103	-1.163
	(0.424)	(0.553)	(0.980)	(1.203)	(2.345)
v99_cs6	-1.005*	-0.507	-2.604**	-1.781	-2.569
	(0.396)	(0.515)	(0.854)	(1.004)	(2.199)
v99_cs7	-0.788	-0.620	-1.254	-2.352	4.454
	(0.444)	(0.566)	(1.198)	(1.595)	(2.748)
v99_cs8	-0.677	-0.557	-1.552	-1.863	1.283
	(0.400)	(0.520)	(0.979)	(1.238)	(2.199)
_cons	-0.874	-1.913*	-0.832	-3.007	-6.859
	(0.645)	(0.888)	(1.589)	(1.940)	(3.600)
N	36538	17087	8149	6529	4773
Log lik.	-8712.528	-2826.407	-1962.287	-2016.222	-1736.546
Chi-squared	516.351	96.166	65.888	75.053	113.326
R-squared	0.0288	0.0167	0.0165	0.0183	0.0316

Standard errors in parentheses

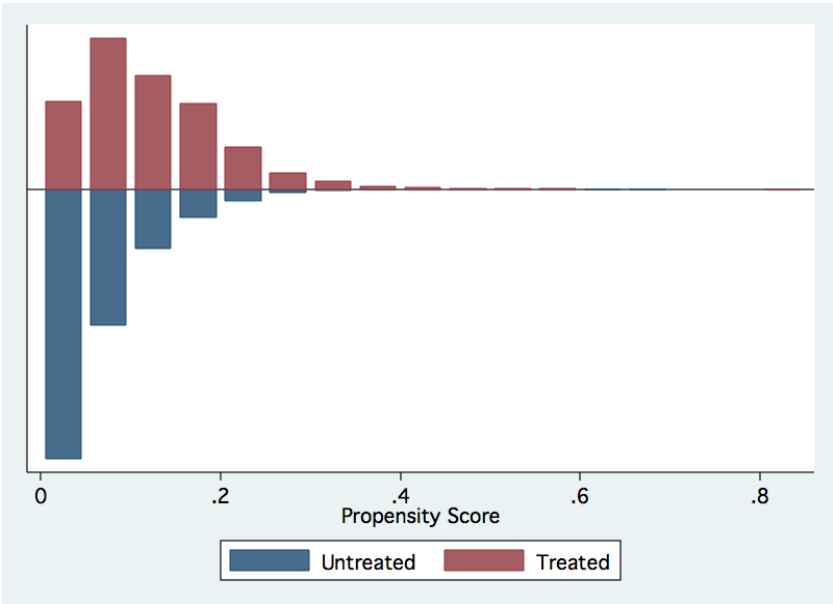
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.3 Propensity score matching

The motivation and justification for using propensity score matching methods are detailed in subsection 3.3. One will implement a nearest neighbor matching method. For simplicity and since most of the cities voted the tax during the year when it was created, one will consider the treatment variable as a dummy[15]. The table in appendix D (probit regression including fixed effects) represents the estimated parameters of the propensity score. Indeed, since the goodness of fit of the model was significantly higher when it included the departmental and election fixed effects, one chose to build the matching on an extensive set of variables.

Figure 4 shows that common support holds. Indeed, the apparent divergence in the distribution is offset by the important number of observations. Comparing the mean of the treated and the control group using the stata command `pstest`, one made sure there was a strong reduction in the bias. In other words, after conditioning on the propensity score, there were very few differences in the background variables between the treated units and the control group.

Figure 4: Distribution of the propensity score



[15] A possible extension would be to consider that there are different kinds of treatments, depending on the date at which the tax was implemented.

Table 7: ATT from propensity score matching on the full sample. NB: S.E. does not take into account that the propensity score is estimated. If variance due to the estimation of the propensity score was to be computed, the T-stat would probably be even closer to zero. In other words, the standard errors mentioned above are clearly understated[16]. This remark is also worth for tables 8 and 9.

Sample	Treated	Controls	Difference	S.E.	T-Stat
Unmatched	.070889074	.068367996	.002521078	.000856555	2.94
ATT	.070889074	.06971992	.001169155	.001196497	0.98

Finally, one created a variable called `diff` that is equal to the difference in the rate of housing vacancy between our two main observations (2008 and 1999). Since we have panel data and as we can reasonably assume that unobservable factors have a constant influence on the outcome we can combine propensity score matching with difference-in-differences using the variable created. The outcome is presented in table 8.

Table 8: ATT from propensity score matching with difference-in-differences on the full sample.

Variable	Sample	Treated	Controls	Difference	S.E.	T-Stat
diff	Unmatched	.003458065	.002056664	.001401401	.000903556	1.55
	ATT	.003458065	.002622741	.000835324	.001161093	0.72
v08provac	Unmatched	.070889074	.068367996	.002521078	.000856555	2.94
	ATT	.070889074	.06971992	.001169155	.001196497	0.98
v99provac	Unmatched	.067431009	.066311332	.001119677	.000921598	1.21
	ATT	.067431009	.067097179	.00033383	.001238922	0.27

4.4 Matching inside subgroups of cities

As we have seen in section 4.2. city size seems to be a determinant factor of participation. Since we are facing a high variety of city sizes, we will divide the full sample in four categories so that each one has approximately the same number of cities that voted the THLV. The subgroups are the same than the one presented in table 6 and appendix D. The results from this new implementation of the matching procedure are of the same

[16] One did not use bootstrapping to assess the variability of the matching estimators, following Abadie and Imbens 2006 according to whom : "[in the case of] nearest neighbor matching, the standard conditions for the bootstrap are not satisfied, leading the bootstrap variance to diverge from the actual variance."

magnitude than the one encountered in table 7 but slightly differ. They are presented in tables 9.a, 9.b, 9.c and 9.d. Figures 5.a, 5.b, 5.c and 5.d show that the common support condition is satisfied.

Figures 5.a, b, c and d: Distribution of the propensity score for the subgroups. Figure a is on the upper left corner, b on the upper right corner, c on the lower left corner and d on the lower right corner.

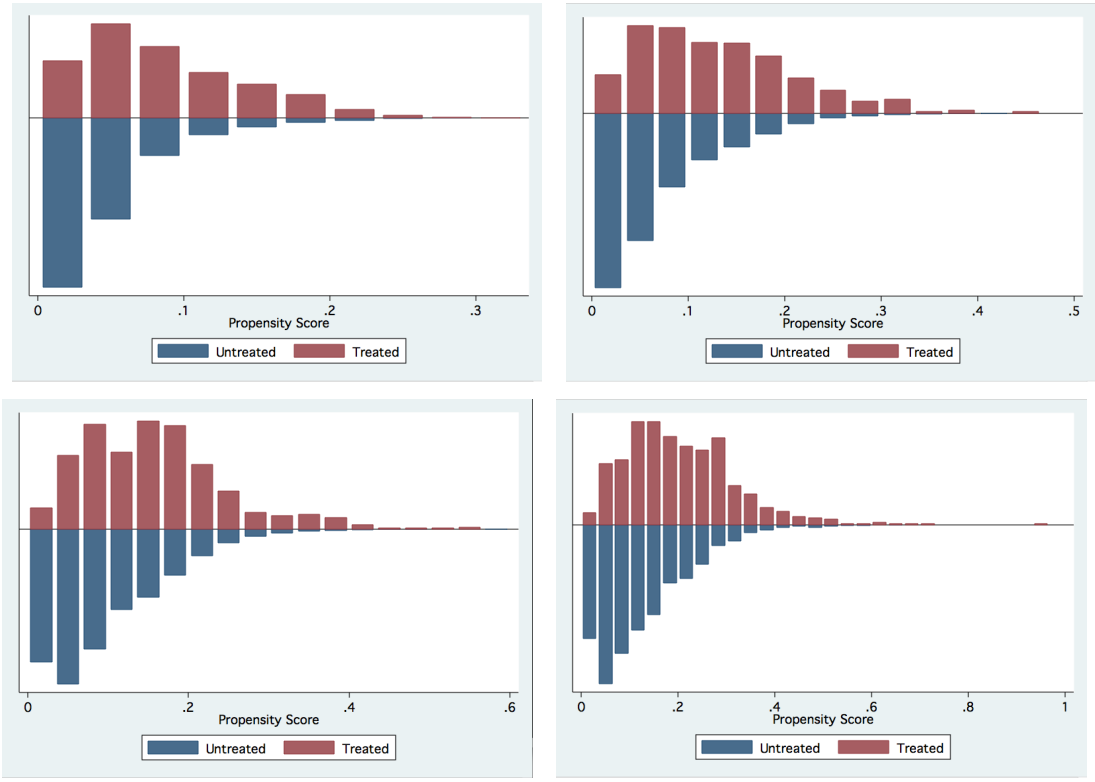


Table 9.a: Propensity score matching for cities with less than 200 units.

Sample	Treated	Controls	Difference	S.E.	T-Stat
Unmatched	.075626121	.071195968	.004430153	.001842505	2.40
ATT	.075626121	.075778812	-.000152691	.002597649	-0.06

Table 9.b: Propensity score matching for cities with 200 to 399 units.

Sample	Treated	Controls	Difference	S.E.	T-Stat
Unmatched	.069997366	.068503966	.0014934	.00165006	0.91
ATT	.069997366	.067652457	.002344909	.002252703	1.04

Table 9.c: Propensity score matching for cities with 400 to 999 units.

Sample	Treated	Controls	Difference	S.E.	T-Stat
Unmatched	.069958212	.065354126	.004604087	.001417462	3.25
ATT	.069958212	.070458053	-.000499841	.00215526	-0.23

Table 9.d: Propensity score matching for cities more than 1000 units.

Sample	Treated	Controls	Difference	S.E.	T-Stat
Unmatched	.067216207	.060907505	.006308702	.001398454	4.51
ATT	.067216207	.066939202	.000277005	.002085898	0.13

4.5 An OLS estimation of vacancy drivers

The evaluation of the TLV is rendered more complicated by several limits. First and foremost the implementation of the 1999 tax program coincides with the census. As noted above, it is therefore delicate to determine if the 1999 data can be considered as pre-treatment (the tax was implemented but not collected yet during the census and the process of finding a renter or a buyer is timely) or as post-treatment (the census occurs after the implementation of the tax, furthermore the tax could have been anticipated and inferred from the law passed during the summer 1998). Moreover, while the law precised that the tax should be implemented on urban areas of more than 200,000 inhabitants and "where there is a substantial disequilibrium between housing supply

and demand at the expense of low income persons" it is difficult to understand why the law had not been implemented in several large cities facing housing market issues (i.e. Marseille, Lille and Nantes) and available parliamentary and official documents on the topic are of little help regarding this matter. Another major limit is that this tax was implemented in urban areas that reflect other administrative divisions (*Communautés ubraines*). Finally it mainly concerns France's largest cities, thus making it difficult to find a good control group.

Therefore the final step of our methodology mainly consists in an OLS estimation of vacancy drivers using the latest census data. This method is more rudimentary but allows to understand the determinants of housing vacancy and if the TLV and the THLV are major vacancy drivers.

Table 10: Evolution of the vacancy rate by category. Before performing the regression, one compared the evolution of the vacancy rate in three categories of cities (where the TLV is enforced, where the THLV is enforced and the rest of the cities, where there are no direct inhabitation taxes) to control for potential "pre-treatment trends".

Category	1968	1975	1982	1990	1999	2008
Mean no tax	.0965	.1021	.0905	.0817	.0666	.0686
S.D. no tax	.0692	.0664	.0569	.0509	.0441	.0410
Mean THLV	.0972	.1028	.0911	.0823	.0668	.0690
S.D. THLV	.0692	.0665	.0571	.0511	.0444	.0412
Mean TLV	.0972	.1027	.0908	.0817	.0665	.0684
Mean TLV	.0697	.0669	.0574	.0514	.0444	.0411

Table 11: OLS regression. Departmental and election dummy variables were not included in the table for simplicity.

Variable	Coefficient	S.E.
tlv	-0.134***	(0.026)
thlvava 2008	0.011	(0.011)
v08_log	0.000	(0.000)
v08_prors	-1.499***	(0.031)
v08_rpmais s	-0.088*	(0.040)
v08_pro49	0.373***	(0.032)
v08_pro4974	-1.043***	(0.054)
v08_prorp1	-0.939***	(0.185)
v08_rpsdb	-1.497***	(0.089)
v08_promoi 4	0.562***	(0.087)
v08_pro10p s	-0.188**	(0.067)
v08_deltapop	-0.625***	(0.062)
v08_pop5plus	0.293***	(0.069)
v08_propro p	-0.980***	(0.051)
v08_prohlmrp	-0.804***	(0.076)
v08_pro014	0.698***	(0.174)
v08_pro1529	0.408**	(0.137)
v08_pro4559	0.118	(0.118)
v08_pro6074	1.747***	(0.133)
v08_pro75p s	2.646***	(0.140)
v08_chom1564	0.874***	(0.094)
v08_cs1	0.856***	(0.103)
v08_cs2	0.000	(.)
v08_cs3	-0.685***	(0.116)
v08_cs4	-0.563***	(0.102)
v08_cs5	-0.443***	(0.103)
v08_cs6	0.300**	(0.097)
v08_cs7	-0.056	(0.096)
v08_cs8	-0.047	(0.103)
_cons	-0.598	(0.360)
N	35686	
Log lik.	-27167.906	

R-squared	0.2953

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5 Empirical findings, recommendations for policy-making and Concluding remarks

5.1 Empirical findings

The results from the evaluation of the 2006 tax scheme suggest that the tax is ineffective. Indeed, when performed on the full sample, the propensity score matching predicts a slightly positive ATT but this effect is reduced when running a pre-program test. The predictions of the matching implemented on subgroups seem more realistic as they suggest a slightly negative ATT, but here again the results are of weak magnitude. The OLS regression yields intuitive results that are robust. Concerning the taxes, the TLV has a significantly negative effect that seems likely and the THLV is not significant. One should however be cautious in interpreting these results, given the limits mentioned throughout the dissertation and given the fact that, over the last five years, several large urban areas subject to the TLV have also started other programs to fight against housing vacancy. These programs are described in the next subsection.

5.2 Recommendations for policy-making

On the overall, it seems that the tax scheme implemented was ineffective or had little effects. This relative failure might be due to its enforcement. Indeed, the mere fact that while the number of vacant housing units subject to the tax decreases while the global number of vacant housing units remains steady demonstrates a poor enforcement (due to fake invoice fraud, difficulties to measure and define housing vacancy, etc.). On top of this limit, inhabitation taxes are likely to be ineffective given the fact that housing vacancy rates are close to their frictional levels and to the fact that such taxes provide little incentives. Indeed, if a homeowner does not rent a house, an increase of roughly 10% of the opportunity cost of not renting the unit is not likely to trigger off dramatic behavioral changes.

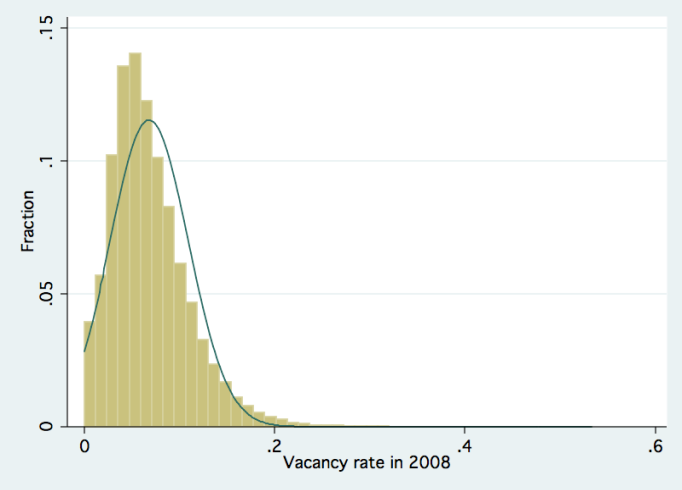
Thus the solution might be to provide other types of incentives. The counseling of homeowners offered by the city of San Diego (detailed in subsection 3.2) seems to be an interesting example for locations where vacancy is associated with crime. Another solution could be the one used in the FNAIM's *"Bail 3"* program or by the *Garantie des risques locatifs - Louer solidaire* initiative started by the city council of Paris. These programs take in charge the risk and trouble of finding a renter. More precisely they offer the owner of vacant housing units (i) the service of finding potential renters and organizing visits (ii) guaranties. In exchange they offer the owner a rent roughly 20%

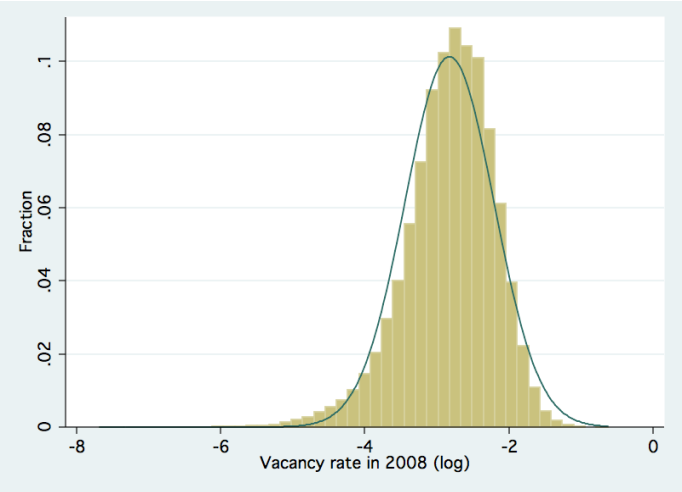
below the market price. Thanks to such measures, 300,000 leases were covered in 2010 and 2011 in France. Since the housing market is marked by information asymmetries and risk, these types of measures might appear as an efficient solution to the housing vacancy problem.

5.3 Concluding remarks

As a conclusion, one could mention possible extensions of this dissertation. A major improvement would be to have access to the FILOCOM data in order to have more frequent observations and to have access to the preliminary works of the bill listing the cities subject to the TLV in order to understand why some major cities were not included in the sample. Another helpful extension would be to build a micro-econometric model in order to better understand the trade-off faced by vacant housing homeowners and thus to have a framework to evaluate more various policy tools (such as *Garantie des risques locatifs - Louer solidaire* or the ones described in section 3.2).

A Distributions of the vacancy rate





B List of the variables

Four remarks have to be made on the following list of variables

1. The list continues over several pages;
2. Council renters are also counted in the "renters" category;
3. The sum of the proportion of renters and owners might not always be equal to one since other minor categories such as "dwelling rented for free" were not taken into account;
4. Finally, due to a lack of data, the unemployment variables are imperfect: the number of unemployed persons between 15 and 64 was normalized by the population between 15 and 60.

Name	Label
	Administrative variables
region	Region
dep	Department
libgeo	City
tlv	Dummy for the implementation of the TLV
thlv	Dummy for the implementation of the THLV
thlvavant2008	Dummy for the implementation of the THLV before 2008
anneethlv	Year when the THLV was enforced
	Housing market variables
v08_log	Dwellings in 2008
logv08_log	Dwellings in 2008 (logarithm)
v08_prors	Proportion of secondary housing in 2008
v08_provac	Proportion of vacant housing in 2008
logv08_provac	Proportion of vacant housing in 2008 (logarithm)
sqrtv08_provac	Proportion of vacant housing in 2008 (square root)
v07_prors	Proportion of secondary housing in 2007
v07_provac	Proportion of vacant housing in 2007
v99_log	Dwellings in 1999
v99_prors	Proportion of secondary housing in 1999
v99_provac	Proportion of vacant housing in 1999
v90_provac	Proportion of vacant housing in 1990
v82_provac	Proportion of vacant housing in 1982
v75_provac	Proportion of vacant housing in 1975
v68_provac	Proportion of vacant housing in 1968
v08_rpmaisons	Proportion of houses among primary housing in 2008

v99_rpmaisons	Proportion of houses among primary housing in 1999
v08_pro49	Proportion of dwellings built before 1949 (observed in 2008)
v08_pro4974	Proportion of dwellings built between 1949 and 1974 (observed in 2008)
v08_prorp1	Proportion of one-room units in 2008
v99_prorp1	Proportion of one-room units in 1999
v08_rpsdb	Proportion of dwellings with a bathroom among primary housing in 2008
v99_rpsdb	Proportion of dwellings with a bathroom among primary housing in 1999
	Household and market dynamism variables
v08_promoins4	Proportion of households that moved in during the last 4 years (observed in 2008)
v08_pro10plus	Proportion of households that moved more than 10 years ago (observed in 2008)
v08_deltapop	Rate of natural increase between 1999 and 2008
v99_deltapop	Rate of natural increase between 1990 and 1999
v08_pop5plus	Proportion of households that lived in the same city (not necessarily in the same dwelling) five years ago (observed in 2008)
	Socio-demographic variables
v08_propproprp	Proportion of homeowners among primary housing in 2008
v08_prolocrp	Proportion of renters among primary housing in 2008
v08_prolocrp	Proportion of city council renters among primary housing in 2008
v99_propproprp	Proportion of homeowners among primary housing in 1999
v99_prolocrp	Proportion of renters among primary housing in 1999
v99_prolocrp	Proportion of city council renters among primary housing in 1999
v08_pro014	Proportion of the population aged below 14 in 2008
v08_pro1529	Proportion of the population aged between 15 and 29 in 2008
v08_pro3044	Proportion of the population aged between 30 and 44 in 2008
v08_pro4559	Proportion of the population aged between 45 and 59 in 2008
v08_pro6074	Proportion of the population aged between 60 and 74 in 2008
v08_pro75plus	Proportion of the population aged above 75 in 2008
v99_pro014	Proportion of the population aged below 14 in 1999
v99_pro1529	Proportion of the population aged between 15 and 29 in 1999
v99_pro3044	Proportion of the population aged between 30 and 44 in 1999
v99_pro4559	Proportion of the population aged between 45 and 59 in 1999
v99_pro6074	Proportion of the population aged between 60 and 74 in 1999
v99_pro1529	Proportion of the population aged above 75 in 1999
v08_chom1564	Unemployment rate in 2008
v99_chom1564	Unemployment rate in 1999
v08_cs1	Proportion of the population older than 15 working in the agriculture sector in 2008
v08_cs2	Proportion of the population older than 15 working as craftsmen in

	2008
v08_cs3	Proportion of the population older than 15 working as business owners or executives in 2008
v08_cs4	Proportion of the population older than 15 in intermediary professions in 2008
v08_cs5	Proportion of the population older than 15 being employees in 2008
v08_cs6	Proportion of the population older than 15 working a factory workers in 2008
v08_cs7	Proportion of the population older than 15 being retired in 2008
v99_cs8	Rest of the population older than 15 in 2008
v99_cs1	Proportion of the population older than 15 working in the agriculture sector in 1999
v99_cs2	Proportion of the population older than 15 working as craftsmen in 1999
v99_cs3	Proportion of the population older than 15 working as business owners or executives in 1999
v99_cs4	Proportion of the population older than 15 in intermediary professions in 1999
v99_cs5	Proportion of the population older than 15 being employees in 1999
v99_cs6	Proportion of the population older than 15 working a factory workers in 1999
v99_cs7	Proportion of the population older than 15 being retired in 1999
v99_cs8	Rest of the population older than 15 in 1999
	Electoral variables
electionsfe1 and 2	Results not available at the city level
electionsfe3	COM
electionsfe4	CPNT
electionsfe5	DIV
electionsfe6	DL
electionsfe7	DVD
electionsfe8	DVG
electionsfe9	ECO
electionsfe10	FN
electionsfe11	MPF
electionsfe12	PREP
electionsfe13	PRG
electionsfe14	REG
electionsfe15	RPF
electionsfe16	SOC
electionsfe17	UDF
electionsfe18	UMP

electionsfe19	VEC
	Departmental fixed effects
depfeXX	Fixed effect for department XX

C Descriptive statistics

Variable	The THLV is not voted		The THLV is voted	
	Mean	Std. dev.	Mean	Std. dev.
v99_log	676.6058	7969.603	2063.614	10011.12
v99_prors	.1587905	.1531661	.1319767	.1411538
v99_provac	.0664477	.04461	.067602	.0391053
v99_rpmaisons	.9148856	.1290292	.8629892	.1808949
v08_pro49	.3449959	.1435436	.3237772	.1414719
v08_pro4974	.1139427	.0862763	.143368	.1019006
v99_prorp1	.0135263	.0236697	.0198099	.0270854
v99_rpsdb	.9329761	.0536729	.9410114	.0442362
v99_deltapop	-.0027708	.0649574	.0010323	.058711
v99_proproprp	.7559749	.11073	.7052265	.1334608
v99_prolocrp	.1822284	.1066277	.2405129	.1333539
v99_prohlmrp	.0297582	.0646903	.0617133	.0874989
v99_pro014	.1850684	.0460418	.1872935	.0393284
v99_pro1529	.1639404	.0387964	.1708372	.0363345
v99_pro3044	.2201209	.0397532	.2165503	.0331242
v99_pro4559	.1891526	.0403602	.1856582	.0321384
v99_pro6074	.1627148	.0572775	.1587365	.0486014
v99_pro75plus	.0790028	.0416016	.0809243	.0396504
v99_chom1564	.0788928	.0395506	.0864787	.0370231
v99_cs1	.0561114	.0637371	.0384924	.048319
v99_cs2	.0388139	.0305691	.0399131	.0240883
v99_cs3	.0372197	.0377019	.0395496	.0347032
v99_cs4	.1001549	.0560857	.101415	.0466456
v99_cs5	.1372938	.0573995	.1437153	.0461892
v99_cs6	.1654716	.0710615	.1669877	.0600957
v99_cs7	.2656276	.0941073	.2622261	.0816884
v99_cs8	.1993071	.0704538	.2077007	.0604165

D Probit regression

A certain number of variables were dropped because of collinearity.

	(1) Full sample	(2) [1;199]	(3) [200;399]	(4) [400;999]	(5) >1000
v99_log	0.000	0.002***	0.001**	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
v99_prors	-0.320**	-0.055	-0.065	-0.239	-0.218
	(0.123)	(0.210)	(0.322)	(0.334)	(0.363)
v99_provac	0.441	0.627	0.416	1.247	-0.228
	(0.303)	(0.414)	(0.767)	(0.943)	(1.304)
v99_rpmaisons	-0.266	0.023	0.331	0.316	-0.138
	(0.144)	(0.421)	(0.487)	(0.400)	(0.321)
v08_pro49	-0.279*	-0.197	-0.021	0.161	0.543
	(0.127)	(0.205)	(0.314)	(0.349)	(0.456)
v08_pro4974	0.327	0.416	-0.372	-0.608	0.198
	(0.204)	(0.383)	(0.575)	(0.533)	(0.464)
v99_prorp1	-0.243	0.506	-1.953	0.675	-1.724
	(0.575)	(1.114)	(1.655)	(1.207)	(1.459)
v99_rpsdb	0.069	-0.176	-1.042	-0.009	-1.522
	(0.288)	(0.377)	(0.749)	(1.033)	(1.854)
v99_deltapop	-0.562*	-0.257	-1.037	-0.602	0.030
	(0.264)	(0.357)	(0.775)	(0.964)	(1.575)
v99_proproprp	0.362	0.636	0.174	-0.990	1.174
	(0.316)	(0.449)	(0.881)	(1.118)	(1.071)
v99_prolocrp	1.597***	1.370**	1.232	-0.043	3.159*
	(0.348)	(0.503)	(0.936)	(1.198)	(1.257)
v99_prohlmrp	-0.443	-1.225	-1.567*	0.413	-1.710**
	(0.262)	(0.796)	(0.788)	(0.656)	(0.630)
v99_pro014				3.509	
				(2.578)	
v99_pro1529	-0.928	-0.106	0.865	1.772	-3.715
	(0.532)	(0.702)	(1.472)	(1.935)	(2.684)
v99_pro3044	-1.448*	-0.558	0.991		-1.750
	(0.673)	(0.884)	(1.805)		(3.830)
v99_pro4559	-0.832	-0.507	-0.230	2.526	0.224
	(0.473)	(0.639)	(1.246)	(1.739)	(2.502)
v99_pro6074	-0.722	-0.640	-1.037	3.791	-4.965
	(0.490)	(0.645)	(1.424)	(2.331)	(2.913)
v99_pro75plus	0.300	0.322	-0.026	3.775	-5.214
	(0.584)	(0.778)	(1.714)	(2.258)	(3.463)
v99_chom1564	0.586	0.622	-0.356	-1.136	2.066

	(0.359)	(0.486)	(0.997)	(1.235)	(1.626)
v99_cs1	-2.663***	-1.402*	-3.865**	-3.139*	-4.249
	(0.436)	(0.566)	(1.208)	(1.588)	(3.329)
v99_cs3	-0.301	-0.604			-3.003
	(0.514)	(0.696)			(2.880)
v99_cs4	-0.939*	-0.432	-3.542**	-1.614	-2.816
	(0.460)	(0.602)	(1.314)	(1.700)	(2.711)
v99_cs5	-1.121*	-1.565**	-2.202	-0.910	-1.126
	(0.453)	(0.605)	(1.123)	(1.395)	(2.643)
v99_cs6	-1.351**	-1.101	-3.312***	-1.524	-4.543
	(0.430)	(0.572)	(0.997)	(1.189)	(2.495)
v99_cs7	-1.066*	-0.936	-2.069	-2.197	1.948
	(0.470)	(0.614)	(1.358)	(1.784)	(3.064)
v99_cs8	-0.962*	-1.060	-1.873	-2.084	-0.919
	(0.434)	(0.578)	(1.119)	(1.452)	(2.466)
electionsfe3	-0.075	-0.258	-0.175	0.178	0.199
	(0.532)	(0.620)	(0.754)	(0.418)	(0.598)
electionsfe6	-0.454		0.614	-0.009	
	(0.554)		(0.785)	(0.540)	
electionsfe7	-0.090	-0.456	0.409	0.283	-0.018
	(0.531)	(0.592)	(0.724)	(0.455)	(0.659)
electionsfe8	0.132	-0.524	0.864	0.814	0.106
	(0.534)	(0.607)	(0.734)	(0.462)	(0.645)
electionsfe11	-0.106		1.138		0.762
	(0.616)		(0.970)		(0.681)
electionsfe13	-0.170	-0.795	0.493	0.418	-0.024
	(0.530)	(0.600)	(0.707)	(0.434)	(0.641)
electionsfe15	0.241	-0.079		0.751	0.314
	(0.542)	(0.602)		(0.580)	(0.817)
electionsfe16	0.002	-0.342	0.415	0.283	0.186
	(0.522)	(0.577)	(0.684)	(0.379)	(0.570)
electionsfe17	0.009	-0.288	0.534	0.347	-0.010
	(0.525)	(0.582)	(0.696)	(0.397)	(0.583)
electionsfe18	-0.081	-0.462	0.362	0.224	0.081
	(0.522)	(0.576)	(0.686)	(0.376)	(0.568)
electionsfe19	-0.269		0.365		-0.027
	(0.555)		(0.789)		(0.655)
depfe1	0.063	0.382	-0.128	-0.179	0.155
	(0.191)	(0.515)	(0.376)	(0.460)	(0.676)
depfe2	0.429*	0.646	0.043	0.590	0.911
	(0.183)	(0.495)	(0.372)	(0.466)	(0.697)
depfe3	-0.893***	-0.546	-1.325*	-1.356*	-1.020
	(0.256)	(0.567)	(0.517)	(0.608)	(0.806)
depfe5	-0.363	-0.650	-0.064	-0.610	-0.183

	(0.241)	(0.631)	(0.463)	(0.565)	(0.760)
depfe6	-0.302	0.122	-0.136	-0.283	-0.545
	(0.229)	(0.616)	(0.494)	(0.536)	(0.684)
depfe7	-0.637**		-1.379**	-0.629	-0.355
	(0.225)		(0.511)	(0.482)	(0.702)
depfe8	-0.539*	-0.269	-0.684	-0.659	-0.356
	(0.213)	(0.513)	(0.471)	(0.550)	(0.768)
depfe9	-0.330	0.001	-0.456	-0.772	-0.704
	(0.210)	(0.509)	(0.441)	(0.557)	(0.805)
depfe10	0.154	0.326	-0.172	0.418	0.568
	(0.193)	(0.499)	(0.414)	(0.497)	(0.715)
depfe11	-0.233	-0.160	-0.172	-0.262	-0.615
	(0.200)	(0.511)	(0.400)	(0.475)	(0.743)
depfe12	0.068	0.204	-0.194	-0.399	0.062
	(0.205)	(0.530)	(0.393)	(0.486)	(0.709)
depfe13	-0.128				-0.192
	(0.228)				(0.667)
depfe14	-0.200	-0.106	-0.578	-0.154	0.149
	(0.190)	(0.503)	(0.389)	(0.470)	(0.677)
depfe15	-1.007**		-1.116*	-0.987	
	(0.321)		(0.541)	(0.621)	
depfe16	-0.506*	-0.692	-0.709	-0.584	-0.259
	(0.212)	(0.555)	(0.408)	(0.506)	(0.707)
depfe17	0.185	0.464	-0.300	-0.045	0.132
	(0.190)	(0.506)	(0.381)	(0.459)	(0.667)
depfe18	-0.309	-0.439	-0.645	-0.299	-0.381
	(0.215)	(0.565)	(0.416)	(0.486)	(0.747)
depfe19	-0.775**	-0.504	-0.848		-0.593
	(0.253)	(0.564)	(0.463)		(0.802)
depfe21	-0.079	0.014	-0.241	0.140	0.430
	(0.189)	(0.499)	(0.388)	(0.479)	(0.705)
depfe22	-0.395	-0.608	-0.787	-0.483	-0.458
	(0.207)	(0.626)	(0.430)	(0.472)	(0.678)
depfe23	0.285	0.356	-0.058	-0.084	0.205
	(0.203)	(0.513)	(0.397)	(0.484)	(0.799)
depfe24	-0.182	-0.101	-0.398	-0.294	-0.161
	(0.195)	(0.511)	(0.388)	(0.460)	(0.694)
depfe25	-0.274	-0.008	-0.394	-0.375	0.214
	(0.193)	(0.502)	(0.404)	(0.492)	(0.698)
depfe26	-0.047	-0.006	-0.316	-0.033	0.096
	(0.198)	(0.517)	(0.407)	(0.465)	(0.684)
depfe27	-0.621**	-0.659	-0.774*	-0.578	-0.369
	(0.202)	(0.523)	(0.392)	(0.487)	(0.718)
depfe28	-1.067***		-0.991*		-0.751

	(0.277)		(0.455)		(0.787)
depfe29	-0.749**			-1.238*	-0.573
	(0.239)			(0.581)	(0.677)
depfe30	0.090	-0.119	-0.144	0.064	0.175
	(0.196)	(0.547)	(0.398)	(0.454)	(0.670)
depfe31	-0.162	-0.178	-0.052	0.081	-0.283
	(0.191)	(0.507)	(0.393)	(0.458)	(0.671)
depfe32	-0.058	0.019	0.135	-0.191	0.652
	(0.198)	(0.503)	(0.424)	(0.537)	(0.720)
depfe33	-1.036***	-0.873	-1.067*	-1.548**	-0.970
	(0.231)	(0.599)	(0.451)	(0.560)	(0.694)
depfe34	-0.907***	-0.710		-1.035*	-0.933
	(0.238)	(0.622)		(0.523)	(0.690)
depfe35	0.146	-0.361	-0.046	0.000	0.083
	(0.194)	(0.644)	(0.385)	(0.461)	(0.664)
depfe36	0.488*	0.802	0.252	0.033	-0.244
	(0.198)	(0.510)	(0.385)	(0.483)	(0.751)
depfe37	0.504**	0.635	0.297	0.257	0.447
	(0.194)	(0.528)	(0.374)	(0.462)	(0.676)
depfe38	-1.079***			-1.488**	-0.523
	(0.233)			(0.562)	(0.677)
depfe39	-0.800***	-0.552	-0.938*	-0.463	
	(0.220)	(0.523)	(0.465)	(0.540)	
depfe40	-0.858***		-1.216*	-0.999	-0.386
	(0.239)		(0.539)	(0.538)	(0.696)
depfe41	-0.542*	-0.224	-0.963*	-0.889	-0.686
	(0.228)	(0.543)	(0.466)	(0.519)	(0.787)
depfe42	-0.450*	-0.285	-1.237*	-0.531	-0.251
	(0.213)	(0.577)	(0.506)	(0.481)	(0.685)
depfe43	-0.257	-0.200	-0.835	-0.462	-0.144
	(0.221)	(0.550)	(0.467)	(0.504)	(0.705)
depfe44	0.163			0.095	0.046
	(0.204)			(0.479)	(0.661)
depfe45	-0.533*		-0.796	-0.483	-0.460
	(0.220)		(0.460)	(0.483)	(0.701)
depfe46	-0.167	0.191	-0.507	-0.629	
	(0.208)	(0.511)	(0.409)	(0.533)	
depfe47	-0.896***		-1.167*	-1.255*	-0.404
	(0.258)		(0.519)	(0.610)	(0.720)
depfe48	-0.285	-0.001	-1.057	-0.719	
	(0.245)	(0.535)	(0.581)	(0.631)	
depfe49	0.538**	0.745	0.513	0.239	0.464
	(0.190)	(0.518)	(0.371)	(0.457)	(0.673)
depfe50	-0.191	0.071	-0.516	-0.617	-0.066

	(0.193)	(0.503)	(0.379)	(0.490)	(0.681)
depfe51	-1.037***		-0.913*	-0.989	-0.258
	(0.246)		(0.462)	(0.607)	(0.751)
depfe52	-0.212	0.010	-0.587	-0.124	0.924
	(0.202)	(0.505)	(0.471)	(0.548)	(0.772)
depfe53	0.447*	0.706	0.144	-0.193	0.573
	(0.199)	(0.513)	(0.379)	(0.497)	(0.703)
depfe54	-0.305	-0.001	-0.585	-0.453	-0.100
	(0.194)	(0.504)	(0.419)	(0.506)	(0.676)
depfe55	0.195	0.404	0.630	-0.183	0.238
	(0.194)	(0.500)	(0.413)	(0.563)	(0.760)
depfe56	0.421*	0.126	0.352	0.235	0.391
	(0.196)	(0.700)	(0.416)	(0.464)	(0.661)
depfe57	-0.225	0.033	-0.609	-0.088	0.181
	(0.188)	(0.506)	(0.398)	(0.470)	(0.668)
depfe58	-1.442***		-1.235*		
	(0.382)		(0.529)		
depfe59	-0.414*	-0.567	-0.651	-0.430	-0.648
	(0.194)	(0.566)	(0.390)	(0.466)	(0.674)
depfe60	-1.171***	-1.086			-0.380
	(0.244)	(0.590)			(0.699)
depfe61	-0.092	0.303	-0.720	-0.419	-0.150
	(0.201)	(0.504)	(0.442)	(0.498)	(0.771)
depfe62	0.174	0.215	-0.067	0.252	0.390
	(0.183)	(0.497)	(0.368)	(0.459)	(0.663)
depfe63	-0.345	-0.845	-1.142*	-0.282	-0.053
	(0.204)	(0.604)	(0.446)	(0.467)	(0.676)
depfe64	-0.610**	-0.709	-1.041*	-0.589	-0.003
	(0.208)	(0.536)	(0.460)	(0.497)	(0.681)
depfe65	-0.444*	-0.277	-0.377	-0.099	-0.773
	(0.206)	(0.511)	(0.446)	(0.514)	(0.809)
depfe66	-0.327	-0.657	-0.316	-0.544	-0.207
	(0.218)	(0.632)	(0.457)	(0.526)	(0.674)
depfe67	-0.272	0.369	-0.470	-0.837	-0.731
	(0.196)	(0.513)	(0.393)	(0.505)	(0.714)
depfe68	-0.665**		-0.902*	-0.653	-0.325
	(0.221)		(0.453)	(0.495)	(0.699)
depfe69	-0.486*	-0.102	-0.433	-0.523	-1.085
	(0.214)	(0.667)	(0.413)	(0.481)	(0.711)
depfe70	-0.638**	-0.587	-0.723	-0.395	0.103
	(0.211)	(0.522)	(0.437)	(0.528)	(0.747)
depfe71	0.153	0.188	-0.141	0.003	0.433
	(0.188)	(0.502)	(0.369)	(0.461)	(0.675)
depfe72	0.306	0.437	0.166	-0.044	0.145

	(0.192)	(0.514)	(0.368)	(0.466)	(0.684)
depfe73	-0.616**	-0.113		-1.187*	-0.049
	(0.225)	(0.552)		(0.594)	(0.685)
depfe74	-0.317	-0.053		-0.395	0.087
	(0.210)	(0.670)		(0.482)	(0.669)
depfe76	-0.094	0.062	-0.252	-0.201	0.157
	(0.186)	(0.501)	(0.368)	(0.464)	(0.669)
depfe77	-0.263	-0.531	-0.551	-0.395	0.098
	(0.194)	(0.562)	(0.390)	(0.470)	(0.666)
depfe78	-0.320	-0.145	-0.662	0.066	-0.479
	(0.209)	(0.587)	(0.443)	(0.479)	(0.693)
depfe79	-0.021	-0.257	-0.047	-0.281	-0.006
	(0.203)	(0.546)	(0.384)	(0.478)	(0.710)
depfe80	-1.029***	-1.236*	-1.391**	-0.614	-0.643
	(0.226)	(0.578)	(0.503)	(0.516)	(0.746)
depfe81	-0.405	-0.901		-0.295	0.216
	(0.216)	(0.611)		(0.501)	(0.693)
depfe82	0.148	-0.269	0.259	0.061	0.268
	(0.213)	(0.573)	(0.421)	(0.487)	(0.711)
depfe83	0.231			0.033	0.115
	(0.212)			(0.503)	(0.663)
depfe84	-0.139		-0.200	-0.363	-0.149
	(0.226)		(0.481)	(0.504)	(0.679)
depfe85	-0.210		-0.709	-0.526	-0.329
	(0.234)		(0.522)	(0.519)	(0.702)
depfe86	-0.846***			-0.822	-0.542
	(0.257)			(0.510)	(0.730)
depfe87	-0.350	-0.395	-1.139*	-0.575	-0.191
	(0.229)	(0.647)	(0.532)	(0.490)	(0.716)
depfe88	-0.215	0.012	-0.403	-0.490	0.398
	(0.197)	(0.507)	(0.420)	(0.509)	(0.675)
depfe89	0.330	0.409	0.164	0.074	0.211
	(0.189)	(0.503)	(0.369)	(0.468)	(0.710)
depfe91	-1.506***			-0.893	
	(0.384)			(0.604)	
depfe95	-0.832**	-0.445	-0.625	-0.714	-1.103
	(0.259)	(0.634)	(0.495)	(0.631)	(0.764)
v99_cs2			-1.095	-0.366	
			(1.473)	(1.960)	
depfe20			-0.509		-0.259
			(0.838)		(0.906)
depfe90			0.674	-0.117	0.269
			(0.465)	(0.600)	(0.770)
_cons	0.190	-0.788	0.838	-1.450	1.886

	(0.889)	(1.244)	(1.994)	(2.345)	(3.853)
N	36202	14924	7302	6189	4462
Log lik.	-7985.520	-2503.758	-1729.015	-1828.326	-1571.141
Chi-squared	1923.620	551.942	408.842	380.831	358.448
R-squared	0.1075	0.0993	0.1057	0.0943	10.24

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Bibliography

NB: This is an extensive bibliography that regroups all the documents that provided interesting insights for this dissertation. This is why most of the documents listed below are not directly quoted or mentioned in the core of the dissertation. The two papers studied in the literature review section are in bold.[17]

Academic literature on real estate housing vacancy

- **John Accordino and Gary T. Johnson, "Addressing the vacant and abandoned property problem", *Journal of Urban Affairs*, 2000, Vol. 22 n°3, p. 301-315.**
- Richard J. Arnott, "Housing Vacancies, Thin Markets, and Idiosyncratic Tastes", *Journal of Real Estate Finance and Economics*, 1989, Vol. 2, p. 5-30.
- Catherine Baumont, "Neighborhood Effects, Urban Public Policies and Housing Values. A Spatial Econometric Perspective", Laboratoire d'Economie et de Gestion, Université de Bourgogne, 2007, 32 p.
- Gabriel Desgranges and Etienne Wasmer, "Appariements sur le marché du logement", *Annales d'Economie et de Statistique*, 2000, n°58, p. 253-287.
- Robert F. Engle and Robert C. Marshall, "A Microeconometric Analysis of Vacant Housing Units", *The Urban Economy and Housing*, 1983, p. 105-124.
- Brice Fabre, "Le poids du logement dans le budget des ménages", *Regards croisés sur l'économie*, 2011 n°9, p. 33-35.
- Gabrielle Fack, "Les aides personnelles au logement sont-elles efficaces ?", *Regards croisés sur l'économie*, 2011, n°9, p. 92-104.
- Gabrielle Fack, "Pourquoi les ménages à bas revenus paient-ils des loyers de plus en plus élevés ? L'incidence des aides au logement en France (1973-2002)", *Economie et statistique*, 2005, n°381-382, p. 17-24.
- Jacques Friggit, "Quelles perspectives pour le prix des logemets après son envolée ?", *Regards croisés sur l'économie*, 2011, n°9, p. 14-32.

[17] Some papers mentioned in the literature review section are not necessarily referenced here, for the detailed reference of these papers please refer to the bibliography of Accordino and Johnson (2000) and Caliendo and Kopeinig (2005).

- Masahisa Fujita, *Urban Economic Theory: Land Use and City Size*, Cambridge University Press, 1989, 380 p.
- Stuart A. Gabriel and Frank E. Nothaft, "Rental Housing Markets and the Natural Vacancy Rate", *AREUEA*, 1988, Vol. 16 n °4, p. 419-429.
- Franois Geerolf, "Une économie de bulles immobilières", *Regards croisés sur l'économie*, 2011, n°9, p. 36-45.
- Dominique Goux and Eric Maurin, "The effect of overcrowded housing on children's performance at school", *Journal of Public Economics*, 2005, n°89, p. 797-819.
- Alain Jacquot, "Doit on et peut-on produire d'avantage de logements ?", *Regards croisés sur l'économie*, 2011, n°9, p. 150-158.
- Anne Laferrère and David le Blanc, *Economie et statistique*, 2002, n°351, p. 3-30.
- Jacques Mistral and Valérie Plagnol, *Loger les classes moyennes : la demande, l'offre et l'équilibre du marché du logement*, La Documentation française, 2008, 178 p.
- William T. Nachbaur, "Empty Houses: Abandoned Residential Buildings in the Inner City", *Howard Law Journal*, 1971, Vol. 17 n°3, p. 3-68.
- Christian Nicol and Fabrice Fabre, "Les logements vacants ne sont pas tous disponibles", *Economie et statistiques*, 1979, Vol. 107, p. 53-63.
- Brian Peterson, "The Beveridge Curve in the Housing Market: Supply and Disequilibrium", Center for Applied Economics and Policy Research, 2009, Working Paper n°2009-000, 31 p.
- James M. Poterba, "Taxation and Housing: Old Questions, New Answers", NBER, 1992, Working Paper n°3963, 15 p.
- Colin Read, "Vacancies and Rent Dispersion in a Stochastic Search Model with Generalized Tenant Demand", *Journal of Real Estate Finance and Economics*, 1997, Vol. 15 n°3, p. 223-237.
- George Sternlieb and Bernard Indik, "Housing Vacancy Analysis", *Land Economics*, 1969, Vol. 45 n°1, p. 117-121.

- Scott Susin, "Rent Vouchers and the Price of Low-Income Housing", *Journal of Public Economics*, 2002, n°83, p. 109-152.
- Etienne Wasmer, "Analyse économique du marché du logement locatif", *Revue économique*, 2007, Vol. 58 n°6, p. 1247-1264.
- William C. Wheaton, "Vacancy, Search, and Prices in a Housing Market Matching Model", *Journal of Political Economy*, 1990, Vol. 98 n°6, p. 1270-1292.
- Michelle J. White, "Property Taxes and Urban Housing Abandonment", *Journal of Urban Economics*, 1986, Vol. 20 n°3, p. 312-330.
- Peter Wyatt, "Empty Dwellings: the use of council-tax records in identifying and monitoring vacant private housing in England", *Environment and Planning*, 2008, Vol. 40 n°5, p. 1171-1184.

Academic literature and programs on propensity score matching

- Alberto Abadie and Guido W. Imbens, "On the Failure of the Bootstrap for Matching Estimators", *Economtrica*, 2008, Vol. 76 n°6, p. 1537-1557
- Sascha O. Becker and Andrea Ichino, `pscore, attnd, attnw, attr, atts and attk` programs for Stata, 2002.
- **Marco Caliendo and Sabine Kopeinig, "Some Practical Guidance for the Implementation of Propensity Score Matching", IZA, 2005, Discussion Paper n°1588, 32 p.**
- Sandra Cavaco, Denis Fougère and Julien Pouget, "Estimating the effect of a retraining program on the re-employment rate of displaced workers", *Empirical Economics*, Forthcoming, 27p.
- James Heckman and Jeffrey Smith, "The determinants of participation in a social program: Evidence from a prototypical job training program", IFAU, 2003, Working paper n°2003:10, 80 p.
- Guido W. Imbens, "Nonparametric Estimation of Average Treatment Effects Under Exogeneity: a Review", *The Review of Economics and Statistics*, 2004, Vol. 86 n°1, p. 4-29.
- Edwin Leuven and Barbara Sianesi, `psmatch2` program for Stata, 2003.

Other documents and administrative literature

- ANAH (Agence nationale de l'habitat), "Atlas 2008 de l'habitat privé. Fonctions, enjeux, évolutions", 2008, 129 p.
- Sabine Bessière, "La proportion de logements vacants la plus faible depuis 30 ans", *INSEE première*, 2003, n°880, 4 p.
- Thomas Billet (interview conducted in April 2011), fiscal specialist on vacant housing.
- Marcel-Pierre Cléach, "Rapport d'information, au nom de la commission des affaires économiques et du plan sur le logement locatif privé", Sénat, October 15th 2003, 124 p.
- Commissariat général du développement durable - Service de l'observation et des statistiques, "Note méthodologique du compte du logement", 2011, 98 p.
- Conseil d'Etat, "Rapport public 2009. Droit au logement, droit du logement", 2009, 459 p.
- Fondation Abbé Pierre, "L'état du mal-logement en France. 17e rapport annuel", 2012, 226 p.
- Maryse Fourcade, Valérie Jeske and Pierre Naves, "Synthèse des bilans de la loi d'orientation du 29 juillet 1998 relative à la lutte contre les exclusions", Inspection générale des affaires sociales (IGAS), Rapport 2004-054, 2004, 337 p.
- Pays de l'Albigeois et des Bastides, "Etude sur le parc de logements vacants de 15 bourgs du territoire", 2009, 32 p.
- Annelise Robert, Claire Plateau, "Mesure la vacance pour évaluer les tensions sur les marchés du logement", INSEE, Notes de synthèse du SESP, 2006, n°162, 12 p.