ARTICLE IN PRESS

PUBEC-104079; No of Pages 22

Journal of Public Economics xxx (xxxx) xxx

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

The impact of taxing vacancy on housing markets: Evidence from France☆

Mariona Segú

RITM, Université Paris Sud, Paris Saclay, France

ARTICLE INFO

Article history:
Received 21 December 2018
Received in revised form 10 September 2019
Accepted 19 September 2019
Available online xxxx

JEL classification:
H71
R31
R38

Keywords:
Housing
Vacancy rate
Tax policy
Long-term vacancy

ABSTRACT

Vacancy is a common phenomenon across developed countries. Policymakers seek to reduce vacancy as it is seen as a challenge to housing affordability, especially in large cities. Taxing vacant housing is becoming a more popular tool among lawmakers, and yet this 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 introduction 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 administrative dataset, which contains information on every housing unit 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 accounted for a 13% decrease in vacancy rates between 1997 and 2001. The impact is especially concentrated in long-term vacancy. Results also suggest that most of the vacant units were turned into primary residences.

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 U.S.[1] While for economists some level of vacancy seems intrinsic to the way markets work, politicians and activists have criticised this situation, arguing that high vacancy rates are undesirable and need to be tackled to improve housing affordability. Indeed, access to housing has worsened in recent years, as suggested by the increasing proportion of households' income spent on housing. Various interventions have been proposed to deal with vacancy ranging from a tax on vacant housing to forced conversion into social housing. Assessing the effect of such interventions at the local level is crucial to understand the role played by governments and local authorities in shaping property owner incentives in the housing market.

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

Demand for housing has been increasing 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 a decline in average household size. In a context of low supply elasticity, which characterises European countries,[2] increases in housing demand tend

☆ I acknowledge the help of Benjamin Vignolles, from the French Ministry of Housing. I would like to especially thank Gabrielle Fack and Miren Lafourcade for their constant and very useful supervision. I would also like to show my gratitude to the Ministry of Housing for letting me work with their data as well as my fellow researchers in RITM, especially Lisa Anouliès, and Paris School of Economics for their useful insights. I am grateful for the funding provided by the grant ANR-10-LABX-93 (Labex OSE) from *Investissement Avenir* program. Finally, I also thank the participants of the Applied Economics Lunch Seminar in PSE, the Summer School of Urban Economics in IEB, UB, the RUES in Paris, the SERC in LSE and the 7th European Meeting of UEA.

E-mail address: mariona.segu@u-psud.fr.

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

[2] Caldera and Johansson (2013) estimate the housing supply elasticity for various OECD countries and find France to be among the least responsive markets, with an elasticity of 0.363. A similar elasticity is also found by Chapelle and Eymeoud (2018).

https://doi.org/10.1016/j.jpubeco.2019.104079
0047-2727/

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

to capitalize into higher prices. This situation is further exacerbated by a high population density, land scarcity and rigid construction regulation.[3] Moreover, due to the concentration of population in urban areas, housing markets tend to be tighter in large cities.

It may seem paradoxical that a situation of increasing demand for housing and inelastic supply coexists with considerably high levels of vacancy in many European countries. 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 (Merlo and Ortalo-Magne, 2004). However, vacancy can also be a result of a rational decision of the owner. For instance, in a context of strong tenant protection, as is the case of the French rental market, an owner may prefer to leave an apartment vacant rather 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 may decide to wait before selling or renting and thus choose to keep 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, policymakers can try to compensate for the distortions caused by tenant regulation and the real option problem by taxing vacant units. As stated by Kline and Moretti (2014), the presence of pre-existing distortions is one of the arguments that can justify the implementation of place-based policies. Moreover, focusing on vacancy reduction may be a faster and easier way to increase residential capacity than promoting the construction of new housing units.

Nevertheless, the benefits of reducing vacancy might go beyond redistribution purposes. Indeed, some empirical evidence suggests that empty housing may have other undesirable social consequences due to negative externalities. Firstly, concentrations of vacant housing or foreclosures tend to reduce the value of properties in the area (Lee, 2008; Fitzpatrick, 2012; Glaeser et al., 2018). Secondly, the increase in the perception of insecurity has also been identified as a consequence of the concentration of vacant houses, which can lead to an increase in the delinquency rate and damage social cohesion (Immergluck and Smith, 2006; Ellen et al., 2013). Therefore, the justification for government intervention to reduce vacancy comes both from the potential redistributive effect of using more intensively the current housing stock and from the reduction of negative externalities entailed by vacancy.

Governments have historically intervened in the housing market in a number of ways. But few have directly tackled the reduction of vacancy due to the limited set of tools available. The difficulty to define and measure vacancy – where there is no consensus as of yet (de La Morvonnais and Chentouf, 2000) – is another important challenge. Nevertheless, there have been some initiatives across OECD countries aiming at decreasing vacancy rates. The Netherlands has historically opted for decriminalising squatting.[4] In the U.S., local governments have enacted vacant property registration ordinances to keep a better account of vacant units. Owners are required to provide property maintenance notifications and are usually charged a fee at the time of registration (Schilling, 2009).

As the interest for a tax on vacant housing rises, an increasing number of countries have implemented this policy. Since April 2013, municipalities in the UK can choose to charge vacant units with up to an extra 50% of the council tax payment, a tax on housing properties. Jerusalem has also implemented a kind of vacancy tax in the form of doubling *Arnona* (a municipality tax on property) for properties that have been empty for more than six months. To my knowledge, there are no studies evaluating the extension of the council tax in the UK nor *Arnona* in Jerusalem.

In France, a vacancy tax called *taxe sur les logements vacants* or TLV was introduced in 1999 in urban units 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 its impact.

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 (PSM) 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 vacancy rates. 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 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 rent levels by rationing stocks. In this context, taxing vacant housing units increases owners' incentives to rent their housing unit at a lower rent because it increases their opportunity cost to leave them 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 open vacancies while reducing the inactive stock and rents in the short-term. In official records, total vacancy is measured as the sum of open vacancies plus inactive stock. Given that the increase in open vacancies is smaller than the decrease of the inactive stock, the model also predicts a decrease in total vacancy.

I empirically test these predictions by exploiting the fact that the tax on vacancy in France was introduced only in some municipalities. This allows me to apply a difference-in-difference strategy combined with 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 the control group and several other robustness tests. 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 a tax on vacancy can indeed be an efficient tool to reintroduce housing units that had been unused for a long time into the market. 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 in the medium-term.

This paper also relates to the abundant branch of literature that empirically evaluates the impact of housing policies. One strand

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

[4] Vacant Property Act in 1981 (Priemus, 2011).

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

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 U.S. have assessed the spillover effects of the Low-Income Housing Tax Credits (LIHTC) on property value resulting in mixed evidence (Di and Murdoch, 2013; Ellen et al., 2007; Nguyen, 2005) .

As for the empirical evidence concerning vacant housing, the amount of research is scanter. 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 restrictive local planning policies result 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 Sections 4 and 5, I present the data and the empirical strategy used in the analysis. 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 search process. Given the dependence 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. Hence, units that are vacant due to frictions are *open* vacancies, this is, 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 labor 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. One could expect a similar mechanism in the housing market than the one observed in the second generation of job search models: 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 from 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 rent adjustment (such as tenant regulations), there may be some strategic holding of vacant units. High levels of tenant protection can result in voluntary or strategic vacancy. For instance, if an owner cannot terminate a rent contract at a 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 high.[5] Therefore, in the French context, vacancy can 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 rented or sold. In equilibrium, the level of vacancy can be a positive level that includes frictional vacancy and inactive stock, provided the conditions for the latter being 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 model developed by Pissarides (2000) to describe labor markets and translate it to the housing market. In their model, DW assume that all owners participate in the housing market and that 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 units vacant. Including a participation constraint is even more relevant if we take into account that owners can be exempted from the tax if they can prove that they are trying to sell or rent their unit. The tax only affects the inactive stock and not the properties that are offered in the market. In this paper, I introduce a participation constraint in a simplified version of the DW model to account for the fact that owners can rationally decide not to participate in the rental market — hereinafter *Participation* (P) model.

2.1. Model setup

I develop a partial equilibrium search and matching model for the housing market in the short-term. The basic framework of the model is as in DW. There is a mass A of homogeneous apartments uniformly distributed in a city which is inhabited by a mass W of homogenous residents. Apartments are owned by the same mass A of owners who decide whether to participate in the rental market in a continuous-time framework. Owners differ in their outside option b_j which they obtain if they decide to leave the apartment empty. When owners choose to participate, they either look for a tenant (V) or already have a tenant (O). Residents 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 (lower cases indicate subsets of the mass of residents/apartments). I adopt the standard assumptions of search and matching models; I assume that $x_s > 0$, $x_v > 0$, $x_{ss} < 0$, $x_{vv} < 0$ and also $x(1, +\infty) = x(+\infty, 1) = +\infty, x(1, 0) = x(0, 1) = 0$. Noting $\theta = v/s$ as the market tightness, we can rewrite the following matching probabilities:

$$q(\theta) = x(s, v)/v = x(1/\theta, 1), \quad (1)$$

[5] Estimated to be around 226 days by Djankov et al. (2002).

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

where Eq. (1) gives the probability of finding a tenant and Eq. (2) is the probability of finding an apartment. The assumptions on the matching function imply that $q(\theta)$ (resp. $\lambda(\theta)$) is strictly decreasing (increasing) and convex (concave).

I can now define the present-discounted utilities of each of the four possible states in a form of four Bellman equations, where upper cases refer to value functions:

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

$$rT = u - R + \delta(S - T), \tag{4}$$

$$rV = -c + q(\theta)(O - V), \tag{5}$$

$$rO = R - c + \delta(V - O), \tag{6}$$

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, c is an ownership cost[6] (i.e. home maintenance), R is the rent and δ is the exogenous probability of a match to break (due to an adverse shock, for example). Contrary to DW, I do not include the vacancy tax in Eq. (5) since owners are exempted from the tax if they offer their apartment in the market. I can then compute the gains from renting as:

$$O - V = \frac{R}{r + \delta + q(\theta)}. \tag{7}$$

To determine the rent, I use the Nash bargaining solution like in DW.[7] The equilibrium rent is obtained after maximising total surplus $(T - S)^{\beta}(O - V)^{1-\beta}$ where β is tenant's bargaining power. From the solution to this problem, I obtain the following *Rent Bargaining* curve in the $(\theta, R*)$ plane:

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

with equation K_1 equal to

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

To include a participation dimension, I add a housing market participation condition:

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

Eq. (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 than or equal to the utility of having an empty and inactive unit (b_j) minus the tax (t). b_j is heterogeneous and idiosyncratic to each owner for several reasons. First, even if housing units are homogeneous by assumption, the state of decay might differ. Some owners might have to undertake significant renovations to make the apartment ready to be rented while others can rent it right away. In this case, b_j is the lack of investment on renovations which depends on the state of deterioration of the unit. Second, owners may differ in their risk aversion with respect to rent default risk. And third, differences in owners' precautionary behaviour with respect to price uncertainty might explain why, ceteris paribus, some owners might delay a transaction to better search the demand, and rent at a higher price.

There is a cutoff value $b*$ such that all owners with a $b_j > b*$ do not participate in the rental housing market. When replacing Eqs. (5), (7) and (RB) into Eq. (9), we can obtain the steady state $b*$ as a function of θ:

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

The proportion of inactive apartments can be written as $i/A = 1 - F(b*)$, where F(.) is the cumulative function of $b*$. For simplicity, I assume that F(.) is strictly increasing. Note that a tax on vacant apartments reduces inactivity by increasing the steady state level of $b*$.

2.2. Steady state equilibrium

In this model, the steady state equilibrium is characterised by threshold participation decision $b*$, a rental price $R*$, a mass of vacant apartments v, a mass of people searching for an apartment s and a mass of occupied units o. 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 transitions 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 the flows into and out of housing states which can be written as:

$$\lambda \cdot s = \delta \cdot o, \tag{11}$$

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

The steady state equilibrium is defined by the stationary conditions (11) and (12), the participation constraint Eq. (9) and the rent bargaining Eq. (RB). From the stationary conditions and using the relation $\theta = \lambda/q$, I obtain the following steady state conditions:

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

2.3. Effect of a tax on vacancy

In the short-term, both the stock of housing and the total number of residents are fixed. The market tightness at the steady state can be obtained by plotting Eq. (2), which is increasing and concave by assumption, and the first steady state condition in Eq. (13). In Appendix C.1, I show that when $W > A - i$, which also implies $s > v$, this curve is decreasing in θ and hence there exist a unique equilibrium level of $\theta*$. In a context of large urban environments, it is reasonable to evaluate the case in which the number of seekers is larger than the number of open vacancies, since it reflects the attractiveness and the dynamics of large cities that have a rigid

[6] This parameter is included in order to follow the DW model, nevertheless it does not affect the results.

[7] See Desgranges and Wasmer (2000) for calculation details.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

housing market supply.[8] Fig. 1 plots first equation in Eq. (13) for different scenarios.[9] Introducing the participation dimension reduces the steady state 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. Introducing a tax on vacant units shifts the curve to the right[10] bringing the equilibrium θ closer to the DW level where full participation is assumed.

I plot in Fig. 2 the *Rent Bargaining* curve with the steady state level of θ to obtain the equilibrium rent. It can be seen that the introduction of a tax reduces rents in both models although the reduction comes from different mechanisms. In the DW model, a tax on vacancy increases residents' bargaining power by shifting the RB curve downwards. Rents decrease because owners are willing to accept lower prices to reduce vacancy duration and pay lower taxes. In the *Participation* model, the rent reduction comes from an increase in market tightness, while the RB curve remains unaffected. The tax affects only owners of inactive units who react by reincorporating their housing units 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 – which is a *Beveridge* curve

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

Fig. 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).

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

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

To determine the impact of the introduction of a tax on $\mathbb{V}$, it is necessary to know if the decrease in i is larger or lower than 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. When I derive the third equation in Eq. (13), I find that $\partial o(\theta)/\partial t > 0$ when $W > A - i$. In that case, when the tax on vacancy increases, the number of occupied units increases as well and therefore $\mathbb{V}$ decreases.

In conclusion, this simple model helps us understand the consequences of the implementation of a tax on vacant units. The introduction of partial 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. Total vacancy, as defined by official record, will decrease. For the remainder 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 extent they can be validated empirically.

One limitation of the model is that it 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 a 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 we consider that high vacancy rates come with some negative amenities (urban crime, increased fire risk, reduced social interaction at a local level, etc.) which are capitalized into lower housing prices and rents. A reduction of vacancy will then also reduce such negative amenities and translate in higher prices. On the other hand, a long-term deflationary price effect could be expected if we consider the impact of vacancy periods on housing quality. By reducing the frequency

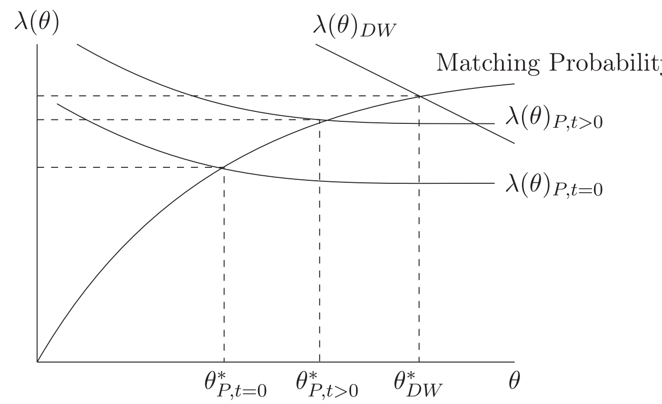


Fig. 1. Equilibrium level of θ.

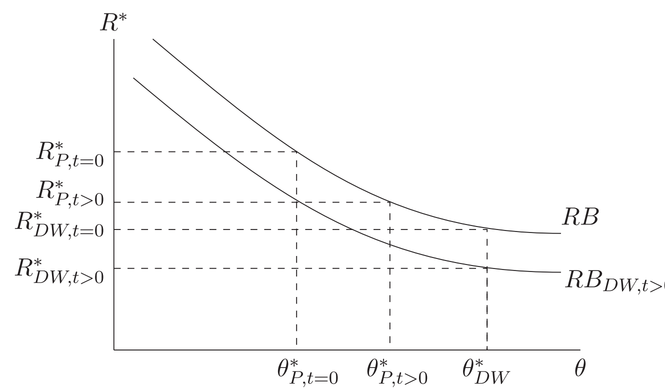


Fig. 2. Steady state of $\theta*$ and $R*$.

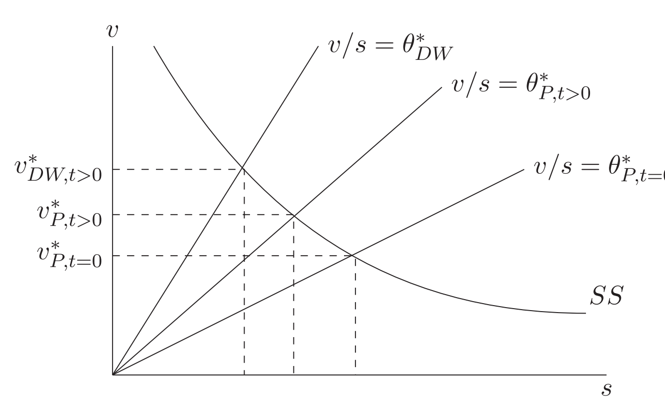


Fig. 3. Steady state of $v*$ and $s*$.

8 The analytical resolution of the model in the case where $W < A - i$ requires further assumptions on the concavity of $b*$.

9 $\lambda(\theta)$ in Eq.(13) is plotted as a convex curve for the sake of representation. While we know that it is not a linear function, it can be both convex or concave.

10 See proof in Appendix C.2.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

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. However, this last mechanism is less likely since the tax has a grace period of two years. 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). In 1999, the implementation of a tax on vacancy changed incentives of the owners both directly and through its interaction with other existing housing taxes. It is important to take into account the tax environment at the time of the implementation.

Like in many other countries, in France, there is a municipal property tax (*taxe foncière*) charged to owners of residential, commercial, and industrial units. The base of this tax is half the rental value[11] of the property and tax rates are determined at the local level, the national average was of 29% in 2004.

Apart from a tax on property, there is another tax on housing (*taxe d'habitation* or TH) to be paid by every individual living in a housing unit, either in ownership or tenancy regime and for both primary and secondary residences. This tax is charged to all housing units except empty ones. It is also a municipal tax, with tax rates determined by local authorities. In 2002, the average rate of the TH for all municipalities in France was 8.7% and for municipalities in the group of analysis it was 13.6%, which is equivalent to 410€.[12] All primary residences are subject to tax allowances, some of which are imposed by the central government and others are decided at the council level. There are also full exemptions for low-income households, people with disabilities and people over 60 years old who are under an income threshold. On average, households pay for their primary residence an effective tax rate 1.5 percentage points lower than the level established by the municipality. The TH is only fully paid by owners of secondary residences and by high-income households on their primary residences.

On July 29, 1998, the French Parliament passed a law to create a tax on vacant housing (*taxe sur les logements vacants* or TLV), which was then implemented on January 1, 1999. The rationale behind the introduction of TLV was to encourage owners of empty units to reintroduce their properties into the market to improve the efficiency of the existing housing stock in areas with high demand. The tax concerned only those municipalities belonging to *urban units*[13] 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 municipalities concerned was published on December 29, 1998. It included 680 municipalities in eight urban units: Paris, Lyon, Lille, Bordeaux, Toulouse, Montpellier, Nice, and Cannes-Grasse-Antibes.

The tax concerned all housing units with a minimum level of comfort that had been vacant, i.e. empty of furniture, for more than 2 years. A vacant unit was defined as a unit that has been inhabited for less than 30 consecutive days during the previous two years. The TLV had an increasing tax rate which base was the rental value, this is, the potential annual rent that the property could produce had it been rented.[14] The TLV was 10% of the rental value during the first year when the tax was 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). Given the distribution of TH in 2002 in the sample, this means that the highest level of TLV was higher than TH in at least 62% of municipalities. The average rental value for the group of taxed municipalities was 3543€, so the amount of the tax was 354€ the first year, 443€ the second year and 532€ in the third year and beyond. Public housing, units requiring important reconstruction work or affected by urban plans of rehabilitation or demolition and involuntarily vacant units were exempted from the tax. Involuntary vacant units included housing units on the market that could not find a renter or a buyer.

Each household could have only one primary residence, which was defined as the housing unit where they usually live and where they have the centre of the professional and material interests. Any other unit owned by the same household was considered either a secondary residence (if it paid the TH) or a vacant unit. In the latter case, the tax authorities could collect the vacancy tax, provided that the housing unit was in one of the impacted municipalities. Households could contest the payment of the tax in a few different ways. First, they could prove that the unit was occupied by providing electricity or water bills and a copy of the payment of the TH. Second, they could prove that the unit was offered for rent or sale at a reasonable price by showing that the asking price was close to the rental value. Third, they could show the housing unit was not habitable by providing proof of the state of the unit.

Owners faced with the tax could react in multiple ways. They could keep paying an increasing amount of tax in subsequent periods or mobilise the housing unit by offering it for sale or rent, using it as a secondary residence or giving it to a family member. Shifting the unit to a secondary residence was the most costly option since the unit had to be furnished and the owners had to start paying the TH for secondary homes, which as stated before was higher than for primary residences. The system of incentives of taxes on housing was changed when the TLV was introduced in a way that encouraged owners to move their units out of vacancy while keeping the shift to secondary residences as the most costly option.

In 2006, a new tax was implemented, the *taxe d'habitation sur les logements vacants* or THLV, that allowed the rest of municipalities to introduce the tax through a vote of their municipal council. Contrary to the TLV, the THLV only concerned those housing units that had been vacant for more than five years (instead of two for the TLV) and the tax rate was determined at the municipality level (the average was 10%). Given the less restrictive criteria of THLV, 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 so on) and the reduction of the threshold for compulsory implementation from 200,000 to 50,000 inhabitants. A 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 prior to taxation was reduced from two years to one.

[11] Estimated annual rent income.

[12] Unfortunately, the information on tax rates from before the implementation of the tax on vacancy is not available.

[13] INSEE defines an "urban unit" as an area of continuous construction (without a separation of more than 200 m between buildings) with at least 2000 inhabitants.

[14] Rental value does not properly represent the value of the house. This is because 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.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

4. Data

I exploit the administrative dataset FILOCOM (FIchier des LOgements par COMmune) containing information on the payments of the *taxe d'habitation* (TH) for every housing unit in metropolitan France from 1995 to 2005. The dataset consists of around 30 million observations per year distributed in 36,170 municipalities. For the analysis, I aggregate the data at the municipality level.[15]

FILOCOM is available from 1995 to 2013, every odd year. However, I only use it up to 2005 because, after this date, two important events occurred which could affect my results. First, as mentioned previously, in 2006 there was an extension of the tax (THLV); second, 2007 marked the beginning of the financial crisis that deeply impacted the French economy. This dataset, created by the General Direction of Public Finances (DGFIP), contains information on the characteristics of the housing stock (surface area, level of comfort, building characteristics), on households' characteristics (income, household size, age of the members) and on the status, the mode and the length of occupation and vacancy. The variable status of occupation classifies units into three categories according to usage: inhabited by the owners, inhabited by renters – either in private, collective or social housing regime – or other uses such as free occupancy or rural lease. There is also a variable that allows us to identify three[16] categories of occupancy (primary residence, secondary home or vacant). Even if only primary and secondary homes pay the TH, vacant units are still in the dataset. 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, the rental value should be considered with caution due to the widening gap between rental value and real renting prices.[17]

The status of vacancy is measured in FILOCOM according to the situation of the housing unit on the 1st of January of a given year. If a unit was not occupied and empty of furniture on the 1st of January 1997, owners did not pay the TH in 1997 and the unit is considered vacant. Then, the vacancy rate is computed by dividing the total number of vacant units by the total number of housing units in a municipality. It is important to note that not all vacant units are subject to the tax, only those that have been vacant for at least two years. Given that social housing institutions (known as HLM and SEM by the French administration) are not subject to the TLV, I do not consider the vacancy rate in the social sector. The outcome of interest will be the private vacancy rate.

I also use other datasets from INSEE for the basic characteristics of a municipality such as population census, population growth and density. To obtain a measure of population at the municipality level with a higher time-frequency than the census, I compute it using the number of people per household in the FILOCOM dataset. This implies that my measure of population is the number of people living in primary residences which is highly correlated with population from the census.[18] Finally, data on transaction prices comes from the Chamber of Notaries of France.

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

[16] There is a fourth category that includes parts of commercial properties which can be used for residential purposes, they represent less than 0.5% of the sample and are therefore excluded.

[17] See footnote 14.

[18] Even though my measure excludes all population living in collective housing, I can test the correlation between the two measures for the year 1999 and it is higher than 0.999; which means that my measure is almost equivalent as the total population as computed in the census.

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 of creating a counterfactual outcome for the treatment group using the outcome of the control group.

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 had a significant imbalance between housing supply and demand. The group of urban units was chosen by the central government and the tax was imposed upon the local authorities, who had no decision power regarding implementation or tax rate. Hence, municipalities could not select themselves into or out of the treatment group. In total, 672 urban municipalities, from 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).[19] Île-de-France has a very unique housing market in terms of demand pressure and prices. Keeping it in the sample would make the common trend assumption less convincing since the evolution of market prices and housing variables in Île-de-France is very different compared to the trends 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. This exclusion does not change the magnitude nor the significance of the coefficients in any of the results tables (see Fig. A3 in the Appendix).

Fig. 4 shows the distribution of treatment and control urban units across the country. The sample is made of urban units spread throughout 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.

For the control group, I use the remaining municipalities that also belong 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". In this group, there are 623 non-taxed municipalities belonging to the other 23 urban units of more than 200,000 inhabitants.[20]

Even though the context of the implementation of the TLV could look like the optimal context for a regression discontinuity design, it is not the case. First of all, it would require taking the analysis at the unit urban level, which would substantially decrease observations (only 7 urban areas were taxed). Secondly, the forcing variable, in this case, population in the urban area is not continuous around the 200,000 threshold. There are 8 urban areas with a population 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 just after the threshold are treated. The first treated urban area had 290,000 inhabitants. These issues make the implementation of an RDD strategy not feasible.[21]

[19] 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 5470 €/m^2 for Île-de-France while roughly around 3000 €/m^2 for the rest of large cities (3210 €/m^2 in Lyon and Toulouse, 2930 €/m^2 in Bordeaux, 3070 €/m^2 in Lille and around 2500 €/m^2 in Marseilles, Nantes and Rennes) (Chambre de Notaires de Paris, June 2013).

[20] 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.

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

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

Fig. 4. Distribution of treatment and control urban areas across France. *Notes:* Dark areas represent urban units with the tax (treated) and light areas urban units without the tax (control). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

The main advantage of the DID strategy is that it allows for the two groups to start from a different level of the 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. This implies that both groups, conditional on observables, should have experienced the same trend on the outcome variables had there been no treatment. 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.

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

In other words, the evolution of the vacancy rate in the treatment group – right part of Eq. (15) – would have been the same as the one in the control group had it not been treated. I also need to assume that the treatment did not affect whatsoever before its introduction (or announcement). This is plausible in this case since the owners of vacant units could not have predicted the approval of the tax before its announcement in 1998.

As for the choice of the time period, ideally, we 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 dataset, 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 1, 1999. Consequently, it is ambiguous whether the point 1999 should be considered as pre- or post-treatment. Given that the tax was already announced in July 1998, it would be reasonable to expect some anticipation from the households. 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 have liked 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 use a non-contaminated pre-period while I still have two periods before the implementation of the law to compare the pre-trends.

Fig. 5 shows the evolution of vacancy rate for taxed municipalities (in dark gray) and for non-taxed ones (in light gray)[22]. 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". The vacancy rate decreases only slightly for non-taxed municipalities, less than 0.5 percentage points in a 10-year period whereas it decreases significantly in taxed municipalities, from 6.5% to 5%, and reaches a level below the control group. The gray dashed line indicates when the tax was officially implemented and the solid vertical lines, the pre- and the post-time points compared, 1997 versus 2001.

Fig. 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 groups 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 than 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. The descriptive statistics displayed in Table 1 show that most of the observable characteristics (except

22 For a longer time span, see Fig. A6.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

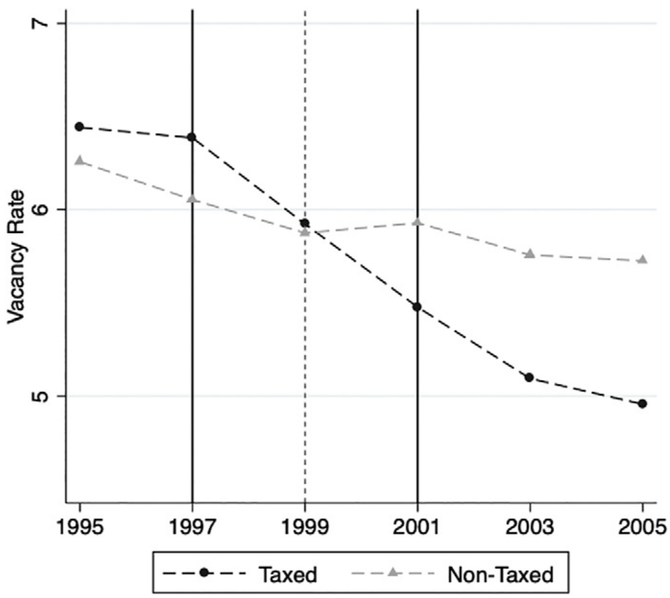


Fig. 5. Evolution of vacancy rate. *Notes:* This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities. Each observation has a weight of 1 (weighted results are available under demand). Taxed municipalities include all taxed urban units except Paris (300 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from the FILOCOM dataset for years 1995 to 2005. (For interpretation of the references to color in this figure, the reader is referred to the web version of this article.)

the 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. The differential trends in long-term population growth might be an underlying sign of differential trends in economic factors. 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 tests section.

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 (Eq. (16)) and obtain a propensity score for each observation. The variables that I use to estimate the model are average surface area, rental value, average household size, population, average annual income of the household and proportion of social housing. Those variables are used at the 1995 levels. In some matching estimations, I also include a vacancy pre-trend which is the difference in vacancy rate between 1995 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 (Eq. (17)).

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

Fig. A1 in Appendix B shows that for each observation in the treatment group, there is at least one in the control group with a similar propensity score. So, I do not have to remove any observation of the sample to ensure 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. Fig. A2 in the Appendix shows the evolution of vacancy weighted by the inverse propensity score. It shows that while trends were parallel before the treatment, the introduction of the tax caused a decrease 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 weighted observations in a way that descriptive statistics of the resulting groups are similar. 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. 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. 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, we would regress the outcome against 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 long 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 the long difference of the outcome and regressing it against a treatment dummy and the long 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 housing units 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. Controls include housing characteristics like average surface area, average rental value and average household size and demographic factors like population, the average annual income of the household and proportion of social housing. I use the long difference of the vacancy rate and of the controls, where $t-1$ represents the period before the implementation of the tax (1997) and t the moment where the tax is in place (2001). The use of the long difference allows me to cancel out the effect of all time-invariant characteristics, so I only need to control for the variables that change over time. In some specifications, I include a specific time trend for each covariate ($\gamma_2 X_{m,t-1}$).

In a different exercise, I look at the yearly effect up to 6 years after the implementation of the tax by regressing the outcome against an interaction of a treatment variable (TLV_m) and year dummies (τ_t), like in Eq. (19). In this specification, I also include time-varying controls ($X_{m,t}$), control-specific time trends based on its level in 1997 ($X_{m,1997} \times t$) as well as time (τ_t) and municipality (μ_m) fixed effects.

$$V_{m,t} = \sum_{t \neq 1997} \delta_t TLV_m \times \tau_t + \gamma_1 X_{m,t} + \gamma_2 X_{m,1997} \times t + \tau_t + \mu_m + \varepsilon_{mt} \tag{19}$$

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

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
Rental Value (€)	18,200	5055	15,156	4487	−3044	9.26	0.00
Surface Area (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
Household Size	2.77	0.27	2.74	0.23	−0.03	1.94	0.05
Average Income (€/year)	22,463	5587	19,027	5427	−3435	8.92	0.00
Population	15,485	42,171	13,090	40,436	−2395	0.83	0.41
Population Growth 90–97	7.3	11.86	3.96	9.06	−3.34	4.73	0.00
Population Density	1194	1499	918	985	−276	3.33	0.00
Social Housing	10.36	12.40	12.86	11.93	2.50	−2.95	0.00

Notes: Data comes from the FILOCOM dataset for year 1997 plus INSEE datasets on demographic characteristics of the municipalities. The Treatment group has 300 observations, the Control group has 623.

Table 2
Balancing test for the covariates.

	Unmatched/matched	Mean *T*	Mean *C*	Difference	*t*-Value	*p*-Value
Average Income	U	19,015	16,532	2483	6.95	0.00***
(€/year)	M	19,015	19,523	−508	−1.11	**0.27**
Surface (m^2)	U	89.75	84.06	5.69	6.79	0.00***
	M	89.75	89.65	0.106	0.1	**0.92**
Population	U	15,485	13,090	2395	0.83	0.41
	M	15,485	15,101	384	0.1	**0.92**
Population Growth	U	7.30	3.96	3.34	4.73	0.00***
	M	7.30	6.26	1.04	1.18	**0.24**
% Social Housing	U	0.10	0.12	−0.02	−2.81	0.01***
	M	0.10	0.10	−0.00	−0.36	**0.72**
Rental Value	U	2692	2239	451	9.25	0.00***
	M	2692	2671	21	0.34	**0.73**
Household Size	U	2.77	2.74	0.03	1.94	0.05**
	M	2.77	2.77	0.00	0.03	**0.98**
Vacancy Trend 95–97	U	−0.06	−0.21	0.15	1.68	0.09*
	M	−0.06	0.03	−0.09	−0.9	**0.37**

Notes: The unmatched rows provide the means for the treatment and the control group for year 1995 for the variables used in the matching procedure. The matched rows take into account the matching weight for the control group. Data comes from the FILOCOM dataset for year 1995 plus INSEE datasets on demographic characteristics of the municipalities. The Treatment group has 300 observations, the Control group has 623.

Given that observations are grouped into 29 different urban units, it is reasonable to think that municipalities are not independent of one another. So, standard errors are block bootstrapped at the urban unit level.[23]

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 Eq. (18). I compare the number of vacant units 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 with respect to the initial level of vacancy.[24] I include a dummy for high initial vacancy rate and I interact it with the treatment.[25] The TLV coefficient 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 the propensity score is estimated. In column (5), I use housing and demographic controls and in column (6), I add the previous vacancy trend (between 1995 and 1997) to account for similarities between municipalities that are due to the vacancy pattern. The effect is negative and statistically significant in all specifications, both for the OLS and for matching. The resulting effect size is a reduction of 0.8 percentage points. 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 units in treated municipalities than there would have been without the tax implementation. These results confirm the model predictions that a tax on vacancy decreases the total level of vacancy, this is, the sum of vacant units on the market plus the number of 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 foregone revenue from renting a unit. The introduction of the tax changes the incentives of the owners

[23] Given that the number of clusters is considerably low (29 urban units), a block bootstrapped treatment of the standard errors is preferred to the standard clustering method.

[24] See Table A1 for the coefficients of each of the control variables.

[25] HighVac equals 1 if the vacancy rate is higher than 5.5%, which corresponds to the percentile 50 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***	−0.728***	−0.553**	−0.151	−0.867***	−0.827***
	(0.175)	(0.199)	(0.234)	(0.273)	(0.137)	(0.138)
HighVac				0.166		
				(0.159)		
TLV * HighVac				−0.812***		
				(0.191)		
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 $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for matching, they are bootstrapped. Each column represents a different regression with the long difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equals 1 for taxed municipalities and 0 for non-taxed. Controls are included in their long 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 taken at their level in 1995. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rates between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities. The Treatment group has 300 observations in 6 clusters, the Control group has 623 in 23 clusters per year.

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 −0.8 which means that the effect of the tax is almost entirely driven by municipalities with an initially high level of vacancy.

Fig. 6 provides the yearly effect of TLV taking 1997 as a reference year (solid vertical line). I plot the resulting coefficients of regressing the vacancy rate against an interaction term of a tax indicator and year dummies (Eq. (19)). This shows how the vacancy rate changed in treatment versus control municipalities every two years. Fig. 6 reports the coefficients of an OLS estimation while controlling by both sets of controls and for characteristic-specific linear time trends, like in specification (3) of Table 3.

The coefficient of the interaction between the TLV indicator and the year 1995 is not significant. This result indicates that the vacancy rate did not evolve in a statistically significant way for treated and non-treated municipalities before the implementation of the tax (dashed gray vertical line). Therefore, it can be interpreted as a placebo test of the common trend assumption. Although the common trend assumption can never be tested, the fact that vacancy rates before the tax was implemented were not statistically different indicates that the two groups evolved analogously and suggests that they could have evolved similarly had the tax not been implemented.

As for the interaction with the year 1999, the coefficient is already negative and barely significant, which suggests a weak anticipation effect in the treatment group with respect to the control. An anticipation effect can occur both in the treatment and in the control group since the announcement of the tax was made one year before the release of the list of targeted urban units. Fig. 5 shows a slight vacancy decrease in both the treatment and control. To further explore this effect, I compare both trends to the trends of municipalities in urban units between 100,000 and 200,000 inhabitants (see Figs. A4 and A5 in the Appendix). In this comparison, the anticipation effect is no longer statistically significant. If at all, it would seem that the anticipation effect is higher in treated municipalities than in controls since the coefficient is already negative (although non-significant).

Lastly, the coefficients for years 2001, 2003, and 2005 are negative and highly significant. The highest decrease occurred in 2001 and the medium-term effect of the tax can be observed in 2005 and it is equivalent to a decrease of 1 percentage point of the vacancy rate.

As the labor market has a *natural rate* of unemployment, the housing market has 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 housing unit becomes vacant, it will likely remain vacant for at least a period of time due to frictional costs. Although the existence of a *natural rate* is generally accepted in housing market literature, few are the estimations of its magnitude. The *Commission des Affaires Economiques* of the French Senate reports a “generally accepted” rate of vacancy ranging between 4% and 5% (Cleach, 2003). If we take this into account, the magnitude of

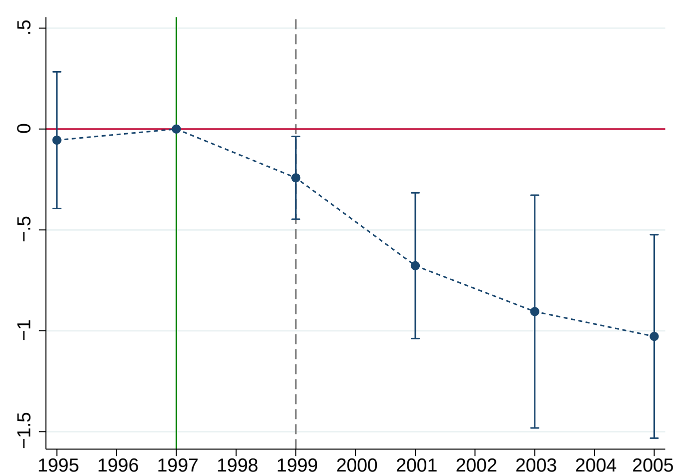


Fig. 6. Event-study graph for the vacancy rate. *Notes:* This graph plots the coefficients (and 5% confidence intervals) of estimating the yearly effect of the tax on vacancy rate. The regression includes housing and demographic controls and characteristic-specific linear time trends. Standard errors are block bootstrapped at the urban unit level (29 clusters). Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1995 to 2005. The Treatment group has 300 observations in 6 clusters, the Control group has 623 in 23 clusters per year. (For interpretation of the references to color in this figure, the reader is referred to the web version of this article.)

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

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 not taxed urban units. The reason for doing so responds to an effort to try to find two comparison groups where the common trend assumption would be even more plausible. The fact that treatment and control urban units belong to the 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.[26]

I provide the results in Table 4. Columns (1) and (2) report the OLS regressions, the 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 unaffected by the TLV to vote and approve the THLV (a local tax on vacancy). In 2008, there were 1938 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 those that were required to adopt it in 1999. It is likely that municipalities that adopted the tax were also experiencing a tight housing market. Those cities had a high level of vacancy in 1999 (7.96%), which may explain why they implemented the tax when authorised.

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

We 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.

To test this, I decompose 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 43%, 14%, and 42% of total vacant apartments respectively.[27] If the group of taxed 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 units that had been vacant for at least two years, we would expect the third category to be the most affected by the introduction of the tax.

In Table 5, we can see that coefficients of long-term vacancy – columns (3) and (6) – report a high, negative, and significant coefficient. As for the other categories of vacancy duration, coefficients are also negative but much smaller in magnitude and not always statistically significant. Therefore, these results suggest that the tax was especially effective in reducing long-term vacancy. The fact that only targeted long-term vacancy strongly decreased while short-term vacancy only slightly decreased provides some evidence against the argument of the more dynamic housing market.[28] A yearly evolution of the vacancy rate decomposed by duration is plotted in Fig. A6 in the Appendix. While trends are reasonably parallel between 1997 and 1999, they start to diverge after 1999, especially for long-term vacancy.

I perform a last robustness test to further dissipate the endogeneity concerns of the selection into treatment. So far, I compared a treatment and a control group which, while sharing similar trends in housing market variables, 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. This allows me to identify control municipalities 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 in December 1998. 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 in the decree with the list of taxed municipalities. 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 manipulated. This provides a source of exogeneity and allows me 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 Fig. A7 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 to make sure that the two groups are as similar as possible; this adds up to 108 treated and bordering municipalities. In Table A4, I compare the characteristics of treated and control municipalities in 1997 and observe that at least half of the baseline characteristics are not statistically significant anymore. The two groups differ in terms of population and average rental value but they started with similar vacancy rates and average income.

I apply the DID strategy on the new sample and provide the results in Table 6. 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 the tax is less effective in the surrounding municipalities than in the centre. For the matching strategy, I also find significant coefficients although at the 10% significance level, likely due to the sample size reduction. The vacancy level of the periphery municipalities where the tax was implemented was reduced by 0.5–0.6 percentage points more than in those other periphery municipalities that were, by chance, not included in the list of taxed municipalities.

Given the geographic proximity of the municipalities in the treatment and the control groups, I need to take into account potential

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

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

[28] I perform a similar robustness test comparing social and private vacancy, see Appendix A.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

Table 4
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	−0.800***	−0.646**	−0.899***	−0.627***	−0.638***	−0.795***
	(0.233)	(0.344)	(0.189)	(0.145)	(0.137)	(0.132)
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 *$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (11 clusters), for the matching, they are bootstrapped. Each column represents a different regression with the long difference of the vacancy rate as the dependent variable (period 1997–2001). I use a propensity score matching strategy to weight control observations. All controls are included in their long difference form. 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 of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities.

Table 5
Effect of TLV on vacancy rate, results by duration.

	OLS			Matching		
Vacancy Rate by duration	<1 year	1–2 years	≥2 years	<1 year	1–2 years	≥2 years
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	−0.071	−0.103	−0.380***	−0.133*	−0.143***	−0.552***
	(0.131)	(0.065)	(0.122)	(0.071)	(0.047)	(0.062)
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
Specific Time Trends	X	X	X			
Vacancy Pre-Trend				X	X	X
N	923	923	923	923	923	923

Notes: Significance is indicated by *$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$. 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 long difference of the vacancy rate as the dependent variable. Last three columns use a propensity score matching strategy to weight control observations. Variable TLV equals 1 for taxed municipalities and 0 for non-taxed. All controls are included in their long difference form. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities.

displacement effects. Notably, if owners affected by the tax put their units on the rental market, this may attract renters from neighbouring municipalities and the impact I identify may be due to renters displacement. I show in Fig. A8 that the vacancy rate of the control municipalities has not increased 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. This robustness test is yet another confirmation of the main results.

8. Understanding the effect of TLV

In this paper, I assess the first direct effect of TLV after its implementation in 1999. I find a strong, negative and significant effect of the tax on the vacancy rate. While the assessment of the direct effect is a first and necessary step to investigate the role of tax policies on housing outcomes, I now turn to evaluate the effect of the tax on alternative outcomes.

First, I aim to assess how the two complementary status of vacancy have evolved due to this decrease in vacancy. Has it translated into an increase of the primary residence ratio or in the secondary residence ratio?[29] Owners can act strategically by transferring vacant units into secondary residences to keep them at their disposal and avoid renting or selling. To do so, they need to furnish them and to pay the *taxe d'habitation* (TH). The decision to fill the unit 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 lower than TLV for those units that have been vacant for five or more years, for which the tax rate is 15%. This strategic behaviour is only optimal for those units in long-term vacancy.[30]

In Table 7, I look at what happens with the primary and the secondary residence ratios (columns (3) to (6)), we see that the entire decrease in vacancy seems to be translated into an increase

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

[30] 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 it is not expected that the tax rate of TH changes considerably from one year to the next, municipalities who got taxed could behave in different ways as far as the tax rates of the TH are concerned.

Table 6
Effect of TLV on vacancy rate, bordering municipalities.

	OLS			Matching	
Vacancy Rate	(1)	(2)	(3)	(4)	(5)
TLV	−0.762***	−0.378*	−0.463***	−0.601*	−0.647*
	(0.244)	(0.202)	(0.146)	(0.317)	(0.331)
Housing Controls		X	X	X	X
Demographic Controls		X	X	X	X
Specific Time Trends			X		
Vacancy Pre-Trend					X
N	181	181	181	181	181

Notes: Significance is indicated by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. 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 long difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equals 1 for taxed municipalities and 0 for non-taxed. All controls are included in their long difference form. For the matching columns, the crosses indicate the variables that have been used for the matching procedure. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities.

in primary residence ratio, for both short and long-term effects. The secondary residence ratio did not increase with the tax; see columns (5) and (6). These results show that there was no strategic behaviour in shifting housing units to secondary residences. Fig. A9 in the Appendix plots the evolution of the two ratios; the pre-trends are fairly parallel, which provides evidence for the common trend assumption.

Second, I look at the impact of the tax on other housing market outcomes. According to the model in Section 2, an increase is expected in the active housing stock right after tax implementation due to the higher mobilisation of the current stock. As a consequence, rents should decrease in the short-term if the volume of the mobilised housing stock is high enough. On the contrary, in the long-term, since the tax causes an increase in the cost of investment, we could expect a reduction in investment and rent increases. To further explore this question I consider three different outcomes: prices (due to data constraints, I cannot look at rents), a measure of mobility and the rate of new construction.

To evaluate the impact on prices, I use data of a sample of repeated transactions from the Chamber of Notaries, which contains information on housing transactions for the period 1995–2005. [31] After running a hedonic regression of the log of square-meter price against some housing characteristics (apartment/house indicator, number of rooms, number of bathrooms, floor number and number of parking spaces and elevators), I retrieve the residual and aggregate it at the municipality level by computing the mean. I then obtain a measure of housing prices net of the impact of the most important housing characteristics.

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 7). Applying the same theoretical predictions for rents to prices, which is not necessarily appropriate, my results would be contradicting the theory in the short-term. However, several factors could explain the lack of a negative effect on prices. First, the mobilisation of the current stock due to the tax may not have been high enough to affect prices. Second, the mobilised stock is split between units that are sold, rented and those that start being used by the owner, meaning that the shock on sales prices in the housing market is even smaller. 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 shrinking of the supply. In columns (11) and (12), the rate of new construction was not statistically different in the treatment than in the control group, neither in 2001 nor in 2005. Six years after tax implementation, housing supply does not seem to have decreased. This result could be explained by the fact that the tax was implemented in dense urban units where land is scarce and 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 housing units. This measure includes units that have been sold but also any kind of transfer or donation implying a change in name on ownership documents. 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) slightly higher in the short-term. This suggests that 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: those who benefited from the tax on vacancy and who occupied the formerly vacant units. Given data constraints, I can only look at aggregated measures[32] of welfare such as average annual household income. In columns (13) to (18) of Table 7, I report the results of the tax on household size, percentage of renters and average household income. Even though these results should be interpreted with caution, it seems that the tax increased the percentage of private renters both in the short and in the medium-term. This suggests that some of the previously vacant units were reintroduced to the market by being offered to tenants. Lastly, I find a very small, slightly negative effect on household size in the short-term and a positive effect on the average income in the long-term. While the impact on household size is harder to interpret, the impact on average income suggests that residents of taxed municipalities were richer than the ones in the control group after 6 years of tax implementation. A more detailed and localised analysis is needed to be able to draw stronger conclusions about the total welfare effects of the tax on vacancy.

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 problematic as it implies

[31] The data I use is not exhaustive since I can only observe the price of those units that were sold in the period 2000–2012 every other year. Since I have information on the previous transaction, I use it to build a dataset for the period of interest, using only those units that have been sold twice during the period 1995–2012.

[32] The dataset is not a panel at the housing unit level but at the municipality level.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

Table 7
Effect of the tax on different outcomes.

PS Matching	Vacancy Rate		Primary residence		Secondary residence		Ln(m^2 Price) -residual-		Ownership changes	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
TLV	−0.827***	−1.331***	0.762***	1.230***	−0.010	−0.033	0.060	0.084***	0.607***	0.595***
	(0.138)	(0.168)	(0.139)	(0.177)	(0.076)	(0.093)	(0.038)	(0.029)	(0.177)	(0.174)
Mean of *C* in 97	6.05		91.60		2.40		830.17		8.36	
Post-Period	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Housing Controls	X	X	X	X	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X	X	X	X	X
Vacancy Pre-trend	X	X	X	X	X	X	X	X	X	X
N	923	923	923	923	923	923	783	783	923	923
PS Matching	New construction		Household size		% of Renters		Average Income			
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)		
TLV	0.408	−0.088	−0.030**	−0.000	0.441**	0.770***	−277.94	710.31***		
	(0.248)	(0.275)	(0.014)	(0.012)	(0.179)	(0.236)	(228.49)	(227.71)		
Mean of *C* in 97	2.05		2.74		19.97		19,027			
Post Period	2001	2005	2001	2005	2001	2005	2001	2005		
Housing Controls	X	X	X	X	X	X	X	X		
Demographic Controls	X	X	X	X	X	X	X	X		
Vacancy Pre-trend	X	X	X	X	X	X	X	X		
N	923	923	923	923	923	923	923	923		

Notes: Significance is indicated by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. Standard errors, in parenthesis, are bootstrapped. Each column represents a different regression which dependent variable is indicated every two columns, the long difference of the outcome is used. I use a propensity score matching strategy to weight control observations. In the short-term effect, I compare year 1997 with 2001, in the long-term, I compare 1997 with 2005. The crosses indicate the variables that have been used for the matching procedure at their level in 1995. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the average population, the average annual household income and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Data comes from the FILOCOM dataset for years 1997, 2001, and 2005 plus INSEE datasets on demographic characteristics of the municipalities for 1999.

an inefficient use of housing stock. Policymakers 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 these 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 compared using a difference-in-difference approach combined with propensity score matching. I find that the introduction of the tax caused a decrease of 0.8 percentage points of the vacancy rate for treated municipalities compared to control ones. In other words, in a four year period vacancy rates were 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 the 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 units moved to primary residences while there is no evidence to suggest a strategic behaviour of turning vacant units into secondary residences.

These results have important policy implications that could support the tax implementation strategy to combat excess housing vacancy outside of the French context. This paper shows that a municipal tax on vacancy can indeed influence the behaviour of owners of vacant units. 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.

Appendix A. Additional robustness tests

I 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, one 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. 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.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

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	−0.728***	−0.553**	−0.827***	−0.314	−0.149	−0.493
	(0.199)	(0.234)	(0.109)	(0.582)	(0.707)	(0.863)
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 $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for Matching, they are bootstrapped. Each column represents a different regression with the long 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 equals 1 for taxed municipalities and 0 for non-taxed. All controls are included in their long difference form. For the matching columns, the crosses indicate the variables that have been used for the matching procedure at their level in 1995. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities. The Treatment group has 300 observations in 6 clusters, the Control group has 623 in 23 clusters per year.

Similarly, I want to test that my results are not affected by another law that was passed during the same period. This law imposed municipalities of more than 3500 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 my 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). I test that the simultaneous implementation of the two laws (TLV and SRU) does not challenge the results by adding in the 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***	−0.752***	−0.541**	−0.556**
	(0.071)	(0.190)	(0.254)	(0.282)
SRU	−0.107	−0.128	−0.134	−0.086
	(0.110)	(0.123)	(0.127)	(0.233)
Tax * SRU	0.106	0.049	0.152	−0.090
	(0.232)	(0.218)	(0.176)	(0.368)
% Social				−0.952***
				(0.341)
TLV * Social				−1.354
				(1.409)
Tax * SRU * Social				0.740
				(2.035)
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 $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. Standard errors in parenthesis, they are block bootstrapped at the urban unit level (29 clusters). Each column represents a different regression with the long difference of the vacancy rate as the dependent variable. Variable TLV equals 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 included in their long difference form. Specific time trends are the controls at the baseline level, 1997. Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

Appendix B. Additional tables and figures

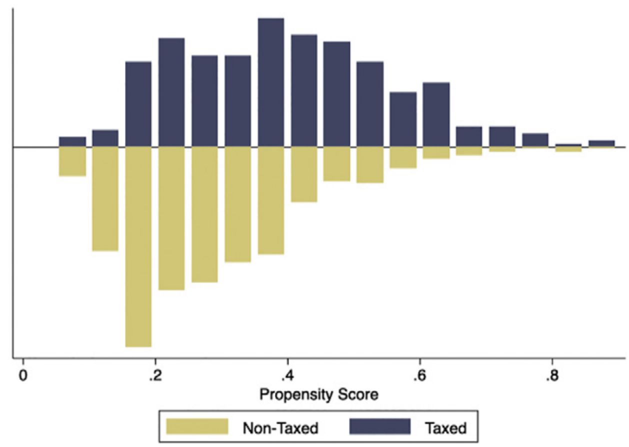


Fig. A1. Common support. *Notes:* This graph plots the frequency of municipalities according to the estimated propensity score. Data comes from the FILOCOM dataset for year 1995.

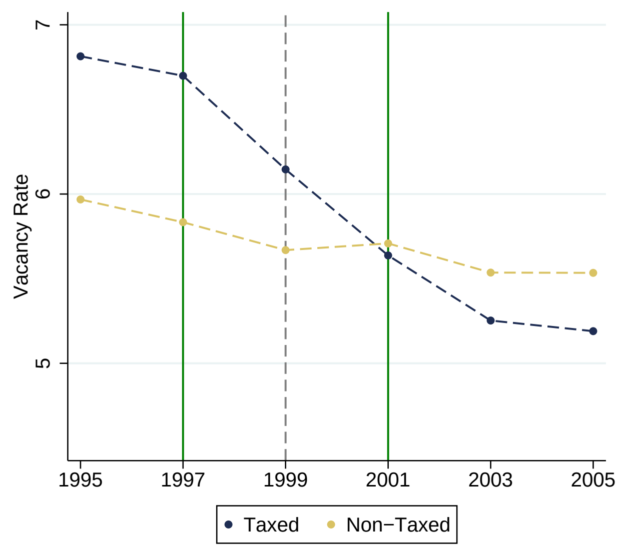


Fig. A2. Evolution of vacancy rate weighted by PS. *Notes:* This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities weighted by the inverse of the estimated propensity score. Taxed municipalities include all taxed urban units except Paris (299 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from the FILOCOM dataset for years 1995 to 2005.

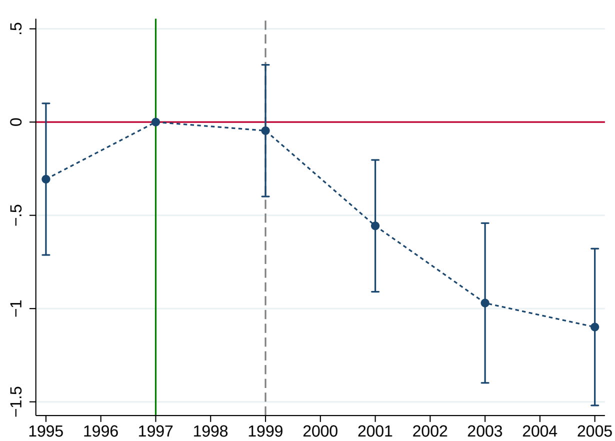


Fig. A3. Event-study graph for the vacancy rate, including Paris urban unit. *Notes:* This graph plots coefficient estimates (and 5% confidence intervals) of estimating the yearly effect of the tax on vacancy rate. The regression includes housing and demographic controls and characteristic-specific linear time trends. Standard errors are block bootstrapped at the urban unit level (30 clusters). Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1995 to 2005. The Treatment group has 672 observations in 7 clusters, the Control group has 623 in 23 clusters per year.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

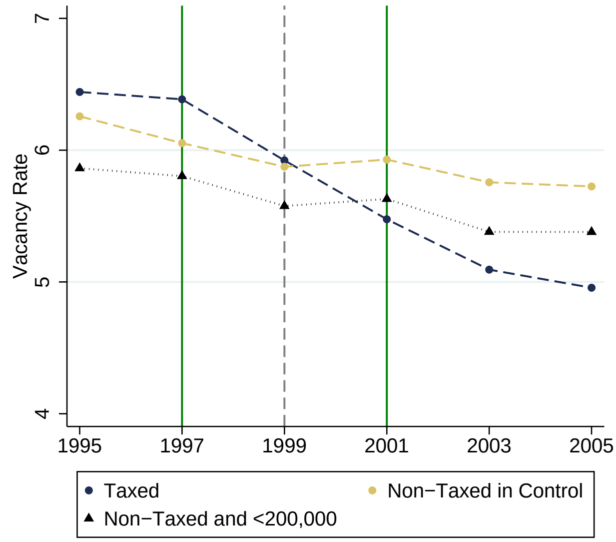
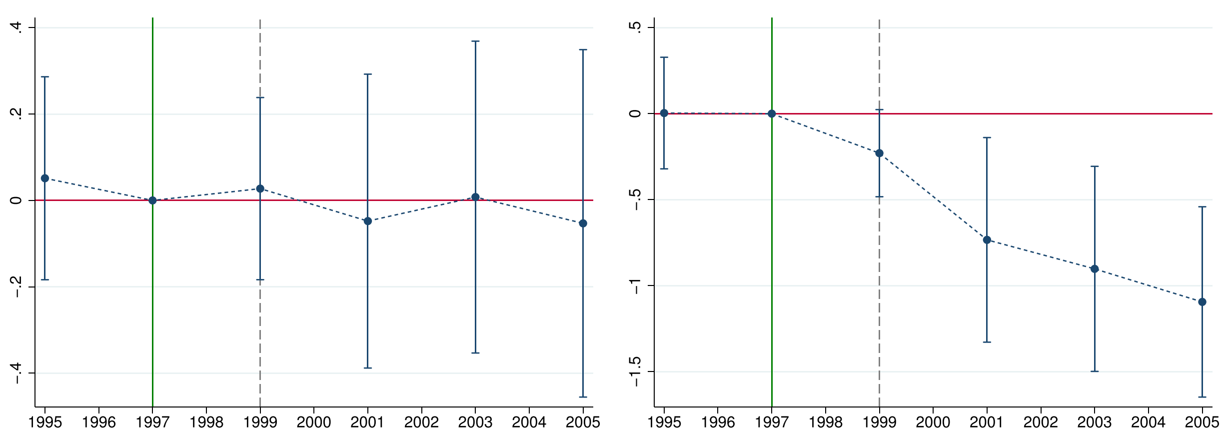


Fig. A4. Assessment of anticipation effect. *Notes:* This graph displays the mean of the vacancy rate for taxed, non-taxed municipalities of more than 200,000 inhabitants and non-taxed municipalities between 100,000 and 200,000 inhabitants. Taxed municipalities include all taxed urban units except Paris (299 municipalities in 6 urban units). In the Control group, there are 623 municipalities in 23 urban units and in the non-taxed, less than 200,000 group there are 317 municipalities. Data comes from the FILOCOM dataset for years 1995 to 2005.



(a) Control vs. <200,000 (b) Treatment vs. <200,000

Fig. A5. Event-study graph for anticipation effect. *Notes:* This graph plots coefficient estimates (and 5% confidence intervals) of the OLS regression comparing treatment and control municipalities to those municipalities belonging to urban units of less than 200,000 and more than 100,000 inhabitants. Standard errors are block bootstrapped at the urban unit level (29 clusters). Housing controls include the average of the surface area, the rental value and the household size. Demographic controls include the average population, the average yearly income of the household and the proportion of social housing. Data comes from the FILOCOM dataset for years 1995 to 2005. The Treatment group has 300 observations, the Control group has 623 and in the non-taxed, between 100,000 and 200,000 inhabitants group there are 317 municipalities.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

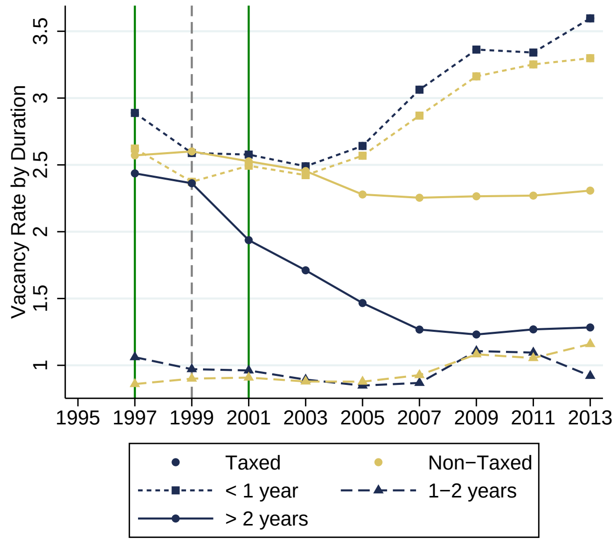


Fig. A6. Evolution of vacancy rate, by vacancy duration. *Notes:* This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities by vacancy duration. Taxed municipalities include all taxed urban units except Paris (300 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from the FILOCOM dataset for years 1995 to 2005.

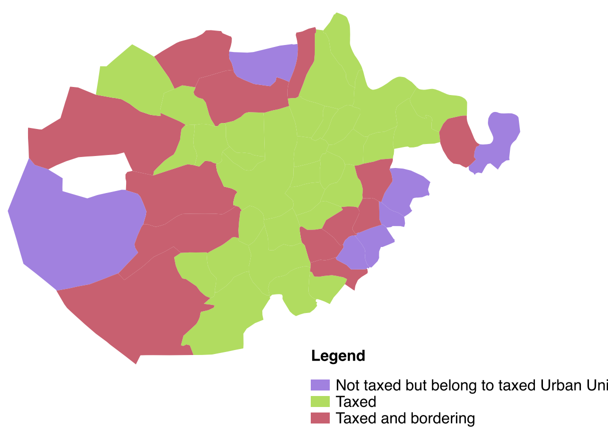


Fig. A7. Urban unit of Bordeaux.

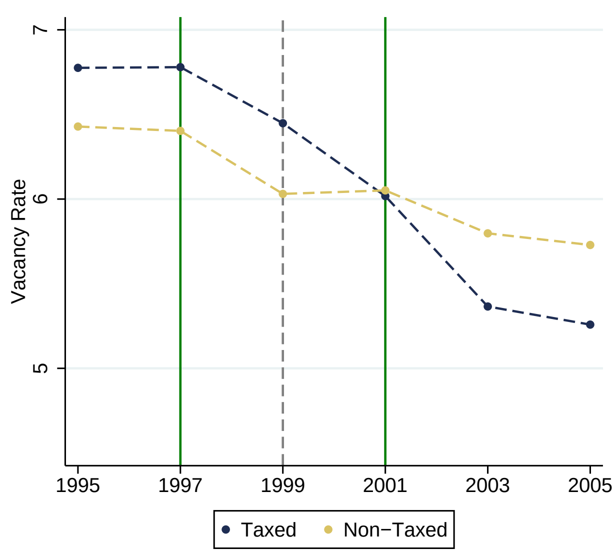


Fig. A8. Evolution of vacancy rate in bordering municipalities. *Notes:* This graph displays the mean of the vacancy rate for taxed and non-taxed municipalities. Taxed municipalities include 106 municipalities. Control municipalities include 73 municipalities. Data comes from the FILOCOM dataset for years 1995 to 2005.

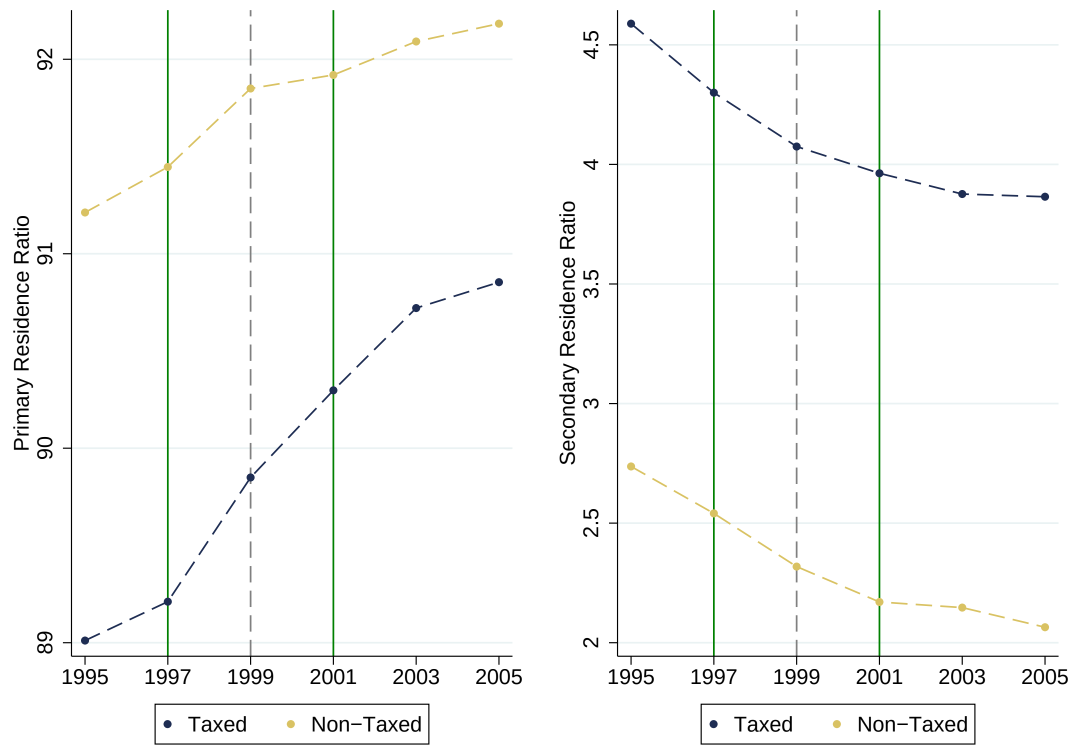


Fig. A9. Evolution of primary and secondary residence ratios. *Notes:* This graph displays the mean of the primary residence ratio and the secondary residence ratio for taxed and non-taxed municipalities. Taxed municipalities include all taxed urban units except Paris (299 municipalities in 6 urban units). Control municipalities include 623 municipalities in 23 urban units. Data comes from the FILOCOM dataset for years 1995 to 2005.

Table A3
Effect of TLV on vacancy rate, comparing 1997 to 2001.

	OLS				Matching	
	(1)	(2)	(3)	(4)	(5)	(6)
TLV	−0.910***	−0.728***	−0.553**	−0.151	−0.867***	−0.801***
	(0.175)	(0.199)	(0.234)	(0.273)	(0.137)	(0.143)
HighVac				0.166		
				(0.159)		
TLV * HighVac				−0.812***		
				(0.191)		
Δ Surface Area		−0.181***	−0.168**	−0.158*		
		(0.050)	(0.080)	(0.081)		
Δ Rental Value		0.001	0.005***	0.005**		
		(0.001)	(0.002)	(0.002)		
Δ Household Size		−0.133	−3.814***	−3.924***		
		(0.540)	(1.253)	(1.219)		
Δ ln(Population)		−5.196***	−4.086***	−3.957***		
		(1.335)	(1.141)	(1.017)		
Δ Av. Income		0.004	0.009**	0.009*		
(in hundreds)		(0.004)	(0.005)	(0.005)		
Δ Social Housing		0.035	0.028	0.025		
		(0.036)	(0.032)	(0.030)		
Surface Area Trend			0.046***	0.043***		
			(0.013)	(0.013)		
Rental Value Trend			−0.537***	−0.478**		
			(0.193)	(0.191)		
Household Size Trend			−1.105***	−1.100***		
			(0.374)	(0.388)		
ln(Population) Trend			0.163***	0.152***		
			(0.055)	(0.057)		
Av. Income Trend			−0.586**	−0.577**		
			(0.276)	(0.268)		
Social Housing Trend			0.010*	0.011*		
			(0.005)	(0.006)		
Vacancy Rate Trend			−0.303***	−0.293***		
			(0.032)	(0.039)		

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

Table A3 (*continued*)

	OLS				Matching	
	(1)	(2)	(3)	(4)	(5)	(6)
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 $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$. Standard errors in parenthesis, for OLS they are block bootstrapped at the urban unit level (29 clusters), for Matching, they are bootstrapped. Each column represents a different regression with the long difference of the vacancy rate as the dependent variable. Last two columns use a propensity score matching strategy to weight control observations. Variable TLV equals 1 for taxed municipalities and 0 for non-taxed. All controls are included in their long 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 of the surface area, the rental value and the household size. Demographic controls include the log of population, the average yearly income of the household and the proportion of social housing. Vacancy Pre-Trend is the difference in vacancy rate between 1995 and 1997. Specific time trends are for all the variables in controls plus the initial level of vacancy. Data comes from the FILOCOM dataset for years 1997 and 2001 plus INSEE datasets on demographic characteristics of the municipalities.

Table A4
Descriptive statistics in 1997 — 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
Rental Value (€)	23,087	7185	20,077	6011	−3010	2.95	0.00
Surface Area (m^2)	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	−0.58	0.61	0.54
Household Size	2.83	0.27	2.87	0.25	0.04	−1.08	0.28
Av. Income (€/year)	25,008	7377	25,734	7601	725	−0.64	0.52
Population	19,445	49,653	4900	6950	−14,545	2.48	0.01
Population Growth 90–97	8.27	13.98	12.88	28.50	4.61	−1.44	0.15
Population Density	1317	1518	606	840	−710	3.64	0.00
Social Housing	11.46	12.49	7.5	11.48	−3.96	2.16	0.03

Notes: Data comes from the FILOCOM dataset for year 1997 plus INSEE datasets on demographic characteristics of the municipalities. The Treatment group has 108 observations, the Control group has 73.

Appendix C. Additional analytical evidence

C.1. Proof of equilibrium existence and uniqueness

In order to prove the existence of a unique equilibrium I need to show that the matching probability curve crosses the first steady state condition only once. We know that the matching probability function $\lambda(\theta)$ (defined in Eq.(2)) is increasing and concave and that $\lambda(0) = 0$. The existence of an equilibrium depends on the sign of the first derivative of the steady state condition in Eq.(13). I then proceed to compute the derivative of $\lambda(\theta)$ while assuming that $F(b*)$ is a strictly increasing cumulative function of $b*$.

$$\frac{d\lambda(\theta)}{d\theta} = \delta W \left\{ \frac{A\frac{dF}{db^*}\frac{db^*}{d\theta}(1-\theta) + AF(b^*) - W}{(W - AF(b^*))^2} \right\} = \delta W \left\{ \frac{A\frac{dF}{db^*}\frac{db^*}{d\theta}(1-\theta) + A - i - W}{(W - (A-i))^2} \right\}$$

Using $(1-\theta) = (1 - \frac{v}{s})$ and $W - s = A - i - v$, I obtain:

$$\frac{d\lambda(\theta)}{d\theta} = \frac{\delta W(s-v)}{s} \left\{ \frac{A\frac{dF}{db^*}\frac{db^*}{d\theta} - s}{(s-v)^2} \right\} < 0 \text{ if } s > v$$

We can see that the second factor of the product is negative since $\frac{dF}{db^*} > 0$ by definition, $\frac{db^*}{d\theta} < 0$ and $s > 0$. Hence, the sign of the derivative depends on whether $s > v$ or the opposite. In the case where $s > v$, which also implies that $W > A - i$, the derivative is negative. In addition, in that case, we have $\lambda(0) = \delta\frac{A-i}{W-(A-i)} > 0$. This implies that, in this case, the two curves cross at a unique point.

In the alternative case, when $W < A - i$, the two curves are increasing. There, the existence of an equilibrium depends on the concavity of the curves, which cannot be determined without further assumptions.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.

C.2. Proof of the impact of the tax on the first steady state condition

In this subsection, I provide the proof of the relationship between the first steady state condition $\lambda(\theta)$ and the tax t. One can see that the derivate is positive when $W > A - i$ since it also implies $\theta < 1$. This means that when the tax increases, the curve shifts to the right.

$$\frac{d\lambda(\theta)}{dt} = \delta\left\{\frac{A\frac{dF}{db^*}\frac{db^*}{dt}\times(W - AF(b^*) + A\frac{dF}{db^*}\frac{db^*}{dt}\times(AF(b^*) - \theta W)}{(W - AF(b^*))^2}\right\}$$
$$= \frac{\delta A\frac{dF}{db^*}\frac{db^*}{dt}W(1-\theta)}{(W - AF(b^*))^2} > 0.$$

References

Andrews, D., 2010. Real House Prices in OECD Countries: The Role of Demand Shocks and Structural and Policy Factors. OECD Publishing. Tech. rep.

Blossier, F., 2012. Is Taxing Inhabitation Effective? Evidence from the French Tax Scheme on Vacant Housing. Ecole polytechnique. Ph.D. thesis.

Busso, M., DiNardo, J., McCrary, J., 2014. New evidence on the finite sample properties of propensity score reweighting and matching estimators. Rev. Econ. Stat. 96, 885Ű-897.

Caldera, A., Johansson, A., 2013. The price responsiveness of housing supply in OECD countries. J. Hous. Econ. 22, 231–249.

Chapelle, G., Eymeoud, J.-B., 2018. The housing supply elasticity and the cost of agglomeration JB. Sci. Po Mimeo.

Cheshire, P., Hilber, C.A., Koster, H.R., 2015. Regulating housing vacancies away? The paradoxical effects of mismatch. Spat. Econ. Res. Cent.

Chetty, R., Looney, A., Kroft, K., 2009. Salience and taxation: theory and evidence. Am. Econ. Rev. 99, 1145–1177.

Cleach, M.-P., 2003. Rapport d'information, au nom de la commission des affaires economiques et du plan sur le logement locatif prive. Ph.D. thesis.

Cunningham, C.R., 2006. House price uncertainty, timing of development, and vacant land prices: evidence for real options in seattle. J. Urban Econ. 59, 1–31.

de La Morvonnais, P., Chentouf, N., 2000. European Public Policy Concerning Access to Housing. Bilancourt, BIPE, France.

Desgranges, G., Wasmer, E., 2000. Appariements sur le marché du logement. Annales d'Economie et de Statistique 253–287.

Di, W., Murdoch, J.C., 2013. The impact of the low income housing tax credit program on local schools. J. Hous. Econ. 22, 308–320.

Djankov, S., Porta, R.L., Lopez-de Silane, F., Shleifer, A., 2002. Courts: The Lex Mundi Project.Tech. rep.. National Bureau of Economic Research.

Eiglsperger, M., Haine, W., 2009. EU housing statistics. IFC Bulletins chapters 31, 111–120.

Ellen, I.G., Lacoe, J., Sharygin, C.A., 2013. Do foreclosures cause crime? J. Urban Econ. 74, 59–70.

Ellen, I.G., Schwartz, A.E., Voicu, I., Schill, M.H., 2007. Does federally subsidized rental housing depress neighborhood property values? J. Pol. Anal. Manage. 26, 257–280.

Fack, G., 2005. Pourquoi les ménages pauvres paient-ils des loyers de plus en plus élevés?[l'incidence des aides au logement en france (1973–2002)]. Econ. Stat. 381, 17–40.

Fitzpatrick, T.E.A., 2012. What Impact Do Anti-vacancy and Anti-blight Ordinances Have on Local Housing Markets?Working Paper 11-23R. Federal Reserve Bank of Cleveland.

Gabriel, S.A., Nothaft, F.E., 2001. Rental housing markets, the incidence and duration of vacancy, and the natural vacancy rate. J. Urban Econ. 49, 121–149.

Gibbons, S., Manning, A., 2006. The incidence of UK housing benefit: evidence from the 1990s reforms. J. Public Econ. 90, 799–822.

Glaeser, E.L., Kincaid, M.S., Naik, N., 2018. Computer Vision and Real Estate: Do Looks Matter and Do Incentives Determine Looks.Tech. rep.. National Bureau of Economic Research.

Grislain-Letrémy, C., Trevien, C., 2014. The Impact of Housing Subsidies on the Rental Sector: The French Example.Tech. rep.. Institut National de la Statistique et des Etudes Economiques, DESE.

Han, L., Strange, W.C., 2015. The microstructure of housing markets: search, bargaining, and brokerage. Handbook of Regional and Urban Economics. 5. Elsevier., pp. 813–886.

Immergluck, D., Smith, G., 2006. The impact of single-family mortgage foreclosures on neighborhood crime. Hous. Stud. 21, 851–866.

Kangasharju, A., 2003. Do the Receivers of Housing Allowance Pay a Higher Rent? Government Institute for Economic Research (VATT) Discussion Paper, 101.

Kline, P., Moretti, E., 2014. People, places, and public policy: some simple welfare economics of local economic development programs. Annu. Rev. Econ. 6, 629–662.

Laferrère, A., Le Blanc, D., 2004. Gone with the windfall: how do housing allowances affect student co-residence? CESifo Econ. Stud. 50, 451–477.

Lee, K.-y., 2008. Foreclosure's price-depressing spillover effects on local properties: a literature review. Federal Reserve Bank of Boston Community Affairs Discussion Paper. 1. pp. 1–11.

Merlo, A., Ortalo-Magne, F., 2004. Bargaining over residential real estate: evidence from England. J. Urban Econ. 56, 192–216.

Nguyen, M.T., 2005. Does affordable housing detrimentally affect property values? A review of the literature. J. Plan. Lit. 20, 15–26.

Pissarides, C., 1986. Unemployment and vacancies in Britain. Econ. Policy 1, 499–541.

Pissarides, C.A., 2000. Equilibrium Unemployment Theory. MIT Press.

Priemus, H., 2011. Squatters and municipal policies to reduce vacancy; evidence from the Netherlands. 23rd Conference of the European Network for Housing Research ENHR. ENHR, Toulouse.July 5–8, 2011.

Schilling, J., 2009. Code enforcement and community stabilization: the forgotten first responders to vacant and foreclosed homes. Alb. Gov't L. Rev. 2, 101.

Susin, S., 2002. Rent vouchers and the price of low-income housing. J. Public Econ. 83, 109–152.

Wheaton, W.C., 1990. Vacancy, search, and prices in a housing market matching model. J. Polit. Econ. 98, 1270–1292.

Please cite this article as: M. Segú, The impact of taxing vacancy on housing markets: Evidence from France, Journal of Public Economics, https://doi.org/10.1016/j.jpubeco.2019.104079.