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Paper's Title

The impact of infrastructure setting litigation on residential property values in Paris's suburban zones

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Abstract:
The presence of nearby public facility contributes to real-estate's value, that's why the market may expect impact of public project on house's price. But undesirable and semi-desirable facility location choices can be contested by close inhabitants, because they are source of negative externalities or negative expectations. In suburban zones of Paris's agglomeration, the oppositions to these infrastructures become frequent, and an official project's announce does not mean automatically its implementation. Through 3 case studies, we explore the way the expectation mechanism is affected by legal conflicts driven by close inhabitants. We suppose that the expectation process depends on the to-be-realized-chance of the project. As the conflict activities amplify or reduce the certainty on the new facility's arrival, market's perception on the infrastructure varies among the different periods of conflicts. The variation is captured by our hedonic model.

Key words: house's price, facility setting conflict, market's expectation
JEL: K41, D62, R21, H76

I. Introduction

This paper investigates the impact of public facility setting conflict on the residential house's values in suburban zones of Paris. Facility setting installation is a serious problem for public decision-makers when the infrastructure is planned to be realized near a residential or preserved ecological zone. Locally undesirable land use imposes costs on host community, which may be partially or completely offset by the stream of benefits provided by the infrastructure project's gain (Kiel and McClain, 1996). In fact, these costs do not often cover all negative externalities: water or air pollution, bad smell, noise, degrading landscape…etc…Because negative impacts reduce inhabitant's well-being, but are not considered to be a social cost yet (Gilchrist and Allouche, 2005), the project could face organized opposition as soon as being announced by the authority. Urban economists talk about infrastructure setting conflict (Janelle and Milward, 1976), (Cox and Johnston, 1982), and we note that in our case the phenomenon is particularly linked to the scarcity of improved land stock in the Paris region (Pham et al.,2010).

Property's depreciation is more and more used to justify the value loss from non marketed environmental degradation caused by polluting amenity (Boyle and Kiel, 2001), (Farber, 1998). Many works have focused on the impact of noise (Nelson, 2004), of industrial pollution (Letombe et Zuindeau, 2005), of air pollution(Smith and Huang, 1993) or of undesirable land use (Farber, 1998). They share a common feature: the negative impacts are

measured once the project is already carried out, meaning *ex-post*. Little is known, however, about the period before the project's realization. This period corresponds to the time interval between the project's announcement and the project's realization. Hence, it figures how the local housing market makes expectation towards the project in overall. The price signal corresponds with the public valuation on facility's utility, but also including how it is expected to generate nuisance. This paper concentrates on this *ex-ante* phase, e.g. before the project's realization, by studying the prices of houses in three confrontational case studies. The conflicts are driven against the projects just after their announcement. We suppose that these events will modify the information source to the market. They will reduce or increase the certainty of the project's realization, while the market expectation mechanism requires information to anticipate the future impacts of the project.

We develop a hedonic design to detect the formation of market's expectation. In this field, some authors used a distance-control hedonic model (Kiel and McClain, 1996), while the others mobilized a spatiotemporal price gradient design (Yiu and Wong, 2005) to isolate the expectation effect. These models catch houses' price variations during the period under study and show the price's change tendency *before*, *during*, and *after* the public facility's implementation. Inspired from these designs, but concentrating only in the *ex-ante* phase, we are looking for a more refined observation in order to understand market's reaction during the *pre-construction period*. We introduce the variable of legal conflict in the model, and test if the legal claims influence the price. The materials are recorded from a lawsuit survey implemented at French administrative tribunals where opponents attack public facility project. We intend to study the house's price change in relation to our registered legal claims.

The paper is organized in 4 sections. The first section resumes the background of our study regarding the literature. It focuses on hedonic model, especially for expectation-capturing hedonic approach. The second section presents our 3 study cases of undesirable and semi-desirable infrastructure setting conflicts, the data, and the econometric model. The third one brings an overall view on our empirical results, but also proposes a derivate model for one study case in order to look into more details of the project's impact. The last section closes the paper with a discussion of future research and gives the conclusions.

II. Background

The seminal article for hedonic theory is the one written by Rosen (1974). The central idea is that the value of a complex good is not intrinsic to this good. It rather comes from the satisfaction that the owner will find by using each of its characteristics. It is generally admitted that, even if a given characteristic is not traded on a specific and separated market – because it is embedded in the good, for instance the market for second bathroom has no reality – we can however work with its price, more precisely with its *implicit* market price. For a housing hedonic model, the retained characteristics are usually physical (number of rooms, surface, floor, period of construction…), local (district, quality of the neighborhood…) and more generally linked to the amenities (public goods, transport…).

The list of characteristics has to be examined each time cautiously because there is no general agreement on it. Hedonic theory allows usually three kinds of works. The first one is the calculation of a global market index, as the Notaires-INSEE index for France (Chambre des Notaires, 2010), which is elaborated with the same database that we are using in this article. Secondly, it allows developing valuation models to appraise non-transacted public goods.

Lastly, the hedonic approach can be applied to define control variables in a more general study. For instance, Engberg and Greenbaum (1999) implemented a classical hedonic model to test the impact of state enterprise zones on the neighboring local real estate prices. They just add a dummy variable to catch the presence/absence of the zone and its associated price impact. The present article corresponds to the third kind of use. Of course the quality of the model relies directly on the quality of the database in terms of available variables and of number of observations.

It is well known in housing economics that public facility has an impact on real-estate value (Beckerich, 2000). The valuation process may pass through the residential choice of community (Glaeser and al., 2001) as in the model of Tiebout (1956), Oates (1969), according to which location choice is depending on the package of public goods supplied by the community to its inhabitants. It can also be taken into account by the distance land rent models (Cavailhès and al., 2002) of Alonso (1964) and Muth (1969), from which land's value is determined by the distance to the centre and to others valuable public equipments. Both of the two processes are adequate to Rosen hedonic approach. They suggest that the capitalization of neighborhood amenities in house's price could be considered as a sum up process (Peltola, 2006). The price of land is the price of pure land, as space at a location but independent of the bundle of neighborhood, environmental characteristics and local public goods embodied in land (Cheshire and Sheppard, 1995). The price of house is given from the pure value of the house and that of the land. By that way, local amenities contribute to house's price as one of its components.

The capitalization effects depend on the nature of the facility[1]. For undesirable and semi-desirable facility – our targeted objects – the literature is abundant. See for example (Kohlhase 1991), (Boyle and Kiel, 1991), (Nelson, 2004) for empirical supporting review on undesirable construction. RICS (2002), a special issue of the Royal Institute of Charter Surveyors reports also the impact of transportation facilities – semi-desirable construction on property's price. At a whole, the literature makes consensus that these kinds of public facility have a depreciative effect.

But while infrastructure's negative impacts are largely admitted to reduce property value, little is known about how the market expects on their future presence. Yiu and Wong (2005) remarked that among 150 studies on the issues of land values and public transport surveyed in the RICS report (2002), very few have paid attention to this kind of observation. Their work follows that of Chau and Ng (1998) in exploring the effect of transport improvement to housing value, and shows that impacts on the price can be affected before the arrival of the infrastructure. They conclude that market's expectation studies are more needed, as they can allow to guide public policy or at least to reduce risky transactions in the option market. Farber (1998), Gravel et Trannoy (2003) had also underlined the importance of market's anticipation understanding, but they didn't point out concretely how to capture this phenomenon.

[1] The desirability of a public facility can be considered in regard to the willingness to locate close to it. Hence, an infrastructure is desirable if people are looking to be in its neighbourhood, while an undesirable one is attended to be as far as possible. Semi-desirable facility is wished to be located at a moderate distance, not too far nor too close on the others words. It is generally admitted that desirable infrastructures increase the neighborhood house's price, while undesirable facilities reduce it (Kiel and Mc Clain, 1996), (Bruckner and al., 1998), (Rosiers, 2002), Maleyre (2007).

In its pioneer work on expectation mechanisms, Muth (1961) states that the market anticipates price changes on the basis of all the information that it disposes. This approach is supported by many authors in housing economics, even if they don't work properly on expectations. Amongst those interested, Farber (1998) thinks that the expectation on property market is based on the perception of risk, which can be a real (quantifiable) or a subjective one. He says that the property markets can also react regardless of how the nuisance risk is quantitative or subjective, because they will not behaving irrationally when subjective risk factors enter as price's determinants. Gayer and Viscousi (2002), Gayer and al. (2002) find that house's price is inversely proportional to the risk information which is diffused in government reports or in newspapers. However, those works don't really pay attention to the expectation process, but rather to risk perception. Then they don't explain how risk can be valuated from an expectation point of view.

As announced, we concentrate on the market's expectation on public facility project. Expectation capture hedonic models can be ranged into two main classes. The first one, also the most used model, is a distance capture design (Kohlhase, 1991), (Smolen and al. 1992); (Kiel and McClain, 1995). This model is intended to measure the price evolution with regards to the distance to the future facility. Changes in the coefficients values of distance variable along the time correspond with different market's estimation on the impact of the infrastructure. For example, Kiel and Mc Clain (1995) have run a distance capture model in a study of 5 stages of a waste site setting project: Pre-Rumor, Rumor, Construction, Online, and Operation. They found that the distance variable is positively significant before the construction, and that the coefficient of this variable evolves between the Pre-rumor and Rumor stages: proof of market expectation on negative effect. The same result is obtained by Smolen and al. (1992) who worked on a case of a proposed radioactive contamination site.

The second family of expectation capture model is the price gradient design (Yiu and Wong, 2005) (Chau and Ng, 1998). In this model, the area under study is divided into sub-zones and the period under study into sub-periods. Theses sub-zones and sub-periods permit to constitute the interaction term dummies who will trace the time-spatial price gradient. The model will then measure the reaction of each sub-zone in each sub-period in comparison to a chosen reference sub-zone and sub-period. Our article adopts this modeling design as it can be applied to any kind of housing data thanks to a precise definition of zones and time intervals dummies. This criterion is crucial because we will deal with more than one facility project of different natures.

Beside the two families of model, a third possibility is offered by the spline model, a hybrid form of the two previous designs. This method regresses the distance inside a set of zoning variables (Cheshire and Sheppard, 1995), (Chernobai and al., 2009). It is based on the idea that the facility impact may not be linear, so by regressing the distance inside a progressive separating zoning we can detect the "best" distance at which the effect of the facility changes.

The price-gradient design has limits, as it doesn't establish the direct relation between house's price and the future infrastructure: the impact is captured as a zone effect. Promising a better result in comparison to a direct regression on distance or zonings, the spline model generates however the same difficulty in our study, that of dealing with different kinds of public facility. The distance capture design could be valid in one project but not for the others, which will make the interpretation of the results uneasy.

In this paper, we use the price gradient model to deal with all the 3 case studies. Then we return to the distance capture model in one case (additionally developed in order to complete the result's interpretation). We do not use the spline model because we are looking to capture only expectation impact, and didn't make any hypothesis on its linearity in terms of distance.

III. Case Studies - Data - Model

a. Case studies presentation

Let's examine the three case studies which correspond with three infrastructure setting legal conflicts in Paris's suburban zones. Our objective is to observe the house's price variation along a controversial project, in order to understand how market adjusts price against litigations. Three zones are identified by extracting information from the public announcement of each project. Each zone covers the host community which receipts the controversial infrastructure and the neighbored ones as they are pointed out in the project documents[2]. The host community's names are respectively *Vaux-le-Penil, Maisse* and *Saint-Nom-la-Bretèche*.

The case of *Vaux-le-Penil* concerns the creation of a regional incinerator. The opposition to the project doesn't come from the host community, but from a neighbor municipality under its direct impact: *Maincy*. An old small incinerator was in service in *Vaux-le-Penil* from more than 30 years, without being contested by *Maincy*. The project is supposed to replace it by a new one ten times larger, which raise a question about how *Maincy*'s population will be influenced. One has to notice that *Maincy*'s population is directly exposed to wind's direction from *Vaux-le-Penil*. As carcinogen substances were found in this village, and cancer cases are detected here at the same moment, *Maincy*'s mayor decided to attack the project's holder at the tribunal, in order to block the new incinerator's construction. The cases of *Maisse* and *Saint-Nom-la-Bretèche* are about local oppositions to two projects of public road's deviation. The deviations imply the use of some non-urbanized space to trace new road. Road facilitates transport, but is also known to be a source of noise and air pollution to those who live alongside. The two projects are opposed by inhabitants who are afraid of environmental destructions and their natural living's degradation.

The choice of the three cases is based on an infrastructure setting conflicts survey. We worked on court litigation database[3] to select most recent and representative conflicts in the Ile de France region (Pham and Kirat, 2008). The selection is based on the criteria of geographical scale and of data availability. The majority of our registered conflicts are related to regional or interregional size projects, which correspond to a large zone of study with many local projects. Our selected cases especially match the availability of Ile de France's real-estate transaction database, which is built from 1996. We limit our choice to three inter-community size projects, which permit to focus on one studying facility in each case. Road's construction and waste sites location are also most frequents problems for public deciders in this region.

In all the three cases, the conflict is well known by the concerned populations. Opponents hold position by organizing collective association, and by circulating petitions to inform other inhabitants about their activities. These actions are intended to propagate information about

[2] The French legislation imposes an Impact study (*Etude d'impact*) before officially announcing a project. This document reveals the project geographical perimeters, and identifies the concerning communities.
[3] *Lamyline* is the French State Council's database which reports all jurisprudence value justice decision.

the project. We explore how the market treats the information. In order to identify the conflict, we register legal claims at tribunal, and work statistically with them. Concretely, we registered the dates of beginning and of ending of these claims, which help to determine the conflict's duration (see below). We also registered the result of the claim, meaning whether it accepted or rejected by the judge. In 2 of 3 cases (*Vaux-le-Penil* and *Saint-Nom-la-Bretèche*), the judge maintains the project by rejecting the inhabitant's claims. In the case of *Maisse*, however, the litigation is on going, as it passes through an appeal procedure. At the first instance, the tribunal accepted the claim and canceled the road's deviation project. At the second instance, the appeal court decided contrarily to maintain the project: it canceled the previous judgment. The litigation was still continued at the moment we conducted our study (beginning of 2009) at the Supreme Administrative Court.

b. Data

We use house's price data from the *Paris Notaires Service* (PNS) database. PNS is the statistical service of the Notaries in Ile-de-France, in charge of collecting the information about the real estate transactions. This database reports nearby 80% of all property sales in the region of Ile de France, namely Paris and its surrounding communities. We work however with only houses' transaction.

In order to concentrate on the conflict's impact, we extracted data with regard to their geographical and temporal proximity of the conflict. Concerned districts are announced by administration's decision at the moment of project launching[4]. As mentioned, the conflict's duration is determined by our survey of tribunal's decisions. We consider that an infrastructure setting legal conflict begins with an administrative decision (project announcement). It is then terminated with the stop of litigation pursuit. Operationally, we take the year of the project's official announcement as the start point of the study period, and the year of court pursuit closing as his end. This delimitation of time permits us to observe price's tendency a little before the project's announcement, and so on after the conflict closing.

We then build 3 samples, respectively for each study zones: *Vaux-le-Penil*, *Maisse* and *Saint-Nom-la-Bretèche*. The case studies are called by the name of the host towns, but we remind that they contain also house sales from concerned neighbor districts raised in the project's official documents. In order to avoid bias risk and to obtain homogenous data, irregular transactions (*e.g* price especially low or high, too many rooms or parking included…etc…) are eliminated.

The 3 samples are given in the following table:

***Vaux-le-Penil* Case (9 communities)**	
Number of houses' transactions	800
Study period	2001-2005
***Maisse* Case (3 communities)**	
Number of houses' transactions	554
Study period	2004-2008
***Saint-Nom-la-Bretèche* Case (3 communities)**	
Number of houses' transactions	665
Study period	2004-2006

[4] See note 1, Impact study documents

Tab. 1 Overall view on the 3 sample sets

c. Model and Explication of variables

Our model mobilizes the price gradient approach, and takes a log-linear form, which means that we explain the price by an exponential function of the house characteristics.

$$LnDP = \beta 0 + F(K_H) + \sum_{1}^{j} \gamma_j C_j + \sum_{1}^{i} \alpha_i Z_i + \sum_{1}^{j}\sum_{1}^{i} \omega_{ij} C_j Z_i + \varepsilon$$

In which

- *DP* is the deflated sale price of the observed house. We use the Ile de France's House price department index (Chambre des notaires, 2010) publicized by the Notary Chamber of Paris to correct the global market trend. This index, calculated by the Paris Notary Chamber, helps to eliminate department market trend from the price, and to isolate the local impact of the project. *LnDP* is the deflated price in logarithm.

- K_H is the vector of hedonic characteristic variables of the observed house. We build K from 9 variables.

  NbRoom (Number of room), measured in continuous value.

  SurfT (Surface of land-ground), measured in continuous value.

  (these two variables are transformed in logarithm to be in linear relation with the logarithmic sale price)

  Cellar (Number of Cellar), measured in continuous value.

  NbPark (Number of car parks), measured by 3 dummies: *NbPark0*, *NbPark1* and *NbPark2* respectively for the house with 0, 1, or 2 car parks. *NbPark1* is removed to be reference.

  HouseTYPE, measured by 4 dummies: *HOU_PV* (Pavilion[5]), *HOU_MV* (City House), *HOU_VI* (Villa) and *HOU_NA* (for unrecognized house type). Pavilion is removed to be reference.

  Level, measured by 4 dummies: *Level_1*, *Level_2*, *Level_3*, and *Level_4plus*, respectively for house with 1, 2, 3 or 4 and more levels. *Level_1* is removed to be reference.

  EPQ (*Epoque* or Period of construction) measured by 4 dummies: *Epq_av1947* (before 1947), *Epq_1947_1980*, *Epq_1980_2000*, and *Epq_ap2000* (after 2000). *Epq_1947_1980* is removed to be reference

  Motif_SPC_Sale (Sale under a special event). This dummy controls special events which lead to house sale: a divorce or a marriage, for example. By default, *motif_SPC_Sale* is set on 0.

  Finally, *RENT_HOUSE* is a dummy to control whether the house is free or is rent at the moment of the sale.

  The model will then estimate the price in comparison to a reference house whose vector K_H is built from linear values and removed dummies that are mentioned. The intercept $\beta 0$ represents the constant value of this reference house.

[5] Pavilion is the most frequented French house's type which is composed from a house and a surrounding garden with car parking and cellar

- The dummies C*j* controls the period of conflicts.

As mentioned previously, we follow the conflict impact by a litigation observation. For each study case, we project conflict's events on the study period time axe, and then define conflict dummies as intervals between the dates of two events. Conflict events mean here legal complaints at tribunal (coded as TA[6]), and their appeals but only for the case of *Maisse* at the appeal court (coded as CAA[7]) and the Supreme Court (coded as CE[8]). A conflict evolution can be then decomposed in a series of successive events *j* (3 maximum): TA, CAA, and CE.

Note that case of *Vaux-le-Penil* is marked by three claims, all the three at the tribunal step (TA). Instead of regrouping them inside a conflict dummy, we give each of them a dummy value, because they are successively reported to the tribunal at different moment of the litigation (due to the progressive discovering of *Maincy*'s resident on the future project). Hence they can differently impact houses' price.

Case 1: *Vaux-le-Penil* : 4 dummies (3 claims at TA, the reference situation is non conflict)				
Av_Conflict (Non conflict)	TA Claim1 (Conflict)	TA Claim2 (Conflict)	TA Claim3 (Conflict)	Service_Date (Non conflict)
03/2001- 01/2002	08/2001- 01/2003	02/2002- 01/2003	02/2003- 08/2003	09/2003- 12/2005

Case 2: *Maisse*: 4 dummies (3 events due to appeal procedure, and 1 reference)			
Av_Conflict (Non conflict)	TA (Conflict)	CAA (Conflict)	CE (Conflict)
01/2004- 08/2004	09/2004- 06/2006	06/2006- 06/2007	07/2007- 12/2008

Case 3 : *Saint-Nom-la-Bretèche* : 2 dummies (1 claim at TA, and 1 reference)		
Av_Conflict (Non conflict)	TA (Conflict)	APTA (Non conflict)
01/2004- 01/2005	02/2005- 9/2006	10/2006- 12/2006

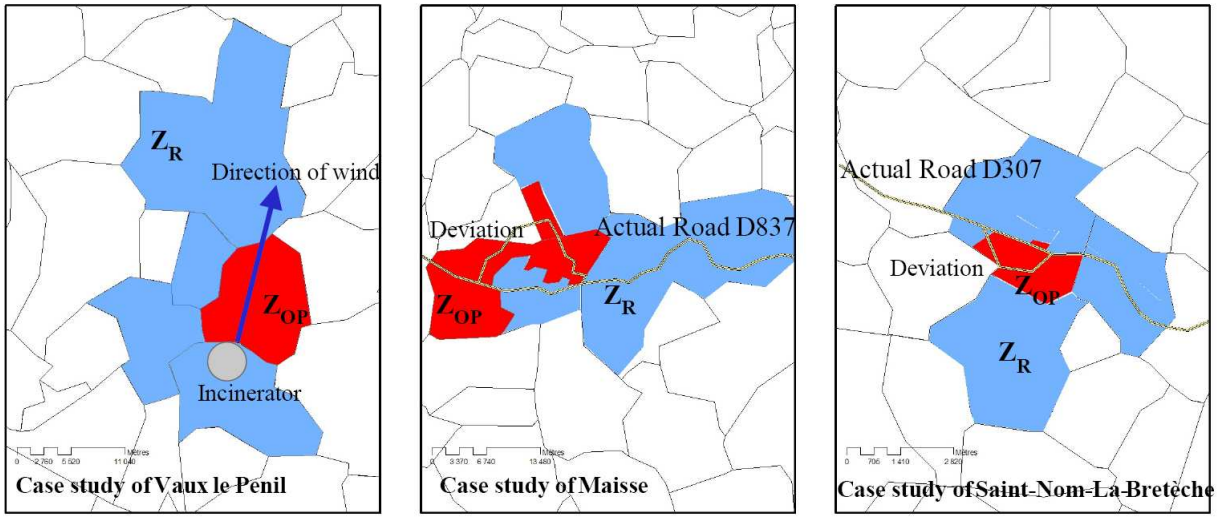
Tab.2 The periods-of-conflict dummies

In each case, the non-conflict period is used to be reference. This period covers all the time before the conflict, and except for the case of *Maisse*, after the conflict. What could be a matter to these dummies is that they embed also time impact reflecting both market trends at global and local level. As mentioned, we use the deflated price to eliminate global market trend. Thanks to this, the coefficient γ_j of the dummy C_j will tell us only about the local market trend of the reference zone during different periods of conflict C_j.

- Z_i (i=2) is the dummy to control geographical location. For each case, we identify the opposite zone to the setting project, whose inhabitants don't agree with the project, and name it Z_{Op}. The rest of the study zones will play the role of a reference Z_R. We use cadastral division to identify the zone Z_{Op}. The French community land register system - *Cadastre* - defines a codified land patterns for community ground. Community's surface can be divided into many levels until building ground (or parcel, if the ground is agricultural land). We mobilized here only the first division level which split community into homogenous residential zones, up to natural borders, or to main axes of

[6] *Tribunal Administratif* in French
[7] *Cour Administrative d'Appel* in French
[8] *Conseil d'Etat* in French

road… In the following figure, the opposite zone Z_{Op} is paint in red. In the case of *Vaux-le-Penil*, this zone is exceptionally the whole community of *Maincy*, and not a cadastral division.



Graphic 1. Study zones and opposite zones

The coefficients α_i will then measure the reaction of the opposite zone Z_{Op}, with regard to the referential zone Z_R at the reference period of no conflict. Both location and conflict controls are coded in the following rule: C_j takes the value 1 if the transaction is done in the period of conflict *j*, 0 if not. Z_i takes the value 1 if the transaction is in the zone *i*, and 0 if not.

- Finally, the last term ω_{ij}, also called interaction term, controls cross effect between zone and conflict factors (Chau and Ng, 1998), (Yiu and Wong, 2005). We code this dummy under the same rule: if the transaction is taken in zone *i* at period *j* then the conflict-location-interaction-dummy will take the value 1, otherwise it will be 0. This control tells us how each observed zone reacts against a specific period of conflict, in regard to the general situation at Z_R, which help to built the price gradient. Main characteristics of house data are given in the following table.

	Mean	Std deviation
***Vaux-le-Penil* Case**		
Price	187 338 €	62 092 €
Number of rooms	5.10	1.38
Number of car parks	0.86	0.55
Net surface	112.18 m²	34.98 m²
Land ground surface	620. 40 m²	395.03 m²
***Maisse* Case**		
Price	234 102 €	83 308 €
Number of rooms	4.83	1.43
Number of car parks	0.74	0.61
Net surface	115.82 m²	42.48 m²
Land ground surface	907.76 m²	718.42 m²
***Saint-Nom-la-Bretèche* Case**		
Price	416 882 €	194 696€
Number of rooms	5.26	1.36
Number of car parks	1.04	0.59
Net surface	123.18 m²	48.37 m²
Land ground surface	458.80 m²	431.49 m²

Tab. 3 Main characteristics of houses and apartments in the three cases studies

As one can recognize, even though negative effects of the future public facilities are expected, we didn't make any hypothesis on it. Our model focuses only on the price gradients of house's transactions. It will capture any price's change on both negative and positive ways, at the zone of opposition, during the conflict.

On summary, our model is based on the estimation of a referential house determined by regression on continue variables and dummies. One dummy is always removed from the dummy-variables to be the reference, while continue variables are regressed directly to give reference values. Concretely, the reference house value is built from the number of rooms, the land-ground surface, and the number of cellars; it is by default a Pavilion, constructed in the 1947-1980period, sold in a normal condition (meaning under no special event, nor with rent contract), with 1 car park, 1 level. It is supposed to be in a zone of no opposition and during the no conflict period.

IV. Empirical results

After realizing a regression for each case study, we present hereafter the results and match them with the context of their corresponding project. Before focusing on market's expectation effect, we first take a look on the bloc of internal characters variables (vector K_H). In general, this bloc is highly significant, especially for the number of rooms, land ground surface, number of car parks and house's level. Room number and land ground surface contribute to, for example, at least 60% of house's value in all the three cases. In the case of *Saint-Nom-la-Bretèche*, they stand for until 90% of house price. The period of construction is not a remarkable determinant of price as it is significant only in the case of *Saint-Nom-la-Bretèche*. On the contrary, the motif of sale under special events (a marriage, an inheritance, or a divorce…etc) influences clearly on the house's value, as they reduce the price from 7% to 12%.

There are also few exceptions of limited significant internal variables, like for the dummy who controls situation of the house (sale with rent contract or not), or those who control the type of house. These exceptions are due to the specificities of our local market approach, especially for the type of house. If luxury house (Villa) is normally about 17% more expensive than referential house (Pavilion), there's no price's difference between City house and Pavilion. This phenomenon can be explained by the fact that our study zones are in peri-urban zones where communities have a dominant semi-rural configuration. In such context, city house is not necessarily different from Pavilion as their locations reveal to be quasi-similar. Both have equivalent size, and are close to the nature.

We now concentrate on market's expectation dummies by looking into conflict, location controls and their interaction terms. To facilitate the reading, we will present the three study cases separately.

a. Case of Vaux-le-Penil

The results show that the p-value of the dummy Z_{Op} is highly insignificant at 74%. It means that there is no distinguished difference between houses locating at *Maincy* (Z_{Op}) and houses locating outside of *Maincy* at the period of no conflict. The three claims 1, 2, 3 and the

operation's entering of the incinerator have also let no impact on the whole reference area, as the corresponding coefficients are all insignificants.

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	9,92	0,09		106,73	0,00***		
lnNbRoom	0,54	0,03	0,49	17,13	0,00***	0,76	1,31
LnSurfT	0,16	0,01	0,31	11,33	0,00***	0,83	1,21
Cellar	0,03	0,02	0,04	1,39	0,16	0,86	1,17
Nb_Park_0	-0,07	0,02	-0,09	-3,41	0,00***	0,90	1,12
Nb_Park_2	-0,03	0,03	-0,03	-1,07	0,28	0,90	1,11
HOU_MV	0,12	0,07	0,04	1,58	0,12	0,80	1,25
HOU_VI	0,17	0,13	0,03	1,24	0,21	0,97	1,03
HOU_NA	-0,04	0,02	-0,05	-2,06	0,04	0,93	1,07
LEVEL_2	0,07	0,02	0,10	3,35	0,00***	0,69	1,45
LEVEL_3	0,15	0,04	0,12	3,95	0,00***	0,65	1,53
LEVEL_4	0,49	0,23	0,05	2,08	0,04**	0,95	1,05
EPO_AV47	0,03	0,03	0,03	1,02	0,31	0,63	1,57
EPO_1980_2000	0,00	0,02	0,00	0,10	0,92	0,66	1,52
EPO_AP2000	0,09	0,06	0,04	1,57	0,12	0,78	1,28
EPO_NA	0,00	0,02	0,00	-0,05	0,96	0,62	1,62
MOT_SPC_SALE	-0,07	0,03	-0,07	-2,60	0,01***	0,93	1,07
RENT_HOUSE	-0,07	0,05	-0,04	-1,39	0,16	0,98	1,02
Z_{Op}	0,01	0,04	0,01	0,33	0,74	0,61	1,64
Claims_1	0,04	0,03	0,03	1,29	0,20	0,87	1,15
Claims _2	0,03	0,02	0,04	1,29	0,20	0,84	1,19
Claims _3	-0,02	0,03	-0,02	-0,64	0,52	0,85	1,18
Z_{Op} _ **Claims_1**	0,01	0,13	0,00	0,08	0,94	0,83	1,20
Z_{Op} _ **Claims_2**	-0,16	0,07	-0,07	-2,24	0,03**	0,67	1,48
Z_{Op} _ **Claims_3**	-0,09	0,10	-0,02	-0,85	0,39	0,81	1,24
Dependent Variable: lnDPrice							
Adjusted R2 : 0,493							

Tab. 4 *Vaux-le-Penil* case regression

The 2nd claim had a negative impact on price at *Maincy*. The coefficient of the crossed effect terms shows that after the 2nd claim, the price falls by 16%. This 2nd claim of *Maincy* asked for an urgent public intervention to stop the incinerator project, as carcinogen substances are found, and some cases of cancer are detected in this community. As mentioned, *Maincy* is directly exposed to the wind coming from the direction of incinerator of *Vaux-le-Penil*, and the cancers are supposed to be in direct consequence from the incinerator's discharge. *Maincy*'s mayor had alarmed the population about the danger, and raised a petition to block the project.

The 2nd claim seemed to raise panic to the population but the panic is not hold longtime because the Prefect's service announced that the pollution is not scientifically confirmed, and officially guarantied the security of the new incinerator. That's why once the risk is no more confirmed the house's value loss also disappears. The fall is not maintained during the following period, that of the 3rd claim. Except for the 2nd claim, there's no price change during the conflict periods (1st and 3rd claim) in comparison to the period out of conflict as a whole. The fall is so likely to be a market's adjustment against a subjective risk perception.

b. Case of Maisse

Maisse[9] is the only case of on-going juridical pursuit with appeal procedure. We tested the impact of conflict phase dummies – so TA (tribunal), CAA (appeal court) and CE (Supreme Court) – on the price. Each phase is also crossed with the observed opposite zone. We have consequently three interaction terms: Z_{Op}_TA, Z_{Op}_CAA and Z_{Op}_CE.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	10,34	0,11		93,11	0,00***		
LnNbRoom	0,47	0,05	0,43	9,48	0,00***	0,57	1,76
LnSurfT	0,11	0,02	0,29	6,99	0,00***	0,68	1,47
Cellar	0,02	0,03	0,02	0,61	0,54	0,89	1,13
Nb_Park_0	-0,07	0,03	-0,10	-2,68	0,01***	0,85	1,17
Nb_Park_2	0,02	0,04	0,02	0,51	0,61	0,90	1,11
HOU_MV	0,01	0,08	0,00	0,07	0,94	0,86	1,16
HOU_VI	0,16	0,07	0,08	2,15	0,03**	0,93	1,08
HOU_NA	0,02	0,03	0,02	0,66	0,51	0,86	1,16
LEVEL_2	0,11	0,03	0,16	3,46	0,00***	0,58	1,73
LEVEL_3	0,13	0,06	0,09	2,13	0,03**	0,63	1,58
EPO_1980_2000	0,01	0,04	0,01	0,37	0,71	0,75	1,33
EPO_AP2000	0,11	0,08	0,05	1,37	0,17	0,91	1,10
EPO_NA	-0,05	0,03	-0,07	-1,70	0,09	0,77	1,30
MOT_SPC_SALE	-0,12	0,04	-0,11	-3,07	0,00***	0,91	1,10
RENT_HOUSE	0,00	0,10	0,00	-0,05	0,96	0,94	1,06
Z_{Op}	-0,09	0,06	-0,10	-1,43	0,15	0,23	4,40
TA	-0,01	0,03	-0,01	-0,24	0,81	0,53	1,89
CAA	0,00	0,04	0,00	-0,09	0,93	0,56	1,79
CE	0,02	0,04	0,02	0,52	0,61	0,56	1,80
Z_{Op}_**TA**	-0,01	0,08	-0,01	-0,15	0,88	0,33	3,07
Z_{Op}_**CAA**	0,01	0,09	0,01	0,14	0,89	0,42	2,38
Z_{Op}_**CE**	-0,17	0,10	-0,08	-1,70	0,09*	0,48	2,06
Dependent Variable: LnDprice							
adjusted R2=0,495							

Tab.5 *Maisse* case Regression

The results (see Tab. 5 above) show that the claims during phases 1 and 2 (from 09/2004 to 06/2007) have let no impact on the price at his moment, which is adequate with our survey on conflict situation. In fact, the first claim at the tribunal (TA) corresponds with a fierce local opposition. 15 years ago, another project was planned to be realized toward the south of *Maisse*. During this time, the north area is transformed in a semi-urbanized area with private house estate[10]. The announcement of the project through the north has caused a big surprise to its population, and explains why a very reactive opposition emerged. After investing in a big

[9] In the case of *Maisse*, the study zone covers 4 communities: *Maisse*, *Boutigny-sur-Essonne*, *Courdimanche-sur-Essonne*, and *Milly-la-Foret*. Thanks to a geographic survey of contesting inhabitants, we determine Zone_Op which contains the north of *Maisse* and the south of *Boutigny-sur-Essonne*. It is also the zone chosen to have the future road. Due to weak presentation of sales in *Courdimanche-sur-Essonne* (4 of 665), we eliminated this community from the sample

[10] *Lotissement* in French

and life-time purchase of house, it seems normal that inhabitants couldn't accept the future road. In such a situation, the market was suffering from a lack of certainty about the project realization before the judgment: it explains why house's price has not declined during this period.

The opponents finally won a first victory judgment at the administrative tribunal. In the next phase the Prefect decided to make appeal at the Appeal Court. But people learn that the first-instance tribunal has ordered for a project's cancellation, what they interpret as quasi-certitude of no project. It explains then why market didn't react as well during the period of CAA despite the appeal procedure of the Prefect.

But the situation changed when the Appeal Court (CAA) decided contrarily to these anticipations: it cancelled the tribunal's judgment, and asked for the maintaining of the project. This judgment had then a sharp impact on the house's value during the 3rd period: according to our equation, the price fell sharply at the opposite zone (17%). The conflict continues with an appeal from opposite inhabitants at the Supreme Court (CE), but the price's fall during the period of CE show their lack of hope to win the lawsuit.

c. Case of Saint-Nom-la-Bretèche

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	10,33	0,11		92,84	0,00***		
LnNbRoom	0,82	0,05	0,46	15,86	0,00***	0,72	1,38
LnSurfT	0,10	0,02	0,17	6,35	0,00***	0,85	1,17
Cellar	0,16	0,03	0,12	4,68	0,00***	0,92	1,09
Nb_Park_0	0,03	0,03	0,03	0,97	0,33	0,83	1,21
Nb_Park_2	0,20	0,03	0,17	6,29	0,00***	0,83	1,21
HOU_MV	-0,07	0,21	-0,01	-0,36	0,72	0,98	1,02
HOU_VI	0,17	0,06	0,07	2,66	0,01***	0,89	1,12
HOU_NA	0,06	0,03	0,06	2,20	0,03**	0,87	1,15
LEVEL_2	0,02	0,04	0,02	0,50	0,62	0,34	2,90
LEVEL_3	-0,23	0,05	-0,21	-4,88	0,00***	0,34	2,98
LEVEL_4	-0,05	0,30	0,00	-0,18	0,86	0,98	1,03
EPO_AV47	0,27	0,09	0,08	3,03	0,00***	0,84	1,19
EPO_1980_2000	0,23	0,04	0,18	5,83	0,00***	0,65	1,54
EPO_AP2000	0,35	0,06	0,15	5,50	0,00***	0,84	1,19
EPO_NA	0,13	0,03	0,15	4,64	0,00***	0,62	1,62
MOT_SPC_SALE	-0,08	0,05	-0,04	-1,48	0,14	0,94	1,06
RENT_HOUSE	-0,08	0,08	-0,03	-1,04	0,30	0,97	1,03
Z_{Op}	0,25	0,10	0,10	2,50	0,01***	0,39	2,56
CONFLICT	0,01	0,03	0,01	0,51	0,61	0,89	1,13
Z_{Op} **_CONFLICT**	0,02	0,13	0,01	0,14	0,89	0,39	2,55
Dependent Variable: lnDPrice							
adjusted R2=0,597							

Tab.6 *Saint-Nom-la-Bretèche* case Regression

In *Saint-Nom-la-Bretèche*, our model tests the impact of only one conflict event (the claim at tribunal). The Z_{Op} dummy is highly significant at 1%, meaning that the location inside this zone is a determinant of price. It is explained by the fact that this zone is closed to a huge golf

resort, which is an appreciated residence choice. Hence, houses locating inside the zone are 25% more expensive than an outside referential house. The time-location interaction term $Z_{Op}\_conflict$ is, however, insignificant. It seems that market's expectation is null toward the project in this case.

This result is surprising, as the road deviation will profoundly modify the landscape of the area. Moreover, in carefully observing the conflict, we remark that the main argument of the project's opponents is that the future road will depreciate their houses. Hence, they asked for more protection implementation, such as antiphonic walls or tree plantings to repair the landscape degradation. Our statistic coefficient, Z_{Op} dummy, significant as found above, backs up the argument that this zone is a valued site for residential location and explains also why home owners here are aggressive toward the project.

The absence of prices changes and impact detection in *Saint-Nom-la-Bretèche* case raises doubts on the market's expectation mechanism. This case shares some similar points with the case of *Maisse*, where the market also reveals no expectation at the tribunal phase, due to strong population's mobilization. But in *Saint-Nom-la-Bretèche* the local associations didn't make appeal, and the conflict stops after the judgment. Another point is that the road is likely a positive facility in *Saint-Nom-la-Bretèche* and local inhabitants asked only for protection and not a project cancellation. The sum up of the two points suggests that market's expectation should be hidden somewhere in our results. We need to look more deeply into this case.

Let's make a synthesis first to have a general view on our three regressions.

Vaux-le-Penil			***Maisse***			***Saint-Nom-la-Bretèche***		
	Out-of-conflict period	**Conflict period**		**Out-of-conflict period**	**Conflict period**		**Out-of-conflict period**	**Conflict period**
Out-of-conflict zone	No Impact	No Impact	**Out-of-conflict zone**	No Impact	No Impact	**Out-of-conflict zone**	No Impact	No Impact
Conflict zone	No Impact	Houses value fall during conflict	**Conflict zone**	No Impact	Houses value fall at the last event	**Conflict zone**	No Impact	No Impact

Tab.7 Synthesis table of three regressions – Assessment of the impacts on houses' prices

The table shows that in general our model captures the conflict impact on the opposite zone. Outside of theses zones, and at the period of no conflict, it doesn't show any sign of price change. Value loss is only detected at the opposite zone during the conflict, proof of market's expectation.

The result is however needed to be interpreted moderately. A no-impact result in the reference zone doesn't necessarily mean that sellers and buyers are all indifferent to the project: the reference zone is large, and the no-impact result only reveals a general trend of the local market. Because our objective is to understand the impact of conflict on the opposite zone, our model didn't target all the expectation at different scales of the study area. This means that if expectation is done at a smaller land pattern, and is neutralized by other factors, price gradient model is not very powerful to detect it. Expectation could be studied at a smaller land pattern, which didn't influence market's trend. We decide then to use distance-capture model to study the case of *Saint-Nom-la-Bretèche* more profoundly.

d. Derivate Model for Saint-Nom-la-Bretèche

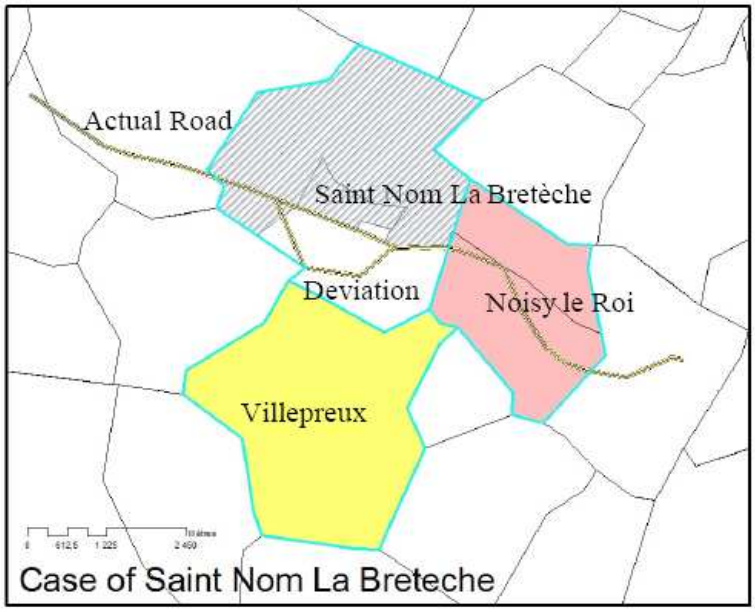
As mentioned, the case of *Saint-Nom-la-Bretèche* provides some doubts on the market's expectation mechanism. As no sign of price change is detected here, we don't know whether the market didn't react because it lacks of certainty, or because there's a hidden factor neutralizing the project's impact. In order to solve this problem and to catch more information, we then realize a derivate model only for the *Saint-Nom-la-Bretèche* case.

The model includes a distance capture design, and is given as following:

$$LnDP = \beta_H 0 + F(K_H) + \sum_{1}^{i} \lambda T_i D + \varepsilon$$

We introduce the distance (D) from houses to the future road. As mentioned in the background section, price gradient model permitted to deal with 3 different infrastructures with the (quasi) same parameters. However, we must use distance capture model in this case, because of this detective power for impact. The distance means the smallest number of km separating the house from the road - the projection in an ideal geometrical approach. The calculus is realized thanks to the longitude and latitude information of house from the PNS data base. We use the Harversine formula[11] to calculate this distance, and transform it into logarithm to be in linear relation with the price.

We also take into consideration all the periods (T*i*) of the project. We define clearly period 1 as a period of pre-announcement (AVDUP). It corresponds to the public-opinion-collection period[12], and will permit us to compare the project's impacts before and after the official announcement. We then divide the next period into three sub-periods: 2. (AVTA) the time gap from the announcement to the claim, 3. (TA) the time of the claim or Conflict, which didn't change, and 4. (APTA) the post conflict period. The objective of this division is to observe more finely the market's consideration about the future road. We look not only at the conflict, but also at the moments before the announcement, and after the conflict. For each period, we control the impact of the distances (D) by crossing their (logarithmic) value in km with the period dummies (T*i*). Hence, the coefficient λ represent the crossed impact TiD, meaning impact of the distance in each sub-period.



Graphic 2: The 3 communities of *Saint-Nom-la-Bretèche* case and the future deviation

[11] The Harversine formula is a spherical geometry's calculus for small distance, by using the longitude and latitude information between two points in the earth's surface (Oxford Dictionary)

[12] French legislation obligates a public opinion collection before all public projects' announcements. The objective is to inform the population about the new public project, and to have their opinions on what should and what should not be done.

We run the model in each of the 3 communities of the study area (see the above map), namely *Noisy le Roi*, *Villepreux* and *Saint-Nom-la-Bretèche*, instead of the study area as a whole. By studying at a lower land pattern, we hope to catch hidden factors behind our first null expectation result.

	NOISY LE ROI		***VILLEPREUX***		***SAINT NOM LA BRETECHE***	
	Unstandardized Coefficients B	**Sig.**	**Unstandardized Coefficients B**	**Sig.**	**Unstandardized Coefficients B**	**Sig.**
(Constant)	10,30	0,00***	10,52	0,00***	10,32	0,00***
ln_NbRoom	0,62	0,00**	0,31	0,00***	0,42	0,00***
Ln_SurfT	0,25	0,00**	0,21	0,00***	0,25	0,00***
Cellar	0,08	0,09	0,09	0,01***	0,03	0,39
NbParking_0	0,01	0,85	-0,02	0,56	-0,01	0,76
NbParking_2	0,03	0,68	0,08	0,04**	0,06	0,08*
HOU_MV	0,05	0,83	0,19	0,27	-	-
HOU_VI	-0,01	0,89	0,04	0,57	0,15	0,04**
HOU_NA	0,10	0,01**	0,01	0,66	0,03	0,38
LEVEL_2	-0,12	0,08	0,03	0,45	0,12	0,02**
LEVEL_3	-0,13	0,12	-0,04	0,25	0,15	0,03**
LEVEL_4	-	-	0,12	0,49	-	-
EPO_AV47	-0,23	0,15	0,60	0,00***	0,03	0,76
EPO_1980_2000	0,05	0,41	0,17	0,00***	0,04	0,49
EPO_AP2000	-0,03	0,71	-	-	0,09	0,22
EPO_NA	-0,07	0,16	0,05	0,01***	0,02	0,61
RENT_HOUSE	-0,25	0,04**	0,11	0,11	-0,02	0,83
MOT_SPC_SALE	-0,06	0,43	-0,14	0,00***	-0,17	0,08*
AVDUP_Dist	0,08	0,05**	-0,15	0,00***	0,04	0,38
AVTA_Dist	0,03	0,76	-0,14	0,01***	-0,06	0,59
TA_Dist	0,14	0,00***	-0,10	0,01***	-0,02	0,31
APTA_Dist	0,05	0,72	-0,05	0,56	-0,08	0,63
	Adjusted R2=0,729 (151 transactions)		Adjusted R2=0,653 (301 transactions)		Adjusted R2=0,663 (213 transactions)	

Tab.9 Results of regressions in the three communities

The results show that the market has made expectation at community level. Remind that our initial model didn't detect expectation at the scale of 3 communities in the whole. In *Noisy le Roi*, we can see that the crossed effect distance-time variables are significant at the AVDUP and TA periods: their coefficients of 0.08 and 0.14 reveal that the expectation is made before the project's announcement, but during the conflict as well. Their positive sign corresponds with a price fall for homes locating next to the future infrastructure. The project is considered as a nuisance source for the community of *Noisy le Roi*. The urban zone of this community is extended along the road, and the project is interpreted by *Noisy le Roi* inhabitants in risk of noise and traffic accident. Even though expectation is made before the announcement, the distance impacts much more on house's price during the conflict, which can be seen in the change of distance variable coefficients from 8% to 14% (nearly the double). The change implies that the market is more certain about the project's implementation and anticipates then the nuisance into the price.

In *Villepreux*, the opposite result is observed. This community is pretty isolated to main traffic axe. As the project plans to broaden the road and create a round about to join with the road of *Villepreux*, it will make this community more accessible. As *Villepreux* is relatively an

isolated semi-rural town, the proximity to main traffic axes is considered to be a gain, which is shown in the distance variable coefficients. The negative signs (-0.15; -0.14; -0.10) mean that the more a house is located next to the future road, the more value it will gain. We see here an interesting phenomenon. Road is appreciated by far and isolated community, as it facilitates transport and accessibility. Meanwhile, it isn't appreciated by close community as being source of nuisance. The project's impacts on *Noisy-le-Roi* and on *Villepreux* population are then opposite, as verified through the coefficients of the distance variables. In *Villepreux*, the road is more and more welcome along the project life (-0.15 then -0.14 and -0.10) while in *Noisy-le-Roi*, it is considered to be more and more undesirable (0.08 then 0.14).

In *Saint Nom-la-Bretèche*, the host community of the sitting infrastructure, the impact of distance is however not detected. Let's keep in mind that the project is mainly projected to be done here, and that inhabitants acted fiercely at the tribunal. It is then surprising to see that market expects price change in all places, but not here. Such a result suggests that there's a hidden factor which neutralizes the project impact. One can suppose that the house's value loss due to facility's nuisance is balanced by the value gain thanks to the proximity to the future road, such as local commercials activity development…etc. This element will be mentioned in the following discussion part.

V. Discussion

The previous regressions allow a partial confirmation of our main intuitions. They show 1) that conflict behaviors did influence on the houses' value, and 2) that the hypothesis that the market expectation depends on the degree of certainty of the project is partly confirmed.

Such conclusions may seem rather obvious, but they never give rise to empirical verifications in the literature. Messer and al. (2006) for example found that houses prices didn't rebound after delaying cleanup operations. But the risk belief caused by this delay is confirmed *ex-post*, meaning later to the actual pollution. Similarly, Gayer and al. (2002) found that houses prices fall after the diffusion of a State reports on pollution waste sites, and Gayer and Viscusi (2002) showed that the price is also reduced by newspaper articles mentioning waste site. But these studies do not cope with conflicts expression by means of tribunal decisions neither they do reveal how the risk perception is estimated by market *ex ante*. Our model permits to integrate these variables, using an expectation study approach. It isolates local market trend toward the infrastructure setting conflict at the pre-construction period, and matches price change with signal of project's certainty given by litigation data.

In order to comment these results, let's have a closer look to our case studies:

- In the case of *Vaux le Penil*'s incinerator, the serious legal demand has first caused a panic among the population of *Maincy*. The inhabitants sold their houses hastily to avoid the pollution risk and the price fell 17% after the 2nd claim which asked for urgent public action because of carcinogen substance detection. However, the Prefect's service announced that the pollution is not scientifically confirmed, and officially guarantied the security of the new incinerator[13]. The tribunal has also refused the claim as the judges are not convinced about the

[13] It is necessary to mention that in this situation, there are also contradictory results between pollution risk reported by the community of *Maincy* (who detected the cancer cases) and that reported by the Prefect's expertise. The risk is not clearly determined and the house market is likely to be in lack of certainty about the project's impact.

pollution risk. The panic is not hold, and that's why price's expectation is no more detected in the latter periods, even when the new incinerator came into operation.

- In *Maisse*, the judgment of the first tribunal in favor of local inhabitants discouraged those who believe in a closed project realization. Hence, the market didn't bet unthinkingly on a change of house price. As long as the project is blocked, non-urbanized space is kept protected and there's no need to sold houses in a pressing situation. But once the appeal court decided to hold the project, the price fell as the certainty of the new facility is confirmed now.

- The case of *Saint Nom la Bretèche* is far more complicated but leads to the same conclusions. With the 1st model, we didn't detect expectation at the level of 3 communities. It suggests that expectation could be done at a lower land pattern, which is confirmed with our 2nd model of distance-capture design. Even though we didn't find expectation in the host community, price's change is detected on the two neighbor ones, and confirmed along the project's life. Such a situation proves that the expectation mechanism is impacted by the to-be-realized-chance of the project.

On the basis of these results, we make the hypothesis that the expectation mechanism concerning the impact of conflict activity on houses prices is based on 2 factors:

a. the estimation by the population of the negatives impacts, and

b. a degree of certainty of the impacts: the to-be-realized-chance of the project.

The product of these two factors means that a project can at the same time have a potentially big impact (a) but will be not considered by the market until there is certainty about its implementation (b). This mechanism explains why price changed during different periods of conflict. As the litigation activity can change the fate of the project, the market takes into account the information and adjusts price on it.

The second point that we want to put under discussion is the role of conflict signals in the mechanism of market expectation. The conflict itself is a complex phenomenon which cannot be easily manipulated. Given this fact, if one looks to our regressions to make prediction on market expectation in case of conflicts or sitting of new infrastructure for example, he should make sure to deeply understand the situation revealed by the conflict activity and its various expressions.

Concerning conflict expressions, even if litigation plays a key role in the expectation mechanism, the land-use conflict process often involves other channels of information diffusion. Press and other media expressions (petition circulation, mediatising propagation, on-street protest)… or even activities of violence can convey further information to the inhabitants (Kirat and Torre (2006). We choose to work on legal litigation rather than others sources of conflict because tribunal judgments convey official information, and can generate legal enforcement grants a certainty to the buyer's and seller's position toward the project. Then it is credible information that will decide on the market expectation.

But conflict signal may also be uneasy to interpret as it plays a double role in information diffusion:

- Firstly, conflict conveys information but also rumors expansion (meaning non official message including wrong information) to future buyers and sellers of houses. In this role, it amplifies the belief of project's implementation. Our results show that when public facility is considered to be a source of risky nuisance (as in the case of *Vaux-le-Penil*), or when the opponents are largely mobilized but without a dynamic engagement in opposition

(as in the case of *Saint-Nom-la-Bretèche*), the conflict amplifies the belief about a new pollutant facility in a larger public. Hence, the prices fall inside the nuisance-suffering-zone and during the period of conflict.

- The second role is linked with the deterring power of conflict, as suggested by game theory (Schelling, 1960). From this point of view, the conflict is seen as a kind of message sent by a group of actors to the others in order to make explicit their opposition (Kirat and Torre, 2007). The message aims also to be read by the public decider. Conflict means here engagement to fight again the project, so its non-implementation.

Kirat & Torre (2006) argue that inhabitants in a conflict zone may choose between Exit or Voice behaviors (Hirschman, 1970) when a territorial modification is announced by a facility setting project. As they anticipate a future nuisance, non organized actors may prefer spatial Exit, e.g. mobility or vote with the feet (Tiebout, 1956), which conducts to price reducing. But organized groups should prefer Voice, e.g. conflict engagement. As they will not leave their territory, house sales will not reflect the decline that they suffer from the territorial project. Such a result is showed in the case of *Maisse* at the tribunal phase (TA). As local residents invest seriously in opposition activities, the message sent to the public decider is clear. The market hesitates in interpreting the situation, and consequently there's absence of impact on price. No matter how the public believes on the project's implementation, the market might react only against trustworthy information.

The last point we would like to discuss from our results is about the general impact of the public facility in the territory. Public facility construction aims to supply public service to inhabitants, and its impacts are supposed to be positive to the whole project area. The benefice of *Vaux-le-Penil* incinerator, for example, is to process all kind of waste inside a zone of 3000 km^2 in Ile de France region. However, even projects of high collective interest can generate local negative effects, which are depreciative for nearby property's value. Our objective is to seize this depreciation. But the difference in the geographical scale of benefice's measuring (quite large in this case) and that of nuisance's perception (rather small) may be a matter, especially in cases of semi-desirable facility.

When the case of *Saint-Nom-la-Bretèche* is studied by the 1^{st} model, the nuisance is compensated by other non revealed hedonic impacts. Road is a semi-desirable facility. It destroys landscape and implies noise, but also brings accessibility to local population. That's why the general market trend is neutralized by auto-compensated price's adjustments. Our 2^{nd} model captures the effects at the communities' level. It helps us to discover that they have divergent expectations concerning the future road. The isolated community (*Villepreux*) appreciates the project of road, which brings accessibility, while the close and well accessible one (*Noisy le Roi)* finds it unwelcome at the same time. The auto-balancing impacts in *Noisy le Roi* and *Villepreux* have participated to hide market's expectation at the higher study level of 3 communities.

This result finds some echoes in the literature. In their study about a project of bridge construction at Jacksonville (Florida), Smersh & Smith (2000) found that it helps to increase real-estate values in the North periphery zone of the city – thanks to the accessibility gain, but decline those of the south residential and commercial district because it augments the traffic and threats consequently the congestion. Farber (1998) notices that indirect impact of public amenity can not be always revealed in house price observation. A negative amenity component may be offset by a residential house choice for job development and positive wage

effect for example. He concluded that a hedonic study that does not allow for observing labor market attraction would underestimate the adverse amenity effect.

The 2nd model doesn't reveal how the price is impacted by other factors in the host community of *Saint-Nom-la-Bretèche*. But the absence of impact here only confirms that project's nuisance is narrowly compensated by its advantages in terms of business opportunity or job development, etc.... This conclusion suggests to open door to more advanced research on conflict impact out of real-estate domain, to enter for example in the field of labor market, economic developments or urbanism planning research…These "spillovers" can influence backward real-estate value as they impact residential location choice. But indirect project impacts such as job enhancing or economics development are not easily captured with hedonic design. They are frequently embedded inside the location variable, and claim for further research to better exploring the hidden characters not included in our hedonic model and influencing residential choice.

VI. Conclusion

In this article we study house's value change during public facility setting legal conflicts. We work with 3 case studies of inhabitant's opposition against public project's announcement. In all the three cases, the conflict is driven before tribunal and/or appealing courts before the project's realization. We use a semi-logarithm hedonic regression with deflated price to isolate the conflict's impact from other determinants of house's value. The results show that the conflicts let an impact on house's value, which can be read as a proof of market's expectation of the project. They also show that expectation mechanism depends on the signal of certainty confirmed by conflict actions, which is asserted by the twofold impact (positive or negative). If neighbors decide together to struggle against the project, they will not leave the territory, will not sell their houses and then maintain house's value consequently. If they choose defection, they will start a procedure of spatial exit, and house's value will then slightly decrease, because local opponents engage them into a collective action. A third result explicates the spatial impact of a project regarding the resident behaviors to conflict. Thanks to a derivate model controlling the distance, we find that neighbor zones of the infrastructure can also expect differently the impact of project. A semi-desirable public facility is welcome by far communities, more isolated, but unwilling for close inhabitants.

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