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Sauveur Giannoni, Olivier Beaumais, Caroline Tafani

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Sauveur Giannoni[1] Olivier Beaumais[1] Caroline Tafani[1]

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Abstract

The presence of foreign buyers in land and housing markets has become a major concern for many regions in the world, sometimes seen as leading to the eviction of local (domestic) buyers from the market. We argue that the existence of *the non-local buyer premium* is a driving force behind the local buyer eviction phenomenon. To account for this phenomenon, we built a stylized static search and bargaining model with one type of seller and two types of buyers, local and non-local. We show that the market is in general characterized by the coexistence of two different selling prices, a high price paid by non-local buyers and a low price paid by local ones. Yet, if the price premium exceeds a given threshold, which we call *the maximum sustainable price dispersion cut-point*, no seller will be willing to deal with a local buyer at a low price anymore. To illustrate our theoretical results, we use a data set of more than 4,800 observations on the seaside farmland market of Corsica between 1998-2008. Controlling for land characteristics and potential endogeneity issues, a huge non-local premium of roughly €16 per square meter is found.

1 Introduction

Nowadays, the presence of foreign (or non-local) buyers in land and housing markets has become a major concern for many cities, regions or countries in the world. Numerous columnists stress the fact that the presence of foreign buyers creates inflation and prevents local people from buying a house or a land

[1]Corresponding author: sauveur.giannoni@univ-corse.fr. UMR CNRS 6240 LISA; Università di Corsica - Pasquale Paoli; Campus Mariani, BP 52, 20250 Corte, France.

plot, thus leading to the eviction of local (domestic) buyers from the market. In general, these foreign buyers are willing to buy or build second homes and are characterized by preferences and opinions on the market value of the coveted good that differ from local buyers' preferences and opinions. Eviction is reinforced by the fact that these foreign buyers can easily afford a high price.
The situation of Australia (Nicholls, 2016; Gauder, Houssard & Orsmond, 2014) or New-Zealand (Davidson, 2016) facing an important inflow of Chinese buyers is a perfect illustration of this phenomenon. Britain (Williams, 2015) or Canada (Sturgeon, 2015) also have to deal with a similar issue.
Despite the worldwide nature of what we call in this paper the local buyer eviction problem, to the best of our knowledge, scholars have devoted little attention to this important social topic. A notable exception is Chao & Yu (2015) who studied the optimal taxation scheme in order to suppress the inflationary influence of foreign buyers on the housing market, with an application to the case of Hong Kong.
This relative lack of interest for a detailed analysis of the influence of foreign buyers on land and/or housing markets appears to be a paradox since the fact that non-local buyers pay a premium on these markets is well documented (Miller, Sklarz & Ordway, 1988; Lambson, McQueen & Slade, 2004). Nonetheless, some authors found no clear evidence of the existence of such a premium (Myer, He & Webb, 1992; Clauretie & Thistle, 2007).
From a theoretical perspective, when it exists, such a premium is simply the expression of a price dispersion phenomenon in the sense of Stigler (1961) related to informational problems and search costs in the market.
A key feature of land and housing markets lies in the fact that prices are set through a decentralized two-person search and bargaining process. According to the literature, bargaining markets are in general characterized by price dispersion (Read, 1991; Leung, Leong & Wong, 2006; Zhou, Gibler & Zahirovic-Herbert, 2015).
Following Lambson, McQueen & Slade (2004) or Clauretie & Thistle (2007) the existence of a price premium (or of price dispersion) is mainly due to a differential between local and non-local buyers search costs on the one hand and the existence of a so-called *anchoring effect* on the other hand. Non-local buyers opinion on the value of the good is potentially biased due to the fact that land or housing is more expensive in the place they live in.
We argue that the existence of *the non-local buyer premium* is a driving force behind the local buyer eviction phenomenon. To explore this question, we build

a stylized static search and bargaining model with one type of seller and two types of buyers, local and non-local. Since sellers are aware of the existence of the premium, the market is in general characterized by the coexistence of two different selling prices, a high price paid by non-local buyers and a low price paid by local ones. Yet, if the price premium exceeds a given threshold, that we call *the maximum sustainable price dispersion cut-point*, no seller will be willing to deal with a local buyer at a low price anymore. In that case, we show that the market price turns unique and corresponds to the price that non-local buyers are willing to pay. Local buyers are evicted from the market, except for those who accept to raise their willingness to pay, *i.e.*, the richer ones.

The empirical relevance of this result is important since it provides a potential theoretical explanation to the fact that some papers found no evidence of a non-local buyer premium (Clauretie & Thistle, 2007). The point is simply that if one observes a market in which the maximum sustainable price dispersion cut-point has been exceeded, the law of unique price holds. In other words, markets in which no price dispersion is found are markets in which the local buyers who refused to raise their willingness to pay have already left the market.

The case of the seaside farmland market in Corsica, a small French island in the Mediterranean, on which the local buyers eviction problem is a major social issue, is studied. A data set of more than 4,800 observations between 1998-2008 is used. Controlling for land characteristics and potential endogeneity issues, a huge non-local premium of roughly €16 per square meter is found. In light of the theoretical results, this finding suggests that over the study period, local buyers are not evicted. The foreign premium is huge and its existence means that the maximum sustainable price dispersion cut-point has not been exceeded.

The rest of the paper is organized as follows: Section 2 develops the theoretical model and highlights some important results; Section 3 presents the farmland market of Corsica and the data set, while econometric method and results are exposed in Section 4; Section 5 briefly discusses the results and concludes.

2 The model

In this section, we develop a model of a decentralized bargaining market in order to analyze the effect of the presence of foreign buyers on land and/or housing markets.

2.1 Description of the market

Consider the market of a durable good (land or housing) with a given set of attributes and in a given region (or country/town). The market is composed of N risk neutral sellers, each owning one unit of good, and M risk neutral buyers, each considering the purchase of one unit of good. Following Nishimura (1999), we adopt a "'temporary equilibrium"' approach to focus on static price formation. The latter assumption implies that next period's market conditions are exogenous and that specifically the next period's good intrinsic value is treated as a parameter. The market is decentralized and buyers and sellers have to carry out a costly search for their trading partners.
A key idea of this model is that sellers are homogenous while two types of buyers coexist in the market. Local (domestic) buyers on the one hand and foreign (non-local) buyers on the other hand. In line with the literature, local and foreign buyers differ in two respects :

- Foreign buyers bear higher search costs than local buyers;
- Foreign buyers suffer from an *anchoring effect*, their opinion on the future value of the good is biased upward.

Each agent faces two types of costs. First, prior to entering the market, every agent has to pay an entry cost in order to obtain full information on the market conditions. The entry cost is a sunk cost for every agent but its absolute value differs depending on the type of agent. Specifically, sellers and local buyers entry cost is assumed low. As proposed in a celebrated paper by Salop & Stiglitz (1976), they simply have to buy a newspaper in order to obtain information. Conversely, foreign buyers bear higher entry costs since they have not only to buy the newspaper but also to pay for transport, hotel, and gathering costs. This means that almost any potential seller and local buyer is in a position to enter the market since the cost is affordable, whereas due to relatively high entry costs only selected (better off) foreign buyers will enter the market.
Second, if, when they meet to bargain, buyers and sellers refuse to contract, they will have to bear additional costs in order to find another potential trading partner. Let's call c_S, c_L and c_F the average additional cost that sellers, local and foreign buyers have to bear if they do not contract with their first potential trading partner.
Furthermore, once they have paid the entry cost, local and foreign buyers have

the same information on the market and the same bargaining abilities, but their opinion about the future intrinsic value of the good differs. Foreigners tend to believe that the future intrinsic value of the good will be higher compared to local buyers. This is the anchoring effect.
Let's call X_F and X_L respectively the intrinsic value of the good from a foreigner and from a local point of view. According to the anchoring effect assumption, $X_F > X_L$. The intrinsic value is the present discounted value of the future benefits from owning the good (land or house).
Let's now turn to the negotiation process. Following Lisi & Iacobini (2013), we rely on the generalized Nash bargaining solution. We will consider the bargaining problem from the seller point of view. The seller has several questions to answer when he has to negotiate:

1. What is the intrinsic value of the good from the point of view of the seller?
2. Since local buyers intrinsically value less highly the good, they will not accept to pay the same price as foreigners. Thus, why should a seller accept to contract with a local buyer?
3. What should be the selling price(s)?

The answer to the first question is a bit controversial. The sellers know that a proportion μ of buyers considers that the intrinsic value is X_F while a proportion $1-\mu$ considers that the intrinsic value is X_L. For sure, if the seller has entered the market then his valuation of the good is compatible with at least one of these values.
A possible answer to the first question would be to say that the intrinsic value from the seller viewpoint lies somewhere between these two extreme values, for example it could be the average intrinsic value given the market conditions.
We believe that this answer does not fit well real world situations. To understand our point, consider for a while that only local buyers are on the market. In that case, the intrinsic value of the good is X_L. With the arrival of foreign buyers, the seller benefits from a *ceteris paribus* increase in his bargaining power and, rationally, he will try to obtain the highest possible selling price. This means that he raises his expectation in the presence of foreign buyers and considers that the intrinsic value of the good is X_F.
The answer to this first question implies the second question. Since local buyers value less highly the good why should a seller contract with a local? This is the central point of the paper. To answer both this question and the question of

the level of price(s), we have to model the transaction process.

2.2 The transaction process and the local buyer eviction

Once he has paid the entry cost, a seller is going to meet a first potential buyer. This buyer will be a foreigner with probability μ and a local with probability $1-\mu$. Let us first consider the behavior of the seller and the foreign buyer.
Since information is perfect, both seller and buyer know the value of every market parameter. The point of the negotiation between them is to split the surplus associated with the transaction. Several solutions, *i.e.*, rules of surplus partition, can be found in the literature (for example Diamond & Maskin, 1979; Mortensen, 1982; Wolinsky, 1987). Following Lisi & Iacobini (2013), we rely on the generalized Nash bargaining solution (Nash, 1950)
The solution of the bargaining game crucially depends on the bargaining power of both buyers and sellers. Let's consider that the bargaining power of the seller in a given state of the market is $0 \leq \alpha \leq 1$, while the bargaining power of the buyer is $1-\alpha$. α is simply the share of the total surplus derived from the transaction that the seller is going to obtain. An important point is to understand what determines the value of α. We discuss it later.
When meeting a seller, a foreign buyer knows that if he does not complete the transaction, he will have to incur a future additional cost c_F in order to find a new seller. Therefore, he will always be willing to complete the transaction in order to save part of this additional cost, provided that he obtains a share $1-\alpha$ of the surplus.
When meeting a foreign buyer, a seller knows that if he does not complete the transaction, he will have to incur additional costs. The cost of finding another potential buyer is on average c_S. However, the seller has no incentive to look for a different buyer since he knows that the willingness to pay of a foreign buyer is higher than the willingness to pay of a local buyer. To be more specific, if he does not complete the transaction, he will have to search until he finds an equivalent opportunity, *i.e.*, another foreign buyer to bargain with. Let's call $T(\mu)$ the number of potential buyers that a seller has to meet before finding another foreign buyer. This number is a decreasing function of μ the proportion of foreign buyers on the market since the higher μ, the easier and less costly to find another foreign buyer. We can assume that $\lim_{\mu \to 0} T(\mu) = +\infty$ and $\lim_{\mu \to 1} T(\mu) = 1$.

At the end of the day, the additional cost that the seller saves when he contracts with the foreign buyer is $c_S \times T(\mu)$. Denoting the selling price as P_F, the surplus can simply be written as the sum of the buyer surplus on the one hand, $S_B = P_F - X_F + c_S T(\mu)$, and the seller surplus, $S_S = X_F - P_F + c_F$, on the other hand. Now, we can write the program that the seller has to solve in order to set a selling price that is mutually advantageous for both the foreign buyer and the seller and will lead to the transaction. This is a Nash equilibrium.

$$\max_{P_F} \left[P_F - X_F + c_S T(\mu)\right]^{\alpha} \left[X_F - P_F + c_F\right]^{1-\alpha} \tag{1}$$

This expression means that in order to contract with the foreigner, the seller has to propose a price that gives to the buyer a fraction $1 - \alpha$ of the surplus. The seller surplus when the transaction is completed equals $P_F - X_F + c_S T(\mu)$. He receives the price paid by the foreigner P_F and concedes X_F to the buyer in exchange. Furthermore, he saves the additional search costs $c_S T(\mu)$. The foreign buyer' surplus is $X_F - P_F + c_F$, he receives the intrinsic value X_F and saves the search costs c_F but pays P_F.
One has to observe that the total surplus associated to the transaction is $c_F + c_S \times T(\mu)$, which is always strictly positive. This implies that it is always possible for the seller to propose a partition of the surplus that satisfies both traders. The seller solves the previous program to find the optimal value of P_F that ensures that the transaction will be completed.

This selling price is given by the following equation:

$$P_F = X_F + \alpha c_F - (1 - \alpha) c_S T(\mu) \tag{2}$$

This foreign selling price equation states that the price positively depends on the intrinsic value. The seller also obtains a premium equal to the share of its additional search costs that the buyer concedes. The seller concedes a discount to the foreign buyer that is equal to a share $1 - \alpha$ of its own additional search costs. Finally, due to the existence of frictions on the market the selling price may be above or below the intrinsic value depending on the value of α. This result is similar to Lisi & Iacobini (2013). The following equation presents the range of the potential selling price depending on the value of α:

$$X_F - c_S T(\mu) \leq P_F \leq X_F + c_F$$

Let's now consider the situation of a seller who has just paid the entry cost and meets a local buyer. The question that he has to answer is simple: As long as I know that the local buyer values the good less than foreign buyers, he is likely to pay a lower price than foreigners ($P_L < P_F$), why should I accept to contract with him?
In a frictionless market, the answer to this question is simple. A seller would never have any incentive to contract with local buyers since they are low bidders. Yet, when frictions exist and are important enough, it potentially creates an incentive for the seller to conclude a deal at a lower price. Sellers may be willing to avoid important additional search costs.

When a seller meets a local buyer, his situation is a bit different than when he meets a foreign buyer. The major difference lies in the fact that, contrarily to the buyer, he has an outside opportunity. He could decide not to conclude a deal with the local buyer and continue searching until he meets a foreign buyer. The point is that this strategy is costly.
The program that the seller has to solve in order to set a selling price that is mutually advantageous for both local buyer and seller is:

$$\max_{P_L} \left[P_L - X_F - V\right]^{\alpha} \left[X_L - P_L + c_L\right]^{1-\alpha} \tag{3}$$

As in the case of the foreign buyer, the seller will transact with a local buyer if it is possible to set a price P_L that is mutually advantageous for the seller and the local buyer. Two major differences arise compared to the previous case. If he decides to conclude a deal, the seller still concedes X_F but the buyer only receives, according to his opinion, X_L. This is a net loss for the seller. Furthermore, the seller receives the selling price P_L but he has to abandon the value associated with continued search. This value is denoted V and may be positive or negative.
A key point is to understand what V exactly is. The answer is quite simple, this is the gain in terms of surplus associated with the decision for the seller to invest in search. Our approach is much simpler, but qualitatively similar for example to Wolinsky (1987). Assuming for simplicity that the discount rate of the seller is null, the value of V is:

$$V = (P_F - P_L) - c_S \times T(\mu)$$

Since the seller is fully informed, when he meets a local buyer he sets the selling price P_L accounting for the fact that he could receive P_F after investing $c_S \times T(\mu)$ and provided he gives up the price he would obtain by concluding the transaction P_L.
This approach is equivalent to a more classical one in terms of expected gains from the search, since we consider that that gain is certain but that the cost of search negatively depends on the probability to meet a foreign buyer. Solving the previous program, the seller sets a price P_L equal to:

$$P_L = \frac{X_F - \alpha(X_F - X_L) + \alpha c_L - (1-\alpha)c_S T(\mu) + (1-\alpha)\left[X_F + \alpha c_F - (1-\alpha)c_S T(\mu)\right]}{2-\alpha} \tag{4}$$

An important issue is to understand in detail the incentive of the seller. The seller has an incentive to deal at a lower price P_L, as long as, once he has accounted for the potential losses of dealing with a local buyer, the surplus associated with this transaction remains positive. Using equation (3) and the definition of V, the surplus of a transaction with a local buyer is as follows:

$$\pi_L = (X_L - X_F) + c_L - V \Leftrightarrow \pi_L = (X_L - X_F) + c_L + c_S T(\mu) - (P_F - P_L) \tag{5}$$

The analysis of equation (5) shows that the surplus of the transaction with a local buyer positively depends on the level of search costs, but negatively depends on the intensity of both the anchoring effect $X_F - X_L$ and the degree of price dispersion.

Proposition 1 *For a given set of parameters, if the price dispersion ($P_F - P_L$) exceeds a given threshold,* the maximum sustainable price-dispersion cut-point*, no seller will accept to deal with a local buyer since the surplus of this transaction is negative. The new unique market price is P_F.*

Proof. Proof is given in appendix B. ■

Corollary 1 *When price dispersion is too large to be sustained, local buyers are evicted from the market, except if they accept to raise their willingness to pay to P_F, the new unique market price.*

Proof. Proof follows directly from the proof of proposition 1. ■

The idea expressed by proposition (1) and its corollary is extremely intuitive. Let's consider a market characterized by two positive prices P_F and P_L

such that $P_F > P_L$. Since the seller has the possibility to wait until he meets a buyer willing to pay P_F provided he pays $c_S T(\mu)$, if the price differential is large enough to offset the total additional search costs, no seller is going to deal with a local.
Now that we have an expression of both P_F in equation (2) and P_L in equation (4), it is possible to compute the price differential $P_F - P_L$ as a function of parameters only.

Proposition 2 *Given the model assumptions, the price differential $P_F - P_L$ is always positive.*

$$P_F - P_L = \frac{\alpha}{2-\alpha}\left[(X_F - X_L) + (c_F - c_L)\right]$$

Proof. Using equation (2) and (4) and recalling that by assumption $X_F > X_L$ and $c_F > c_L$ proof is straightforward. ■

Corollary 2 *A ceteris paribus increase in sellers' bargaining power, α, increases the price differential.*

Proof. The partial derivative of $P_F - P_L$ with respect to α is $\frac{2}{(2-\alpha)^2}\left[(X_F - X_L) + (c_F - c_L)\right]$, that is obviously positive. ■

These results stress the fact that any factor improving the bargaining power of the seller leads to higher price dispersion and as a consequence tends to favor locals' eviction. In the next subsection, we discuss the factors affecting the value of α.

Proposition 3 *For a given set of parameters, if the anchoring effect ($X_F - X_L$) is large enough, no seller will accept to deal with a local buyer since the surplus of this transaction is negative.*

Proof. Proof is given in appendix C. ■

Proposition (3) is intuitive since it simply states that if some buyers, foreigners, are willing to pay extremely high prices due to a strong differential in their intrinsic valuation of the good, local buyers cannot remain on the market.

Previous results are established for a given set of parameters, among these market parameters μ, the proportion of foreign buyers has a crucial role to play

since any increase in μ decreases the number of necessary attempts to meet a foreigner from a seller point of view, $T(\mu)$. Using proposition (2) and equation (5), it is possible to rewrite the surplus of a deal with a local buyer as:

$$\pi_L = c_S T(\mu) + \frac{2(c_L + X_L - X_F) - \alpha c_F}{2 - \alpha} \tag{6}$$

This reformulation implies the following proposition.

Proposition 4 *If the necessary number of attempts before meeting a foreigner falls bellow a given critical positive value, $T(\mu) < \frac{\alpha c_F - 2(X_L - X_F + c_L)}{c_S(2-\alpha)}$, local buyers are evicted.*

Proof. Using equation (6) and considering that a deal will never occur if $\pi_L < 0$, simple calculation gives proposition (4). ■

Remark 5 *The lower the cost of an additional meeting for the seller, c_S, the more likely is local buyers eviction since it increases the critical value of $T(\mu)$.*

Corollary 3 *Ceteris paribus, a higher proportion of foreign buyers tends to favor local buyers evictions since it lowers the value of $T(\mu)$*

Proof. Proof follows directly from the fact that T is assumed to be decreasing in μ. ■

Proposition (4) deserves some comments. The idea behind this proposition is simply that sellers have to deal with a budget constraint. The cost of each unsuccessful meeting, the fact of meeting a local, is c_S. In order to meet a foreigner, a seller expects to spend $c_S \times T(\mu)$, that is simply the expected cost of search for a seller. Let's assume that each identical seller is rich enough to spend a given amount of money S in search activities. As long as $T(\mu)$ is such that $c_S \times T(\mu) > S$, no seller can afford the necessary level of search and only lucky sellers who meet foreigners on their first attempt will receive P_F. Conversely, as soon as μ is large enough to insure that $c_S \times T(\mu) < S$, any seller is rich enough in order to wait until he meets a buyer willing to pay P_F so that local buyers have a decision to make, either to pay P_F or leave the market. Obviously, this could also be interpreted in terms of time constraint. It echoes some papers such as Albrecht, Anderson, Smith & Vroman (2007) dealing with the idea that some traders could become desperate because they had spent too much time on the market and accept *bad* deals.

Let's now discuss in some detail factors that influence the value of key market parameters such as search costs and sellers' bargaining power.

2.3 On the role of market tightness

At the beginning of the present section, we wrote that the market is in a temporary equilibrium situation in which M buyers and N sellers are on the market. Later, parameters such as additional search costs and the degree of bargaining power of a seller have been proven to be of prominent importance. In this subsection, we want to stress the fact that a strong relationship exists between the state of the market, *i.e.*, the number of sellers and buyers, and the value of these parameters.

Let's define the level of market tightness as $\theta = \frac{M}{N}$. This ratio of the number of buyers to the number of sellers is of current use in the bargaining literature (Mortensen & Pissarides, 1994; Genesove & Han, 2012).

A typical idea promoted after Mortensen & Pissarides is related to the notion of stochastic rationing. According to this notion, a *ceteris paribus* increase in θ decreases the probability for a buyer to conclude a deal and increases the probability for a given seller to conclude a deal due to increased competition between buyers.

In the context of this paper, there is no stochastic rationing. Yet a rationing phenomenon exists that has pecuniary consequences.

The point is that, for a given temporary equilibrium, the search costs and the bargaining power of traders crucially depend on the level of market tightness. In fact, one can easily assume that any increase in θ, due either to an increase in the number of buyers or a fall in the number of sellers, improves the situation of sellers in two respects. First, it improves their bargaining power and second it decreases the cost of an additional meeting c_S since the average number of buyers *per* seller increases. Conversely, it increases the cost of an additional meeting for both a foreign (c_F) and a local buyer (c_L)[1].

This set of assumptions greatly enriches the analysis since it is possible to say from proposition 2 and corollary 2 that an increase in θ would lead to stronger price dispersion. Furthermore, since a higher θ means a lower c_S, following remark 5 local buyers are more likely to be evicted.

The next two sections will focus on the case of the seaside farmland market

[1] Formally, $\frac{d\alpha}{d\theta} > 0$, $\frac{dc_L}{d\theta} > 0$, $\frac{dc_F}{d\theta} > 0$, $\frac{dc_S}{d\theta} < 0$

of Corsica as a case study. Corsica is a French island in the Mediterranean, on which the problem of local buyers eviction is especially important. The results of this case study will be analyzed in light of our theoretical results.

3 The seaside farmland market of Corsica

Corsica is a small French island in the Mediterranean sea with 326,000 inhabitants. Farming used to be the most important activity in Corsica but nowadays the drop in farming is strong and this sector accounts for only 1.5% of the regional value added. Conversely, the island is one of the most popular tourist destinations in France. According to official data, INSEE (2015), 35 million night stays are registered each year while the total amount of tourism spending is 2.5 billion euros a year, one third of the regional GDP. Along with tourism development, the number of second homes is steadily growing. The share of second homes in total housings is 36.4% in 2012. Furthermore, the population has grown of more than 25% between 1999 and 2015. Due to these demographic dynamics, land is becoming scarcer and scarcer and the pressure on the farmland market is increasing for several years. This pressure is even stronger in the seaside regions of Corsica due to their peculiar attractiveness. In this context, the local population is concerned about the difficulty to buy land especially for housing purposes. The local buyer eviction problem has become a prominent politic issue. Specifically local nationalist political parties put pressure on the national government in order to obtain a protective legislation for local buyers. In a 2011 official report[2] entitled *Local commitment for a policy of land and housing*, the president of the local government stated:

> A measure of the reality of problems in the land market, and it is a big issue for Corsica, lies in the important number of disputed or invalidated urbanistic plans, which is evidence of the pressure on the land market and stresses the difficulties in finding a long-term equilibrium point between the preservation of the general interest, on the one hand, and the pressure coming from private interests in highly valued areas, on the other hand.

In France, the SAFER is a para-public institution in charge of the promotion and the development of agriculture and rural areas. When the owner of

[2]In French, the report is entitled *Engagement territorial pour une politique du foncier et du logement, p. 43.*

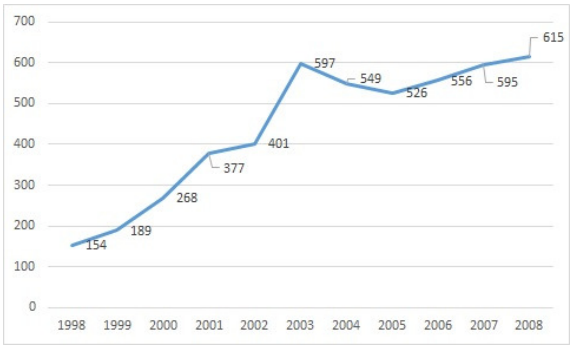

Figure 1: Annual number of sales.

a parcel of farmland is willing to sell it, he has first to declare his intention to the SAFER, before being allowed to complete the transaction. This prior declaration is called a DIA. The present paper exploits a data set including all the DIA of seaside municipalities of Corsica between 1998 and 2008. The data illustrates some interesting features of the seaside farmland market of Corsica. Between 1998 and 2008, more than 5,600 DIA were registered by the SAFER of Corsica for seaside municipalities. In total, between 1998 and 2008, 662 land plots have been bought by farmers while only 700 land plots were destined to farming use. These figures emphasize the fact that most of the farmland is sold for recreational and housing purposes. In the remainder of the paper, we focus on the 4,827 transactions in which the land plot is not destined to farming. The evolution of the annual number of transactions also gives evidence of an increasing demand related to demographic and tourism pressure.

Table 1: Summary statistics on m^2 prices (€ 2008).

Variable	**Mean**	**Median**	**Std. Dev.**	**Num. of observations**
m^2 price	16.152	6.789	25.416	4,827
m^2 price for local buyers	13.681	5.622	21.174	3,464
m^2 price for non-local buyers	22.432	9.818	33.073	1,363

Figure 1 depicts the evolution of the number of transactions per year. These transactions are multiplied by 4 within 11 years, *i.e.*, an annual growth rate of more than 13,4%, from 154 transactions in 1998 to 615 transactions in 2008.
As shown by Figure 2, the idea of land scarcity is supported by the fact that the price of a square meter of farmland (in constant 2008 euros) is multiplied

Figure 2: Average annual m^2 price in 2008 constant €.

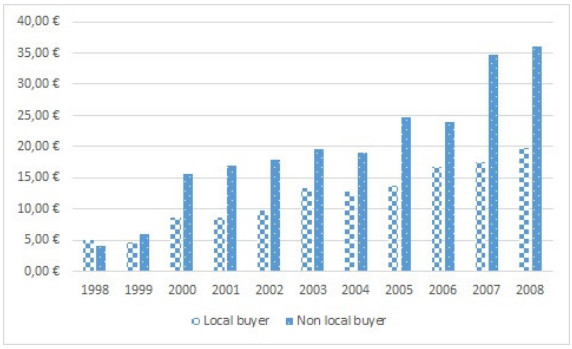

Figure 3: Average annual m^2 price by place of residence in 2008 constant €.

by 5 between 1998 and 2008. A common belief in Corsica is that the growing demand for land by foreign buyers results in increased prices. Furthermore, the data show an even more interesting feature of the market. Figure 3 and table 1 point to the existence of price dispersion between local and non-local buyers. These statistical observations are consistent with the predictions of the theoretical model presented in the previous section. Yet, a potential explanation to the existence of this price premium could be related to a difference in the attributes of the land plots bought respectively by local and non-local buyers. The next section deals with this methodological issue.

4 Estimation strategy and results

Empirically, the bargaining process described in the previous theoretical model can be viewed as an endogenous-switching or as an endogenous-selection mech-

anism which can thus be presented within the potential-outcome framework (outstanding entries on the potential-outcome model include Holland (1986), Heckman (2010) and Pearl (2012)).

Define the price a seller gets from sale i if he/she sells to a resident (local) and a non-resident (non-local) as, respectively, p_{0i} and p_{1i}. $nonres_i$ is a binary variable which takes the value 1 if the buyer is non-local (non-resident), and 0 otherwise. We never observe both p_{0i} and p_{1i}, only one or the other. Thus, we observe the selling price

$$p_i = (1 - nonres_i)p_{0i} + nonres_i p_{1i} \tag{7}$$

The general potential-outcome model is

$$\begin{aligned} p_{0i} &= x_i\beta_0 + \epsilon_{0i} \\ p_{1i} &= x_i\beta_1 + \epsilon_{1i} \\ nonres_i &= \begin{cases} 1, & \text{if } w_i\gamma + u_i > 0 \\ 0, & \text{otherwise} \end{cases} \end{aligned}$$

where x_i is a vector of covariates which are used to model the price (*i.e.*, land-plot characteristics, location, etc.), w_i is the vector of covariates used to model the selection of a foreign buyer, β_0, β_1, γ are vectors of parameters to be estimated. β_0 and β_1 can be different from one another, which allows local and non-local buyers to value differently the x_i's. Put another way, the model specification captures heterogeneous responses, across local and non-local buyers, to observationally identical land-plot characteristics. The generality of the model also stems from the fact that the vector of error terms $(\epsilon_{0i}, \epsilon_{1i}, u_i)$ comes from a trivariate normal distribution with mean 0 and covariance matrix

$$\begin{bmatrix} \sigma_0^2 & \sigma_{01} & \sigma_0\rho_0 \\ \sigma_{01} & \sigma_1^2 & \sigma_1\rho_1 \\ \sigma_0\rho_0 & \sigma_1\rho_1 & 1 \end{bmatrix}$$

Thus, the model allows for separate variance and correlation parameters for the local and foreign groups, which means that the unobservable variables that determine the selling price could be different for local and foreign buyers. Note that the covariance between ϵ_{0i} and ϵ_{1i} , σ_{01}, cannot be estimated because the potential outcomes p_{0i} and p_{1i} are never observed simultaneously. However, identification of σ_{01} is not necessary to estimate the other parameters (see

Maddala (1983), p. 224). Additionally, the unobservable variables governing the bargaining/selection process (u_i) may be correlated with the unobservable variables governing the price (ϵ_{0i} and/or ϵ_{1i}); $\lambda_0 = \sigma_0\rho_0$ and $\lambda_1 = \sigma_1\rho_1$ are the correlation between ϵ_0, u and ϵ_1, u. The model can also be considered as an endogenous treatment-regression model, $nonres_i$ being the endogenous "treatment" variable. Therefore, the average treatment effect (ATE) is

$$ATE = E(p_{1i} - p_{0i}) = E\left\{x_i(\beta_1 - \beta_0)\right\} \tag{8}$$

The ATE measures the average difference of the potential selling price for foreign buyers and the potential selling price for the local buyers; ATE is the price differential as derived from the theoretical model (Proposition 2). The empirical model is estimated using the control function approach presented by Maddala (1983), p. 223-228[3].

4.1 Data

Our unique dataset provides information on the intrinsic characteristics of the land plot:

- the land plot square meter price in €2008;
- the year of the sale;
- the cadastral category of the land plot;
- the municipality and the region in which the land plot is located.

We also have some administrative information: the place of residence of the buyer and the legal status of the farmland plot for the SAFER. Indeed, according to the law, in order to preserve farming activity, the SAFER has a first right of refusal on any farmland plot that the owner is willing to sell. When a landowner offers a land plot for sale, the institution makes a decision, to buy or not to buy the land plot. Yet, some land plots are not subjected to a first right of refusal, mainly when the land plot is sold to heirs. As we believe that the legal status of the plot may influence the selection process, this variable is included in the selection equation as an instrument.

We complemented the dataset with some additional variables:

[3]The command is implemented in Stata MP 14 as etregress.

- the location of the land plot in a city;
- the undeveloped nature of the cadastral section in which the land plot is located (no existing building on the land plot; the land plot is preserved from urbanization).

The dataset is restricted to land plots that are not sold to farmers and that will not be used for farming, *i.e.,* non farming farmland. Table 2 reports some descriptive statistics.

4.2 Results

Note that, under our normality assumptions, no exclusion restrictions regressors are required to identify the mean treatment effects (see, *e.g.*, Aakvik, Heckman & Vytlacil, 2005). However, we introduce two variables in the *nonres* equation, which can be viewed as relevant instruments: *exemption* and *nourb* are potentially important determinants of the selection process, while being non-significantly correlated with *price*[4]. The estimation of the model was much more stable when using these two exclusion restrictions.

First, it should be noted that testing the exogeneity of the *nonres* variable in that potential outcome model model amounts to testing the following null hypothesis: $\rho_0 = 0$ and $\rho_1 = 0$. A Wald test indicates that we cannot reject the null hypothesis ($\chi^2(2) = 1.76$, $p - value = 0.414$), thus suggesting that the unobservable variables in the price equations are not correlated with the unobservable variables governing the selection process. Thus, we find *no evidence* of selection bias due to unobservables.

Additionally, the *nonres* equation gives some insights that deserve commenting upon. Remember that we do not have any information regarding the buyers' characteristics, such as gender, income, exact place of residence, etc., neither do we have any information regarding the sellers. Thus, u_i in the *nonres* equation, actually captures the effects of these unobservable variables, while the w_i reveals some observable variables that account in the selection process, notably because non-local and local buyers may have very different preferences underlying their decision. As said in the introduction, non-local buyers are mainly in search of a second-home, while local buyers are in search of a principal residence.

[4]The correlation between *exemption* and *price* is 0.01, and not significant; the correlation between nourb and price is -0.01 and not significant.

Table 2: Description of the variables used in the model

Variable	Description	
price	Land plot price in €2008	-
Variable	Description	Percentage
YEAR	Year of sale	
	1998	3.19%
	1999	3.92%
	2000	5.55%
	2001	7.81%
	2002	8.31%
	2003	12.37%
	2004	11.37%
	2005	10.90%
	2006	11.52%
	2007	12.33%
	2008 (Reference year)	12.74%
CAD CAT	Cadastral category of the land plot	
	No predominant feature	33.33%
	Meadow (Reference level)	37.46%
	Vineyard and orchard	3.73%
	Scrubland	4.33%
	Wilderness	7.23%
	Wood	10.90%
	Garden	3.02%
Region	Area in which the land plot is located	
	Ajaccio area	15.19%
	Southern area	22.81%
	Valinco area	5.70%
	Sevi-Sorru area	5.14%
	Bastia area (Reference region)	26.56%
	Balagna area	10.96%
	Eastern area	13.65%
DEVELOPED	The land plot is developed (1/0)	7.23%
EXEMPTION	SAFER exemption (1/0)	16.32%
NONRES	Non-resident buyer (1/0)	28.24%
CITY	Land plot located in a city (1/0)	29.17%
NOURB	Land plot preserved from urbanization (1/0)	43.67%

Three positive and significant regional indicators are identified (Southern, Valinco, Balagna). Yet, non-local buyers seem to avoid crowded places (*city* is negative) and look for preserved places (*nourb* is positive) probably in order to build a second-home (*developed* which captures the fact that the land plot is fully developed, is positive and significant). Logically, given that the first right of refusal is not at play when a land plot is bought by an heir, *exemption* influences significantly and negatively the probability that a non-local buyer be selected.

Next turn to the price equations. The β_0-vector is reported in column 2 of Table 3 and the β_1-vector is reported in column 3 of Table 3. The estimate of the price error standard-deviation parameter for the foreign group (σ_1) is clearly[5] larger than that of the domestic group parameter (σ_0), indicating a greater variability in the unobservable variables among the foreign group. First note that most of the year-indicator coefficients are statistically significant. The reference year is 2008, and the negative coefficients associated with previous years reflect a positive trend in the land plot price (in constant €2008). Both local and non-local buyers value significantly and positively garden-type land plots, which reflects the fact that gardens are easy to convert in order to build a house. Conversely, scrubland- and wilderness-type of land plots are less valued. Additionaly, local and non-local buyers respond heterogenously to some of the land plot characteristics. For example, the wood-type coefficient is significant and negative for local buyers, while non-significant for non-local buyers. Likewise, non-local buyers value the southern area (positive and significant coefficient), while local buyers don't and the eastern area is found to be unattractive to local buyers, while non-local buyers appear indifferent to it.

[5]The null hypothesis that $\sigma_0 = \sigma_1$ is unambigously reject ($\chi^2(1) = 45.98$, $p - value = 0.000$).

Table 3: The potential-outcome model

	Selection equation	Price equation (non-residents)	Price equation (residents)	Marg. effects on ATE
exemption	-0.156**	-	-	-0.590
	(0.056)	-	-	(0.427)
nourb	0.325***	-	-	1.226
	(0.040)	-	-	(0.785)
developed	0.440***	23.428***	10.914***	15.228**
	(0.072)	(4.469)	(2.414)	(4.456)
1998	-0.048	-29.039***	-15.470***	-8.395**
	(0.128)	(4.220)	(1.717)	(2.631)
1999	0.053	-31.227***	-14.743***	-11.001***
	(0.115)	(4.024)	(1.532)	(2.201)
2000	0.025	-19.290***	-10.834***	0.095
	(0.102)	(4.627)	(1.601)	0.389
2001	0.224*	-20.899***	-12.172***	0.846
	(0.089)	(4.254)	(1.582)	(0.610)
2002	0.171	-19.580***	-9.818***	0.648
	(0.090)	(4.338)	(1.500)	(0.522)
2003	0.056	-17.675***	-6.877***	-4.734*
	(0.079)	(3.812)	(1.476)	(2.340)
2004	0.003	-16.477***	-8.572***	0.121
	(0.087)	(4.155)	(1.621)	(0.331)
2005	0.052	-10.497**	-5.512**	0.199
	(0.082)	(3.981)	(1.590)	(0.330)
2006	-0.069	-10.549*	-2.928	-0.263
	(0.082)	(4.128)	(1.626)	(0.354)
2007	-0.068	-1.570	-1.990	0.258
	(0.080)	(4.439)	(1.600)	(0.331)
No predominant feature	-0.146**	0.998	-1.894	-0.552
	(0.055)	(2.471)	(1.071)	(0.405)
Vineyard and orchard	-0.089	-9.335**	-5.085**	-0.337
	(0.111)	(2.686)	(1.496)	(0.468)
Scrubland	-0.174	-8.878**	-5.092**	0.659
	(0.101)	(3.013)	(1.715)	(0.552)
Wilderness	-0.005	-8.283**	-5.820***	-0.018
	(0.084)	(3.109)	(1.242)	(0.319)
Wood	-0.063	0.446	-5.338***	6.775*
	(0.075)	(3.567)	(1.331)	(3.168)
Garden	0.048	23.838***	20.866***	-0.183
	(0.123)	(7.503)	(3.955)	(0.478)
Ajaccio area	0.107	17.471***	7.619***	8.653 **
	(0.065)	(3.271)	(1.250)	(3.268)
Southern area	0.564***	9.169**	1.987	9.405***

Table 3: The potential-outcome model

	Selection equation	Price equation (non-residents)	Price equation (residents)	Marg. effects on ATE
	(0.059)	(3.549)	(1.698)	(2.153)
Valinco area	0.723***	1.491	-5.031	2.729
	(0.088)	(4.600)	(2.160)	(0.115)
Sevi-Sorru area	0.244*	-1.463	-2.566	0.923
	(0.095)	(3.013)	(1.531)	(0.674)
Balagna area	0.309***	3.826	0.951	1.166
	(0.072)	(3.071)	(1.442)	(0.766)
Eastern area	0.062	-1.860	-3.161***	0.235
	(0.070)	(2.350)	(0.798)	(0.302)
city	-0.466***	7.955*	4.594***	-1.758
	(0.049)	(3.136)	(1.227)	(1.115)
constant	-0.858***	35.953***	19.081***	-
	(0.082)	(9.511)	(2.343)	-
ρ_0	0.068			
	(0.237)			
ρ_1	-0.274			
	(0.201)			
σ_0	19.53***			
	(0.671)			
σ_1	30.06***			
	(1.796)			
λ_0	1.33			
	(4.642)			
λ_1	-8.25			
	(6.428)			
N	4827			

Robust standard errors in parentheses

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

We next compute the average treatment effect, *i.e.*, the *average causal effect* of being a non-local buyer on the selling price. We find that

$ATE = E\{x_i(\beta_1 - \beta_0)\}$ =€16 per square meter with a 95% confidence interval of [€3.54, €28.46].

Thus, even after controlling for the land-plot characteristics, for the endogeneity of the selection process, we still find a significant difference in selling prices paid by non-local and local buyers (remember that the mean price is €16 per square meter, see Table 1). Beyond that, computing the marginal effects of the observed land-plot characteristics on the average treatment effect enriches

the analysis. The marginal effects on the average treatment effect are reported in column 4 of Table 3. Very few marginal effects are found to be significant. If we reflect back to the definition of the average treatment effect, the marginal effect of a variable is likely to be not statistically significant when the difference between β_1 and β_0 for this variable is actually not significant. Notably the marginal effects of the year indicators are significant only for three years, mainly concentrated at the beginning of the study period (1998 and 1999), thus suggesting that the trends in prices have now converged. Among the land-plot characteristics, two locations (Ajaccio area, southern area), and one cadastral category (wood) impact significantly and positively the ATE. The fact that the land plot is fully developed is associated with the largest marginal effect on the ATE (about €15.22). As said above, developed land plots are attractive to non-residents, as such land plots are directly available for the construction of a second-home.

5 Conclusion

This paper investigates the problem of local buyers eviction from land or housing markets due to the presence of foreign buyers. We argue that the existence of diverging opinions on the value of the coveted good and the level of search costs are driving forces behind the eviction process. Price dispersion is paving the way towards eviction. Our theoretical model highlights the fact that, provided that the price differential does not exceed a threshold value, which we call the *maximum sustainable price dispersion cut-point*, two prices might coexist. Once the price premium is higher than the *maximum sustainable price dispersion cut-point*, every buyer has to pay the same, and the highest, price. When price dispersion becomes substantial, locals who cannot afford the highest price are evicted from the market. A market showing no evidence of price dispersion between locals and foreigners is a market in which part of the locals have already been evicted.

The case of the seaside farmland market of Corsica between 1998 and 2008 is studied. This market is of special interest since locals complain about the difficulty of buying land due to the presence of foreign competition. In order to account for the endogenous-selection mechanism, a potential-outcome model is estimated. Controlling for land features, an *average causal effect* of being a non-local buyer on the selling price of roughly €16 per square meter is found. The

latter result suggests that the *maximum sustainable price dispersion cut-point* in Corsica is higher than €16. Intuitively, one could find this finding difficult to interpret. However, within the theoretical model, the interpretation is straightforward, using proposition 2. First, since the price differential is large, one can say that the anchoring effect and the difference in search costs, between foreign and local buyers, are likely to be important. Unfortunately, the lack of data on individual characteristics of sellers and buyers hampers the disentanglement of anchoring effects and search cost effects. Second, the Corsican farmland market is probably characterized by a high level of sellers' bargaining power. If sellers' bargaining power was not strong, such a large price differential could not be observed.

Furthermore, as stated in proposition 1, *the maximum sustainable price dispersion cut point* has not been reached in Corsica suggesting that by 2008 local buyers were not evicted from the land market. That is to say, according to proposition 4, that sellers' search costs were high enough to force them to contract with local buyers.

Appendix A Determination of the selling prices

Let's start from equation (1). Deriving this expression with respect to P_F and equating to 0 in order to find a maximum, one yields:

$$\alpha(X_F - P_F + c_F) = (1-\alpha)[P_F - X_F + c_S T(\mu)]$$

Solving this equation with respect to P_F, equation 2 is obtained.

$$P_F = X_F + \alpha c_F - (1-\alpha) c_S T(\mu)$$

This is the price paid by a foreign buyer. It always exists since the surplus of the transaction is always positive.

Let's now turn to the derivation of P_L. Let's start from equation (3) using the definition of the search value V. The value of P_F is assumed known by the seller when he sets the price P_L.

Deriving equation (3) with respect to P_L and equating to 0 in order to find a

maximum, one yields:

$$\alpha(X_L - P_L + c_L) = (1-\alpha)\left[P_L - X_L - V\right]$$

Substituting for the value of V and solving with respect to P_L, one obtains P_L as a function of P_F:

$$P_L = \frac{X_F - \alpha(X_F - X_L) + \alpha c_L - (1-\alpha)c_S T(\mu) + (1-\alpha)P_F}{2-\alpha}$$

Finally, using the optimal value of P_F given by equation (2), equation (4) is obtained:

$$P_L = \frac{X_F - \alpha(X_F - X_L) + \alpha c_L - (1-\alpha)c_S T(\mu) + (1-\alpha)\left[X_F + \alpha c_F - (1-\alpha)c_S T(\mu)\right]}{2-\alpha}$$

Appendix B Proof of Proposition 1

Let's start from equation (5) that defines the surplus of a transaction between a seller and a local buyer.

$$\pi_L = (X_L - X_F) + c_L - V \Leftrightarrow \pi_L = (X_L - X_F) + c_L + c_S T(\mu) - (P_F - P_L)$$

For such a transaction to be economically meaningful the surplus has to be non-negative. Let's write $\pi_L < 0 \Leftrightarrow (X_L - X_F) + c_L + c_S T(\mu) - (P_F - P_L) < 0$. If this condition is true, the surplus is negative and no transaction will occur between a seller and a local buyer. Provided $P_F - P_L > (X_L - X_F) + c_L + c_S T(\mu)$ this condition is fulfilled and no transaction with a local buyer will take place. If the price differential is too large, no seller has an incentive to deal with a local buyer and as a consequence P_F is the unique price on the market.

Appendix C Proof of Proposition 3

Let's once again start from (5) and write $\pi_L < 0 \Leftrightarrow (X_L - X_F) + c_L + c_S T(\mu) - (P_F - P_L) < 0$. Substituting $P_F - P_L$ for its value given in proposition (2), one obtains $(X_L - X_F) + c_L + c_S T(\mu) - \left\{\frac{\alpha}{2-\alpha}[(X_F - X_L) + (c_F - c_L)]\right\} < 0$.
Solving this inequality equation with respect to $X_F - X_L$, the following condition

is obtained:

$$X_F - X_L > \frac{2-\alpha}{2}[c_L + c_S \times T(\mu)] - \frac{\alpha}{2}(c_F - c_L)$$

If the anchoring effect exceeds the value $X_F - X_L > \frac{2-\alpha}{2}[c_L + c_S \times T(\mu)] - \frac{\alpha}{2}(c_F - c_L)$, the surplus of the transaction is negative so that local buyers are evicted from the market.

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