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Does decentralization theorem shape intermunicipal cooperation?

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Abstract

This paper proposes a theoretical model of voluntary intermunicipal cooperation and empirically tests its assertions through the French municipalities choices of transferring their competences to the intermunicipal level. Using an original threshold models inference procedure, a probit model is estimated on shared competences. Two main results arise. Contrary to the decentralisation theorem prediction, citizens' preference heterogeneity does not hinder local cooperation, but fiscal potential heterogeneity does. Moreover, a zoo effect is at stake for some competences, for which a significant threshold effect in their transfer probability is identified.

JEL codes: H1, R5, H4, H73, H77.

Keywords: intermunicipal cooperation, decentralisation theorem, economies of scale, zoo effect, threshold regression model.

1 Introduction

Over the last decades, European countries show a clear-cut common trend towards an increasing decentralisation of their public sector. By bringing public deciders closer to their electors, the aim is to reduce the information asymmetry between them in order to improve the efficiency and the democratic quality of the public sector. On one hand, citizens have a better knowledge of public deciders' decisions and behaviour, which reinforces the electoral constraint (Brennan and Buchanan, 1980), and on the other hand, local public policies can better take into account the spatial heterogeneity of citizens' preferences (Tiebout, 1956; Balaguer-Coll et al., 2010). For these two reasons, the more public policies are decentralised, the more they are able to take into account the spatial heterogeneity of citizens' preferences, leading to a better allocation of public goods. This is the so-called *decentralisation theorem* (Oates, 1972).

But decentralisation also has its downsides (see Martínez-Vázquez et al., 2017 for a survey). In particular, some local government units may be too small to provide some of the public goods, which could induce some economic inefficiency (Rodríguez-Pose and Bwire, 2004). For instance, the average population of the French municipalities does not exceed 1,600, with 75% of them with less than 1,000 inhabitants. As a consequence, most of French municipalities are not able to provide, by themselves, the whole range of local public goods widened by decentralisation. This case is extreme, as France is the European country where the municipal fragmentation is the most intense (Martins, 1995), but it is not a unique case. To deal with this issue, in parallel to decentralisation, all European countries have developed intergovernmental cooperation involving municipalities (Hulst and Van Montfort, 2007). Several municipalities can then choose to provide together one or several local public goods (*competences* hereafter).

Such local cooperation intends to improve the efficiency of the local public sector in three ways. First, it gives rise to economies of cooperation, due to fixed costs pooling and eventual increasing return to scales, which reduces the local public goods production costs and allows small municipalities to provide together local public they would not be able to by themselves. Second, it allows to internalise spending and tax externalities,

respectively due to spending spillovers and tax/yardstick competition. Third, because of costs and financial/fiscal resources pooling, it reduces inequalities between cooperating municipalities through horizontal equalisation.

Therefore, decentralisation and intermunicipal cooperation (IMC hereafter) appear to be complementary in the quest of the optimal institutional design. In essence, IMC can be viewed as a local centralisation. Then, applying the decentralisation theorem (Oates, 1972), intermunicipalities public choices would be less able to take into account citizens' preferences heterogeneity than a set of municipalities would do. As a consequence, IMC would result in at best similar (and typically lower) welfare level. This would be due to the uniformity of intermunicipalities choices across all member municipalities, and because of information asymmetry between citizens and the public decider that increases with centralisation (the more the decision is centralised, the less precise is the knowledge of the public decider about the local context and citizens' preferences).

However, there are three key features that make it somewhat reductive to literally apply the decentralisation theorem to IMC. First, the information asymmetry argument of the decentralisation theorem is not relevant in the case of IMC. Indeed, the communitary councilors (who take decisions for the intermunicipality) also sit at one of the member municipalities councils¹. In this context, there is no reason for assuming that the information asymmetry would be higher at the intermunicipal level than it is at the municipal level. Therefore, the choice of transferring a municipal public good to the intermunicipal level would take the form of a trade-off between economies of scale and the social cost of citizens' preferences heterogeneity (Tiebout, 1956). Second, IMC largely rests on a voluntary principle: municipalities choose to cooperate or not, with who and for which competence(s). This feature leads to a specific collective decision process, where a competence is transferred if and only if a sufficient proportion of municipalities is in favor of this transfer. Therefore, despite its name would suggest, voluntary cooperation takes the shape on a non-cooperative game. Third, as cooperation is intended to reduce local public goods production costs thanks to fixed costs pooling and eventual economies of scale, the range of local public goods provided itself may be widened by cooperation.

To deal with these features, the present paper proposes an original theoretical model

à la Alesina and Spolaore (1997, 2005), a revisit of the decentralisation theorem through municipalities choices of competences transfers to the intermunicipal level. On the theoretical side, this paper contributes to the literature by offering a non-cooperative model in competency transfer decisions, while most models studying inter-municipal cooperation is based on cooperative games (Di Porto and Paty, 2018). Three main new results arise. First, it is not the overall intermunicipal heterogeneity cost of citizens' preferences that is at stake, but only its increase derived from cooperation in comparison to its level without cooperation. Moreover, when member municipalities financial contributions to the intermunicipal derive from their relative fiscal wealth, the heterogeneity of municipal fiscal bases per capita may hinder cooperation as well. Second, there might be significant indivisibilities in respect of many local public goods (such as zoos), leading that the community must reach a certain minimum size in order to be able to provide them. This is the so-called 'zoo effect' (Oates, 1988). This phenomenon encourages municipalities to transfer competences to bigger intermunicipalities. Third, as this zoo effect also occurs at the municipal level, the smaller a municipality, the less she is able to provide these local public goods by herself, the more she is prompted to cooperate. We called this phenomenon the 'indirect zoo effect'.

Then, these theoretical propositions are empirically tested by estimating a probit model over the French municipalities choice to transfer specific competences to the intermunicipal level. This work extends the explanatory analysis of Frère and Védrine (2017) by testing the existence of threshold effects induced by the zoo effect. To this end, we use a Likelihood Ratio (LR) tests strategy in order to detect such thresholds, but also to estimate their levels endogenously (Fong et al., 2017). As robustness checks, we assess the non-linear effect of intermunicipal population size on cooperation choices by estimating a General Additive Model (Wood, 2017). Results show threshold effects and non-linearity for six studied competences over ten, which extend previous studies results based on municipal spending (Josselin et al., 2009; Breunig and Rocaboy, 2008). We also account for the spatial dependence in the IMC choices, which reveals a mimicking behaviour similar to that documented by Rincke (2006) on the choices of school policies by US local governments, and Védrine (2020) on the allocation of structural funds, differentiated by the

mode of governance of the Cohesion Policy (devolved *vs* decentralized).

The existing empirical literature mainly focuses on the valuation of IMC consequences. It showed no evidence that IMC could significantly reduce local public spending, neither in Netherlands (Allers and De Greef, 2018), nor in France (Frère and Paty, 2014), but the reverse result appeared in Italy, where being in a Municipal Union reduces the total *per capita* current expenditures by 5% (Ferraresi et al., 2018). Similarly, IMC impact on the production costs of local public goods remains ambiguous across European countries (see Bel and Sebó, 2021; for a meta-regression analysis). Focusing on solid waste management, IMC generates cost savings in Spain (Bel and Mur, 2009; Bel et al., 2014) and in Czech Republic (Soukopová and Klimovský, 2016; Struk and Bakoš, 2021), mixed impact in Netherlands (Dijkgraaf & Gradus, 2013), but cost increases in Norway (Sørensen, 2007). Besides, in France, IMC appears to be able to reduce both horizontal spending externalities (Frère et al., 2014) and horizontal tax externalities (Carbonnier, 2013; Charlot et al., 2015; Ly and Paty, 2020) that distort local public choices.

In parallel, as IMC is widely voluntary across European countries (Hulst and Van Montfort, 2007), it may be relevant to understand why municipalities choose to cooperate or not, an issue on which empirical studies are much scarcer. In France, it appeared that political alignment does not play a significant role, *i.e.* a municipality does not cooperate more easily with its neighbours when they share a similar political affiliation (Di Porto et al., 2016), whereas a municipality cooperates only if its expected fiscal revenues by cooperating exceeds what it earned when isolated (Di Porto and Paty, 2018). This last result suggests that IMC would be a non-cooperative game, where municipalities cooperate only when they have individual interest for it. Similarly, LeRoux and Carr (2007) showed that Michigan municipalities' decision to transfer or not their public works competence to the intermunicipal level is based on a number of factors, such as the expected economies of scale, but also the economic and fiscal resources of member municipalities, the level and distribution of their populations, as well as their surface area. However, the context of the Michigan municipalities seems far removed from that of French municipalities, especially because French IMC is multipurpose and has own fiscal powers.

This paper contributes to this literature in three ways. First, Di Porto et al. (2016) and

Di Porto and Paty (2018) studied the IMC through a dichotomous choice: do a municipality cooperate or not? But cooperation may vary in intensity, with some intermunicipalities in charge of only few competences, whereas others have much more responsibilities. To shed light on this point, we study municipal competences transfer from member municipalities to their intermunicipalities. In this way, we aim at identifying what favors or hinder competences transfers, as in LeRoux and Carr (2007), but studying various competences coming under different scopes. Second, in line with Di Porto and Paty (2018) empirical findings, IMC is modeled as a non-cooperative game and take into account IMC specific features. Third, as suggested by the theoretical model, thresholds effects may occur in municipalities choice of competences transfer due to a zoo effect, as shown in Frère et al. (2011) and Frère et al. (2014). The empirical estimation strategy is then chosen in consequence, applying the likelihood Ratio (LR) tests strategy developed by Fong et al. (2017). To the best of our knowledge, it is the first time that such thresholds are properly taken into account in municipalities cooperation choices.

The rest of the paper is organized as follows. Section 2 presents the French institutional context and a theoretical model of local cooperation is built in Section 3. The econometric strategy and the data used are described in Sections 4 and 5, before presenting the estimations results in Section 6. Section 7 concludes.

2 The French institutional context

France consists of some 35,000 municipalities, which is the lowest of three tiers of local government. Inherited from the 1789 French revolution, where a municipality was created from each parish, this map result in an extreme municipal fragmentation issue, where the average municipal population does not exceed 1,600 inhabitants, with 75% of them with less than 1,000 inhabitants. As a consequence, municipalities are generally way too small demographically and geographically to be able to provide, by themselves, the whole range of local public goods on the relevant economic area, which generally spillover municipal boundaries. And this issue has even been worsen from the early 1980s, with the Act I of Decentralisation that marks the beginning of a period of profound reorganisation

within the French public sector and during which new competences were transferred to municipalities. Two possibilities may solve this issue.

First, the central government could force or encourage municipalities to merge. This has been done successfully for instance in Finland, where the number of municipalities has been halved in few decades² (Moisio & Uusitalo, 2013), or even more spectacularly in Denmark, where the 271 municipalities were amalgamated into 98 by the local government reform in 2007 (Blom-Hansen, 2010). In France, this solution has been already tried, but far less successfully. The law of 16 July 1971 on municipality mergers and consolidations intended to reduce the number of municipalities by 20% through mergers. But mayors massively blocked the reform and only a few mergers took place, reducing the number of municipalities by only 3%. From the 1980s to 2015³, the number of municipalities in France remained stable.

Second, IMC can be developed. Far from being a step backwards, intermunicipal cooperation appears to be complementary to decentralisation. It offers municipalities the opportunity to provide and finance collectively some local public goods, whose range has been extended through decentralisation. Today, intermunicipality is a key level of territorial governance in most European countries, where decentralisation and intermunicipal cooperation have been developed in tandem (Hulst and Van Montfort, 2007; Frère and Paty, 2014). In France, because of the particularly intense municipal fragmentation that could not be reduced through municipalities mergers, IMC has taken a specific and highly integrated form, where intermunicipalities have their own fiscal powers transferred from their member municipalities.⁴ A municipality does not disappear when entering an intermunicipality, as it would in mergers: the two levels coexist, the intermunicipal one overlapping the municipal one. However, as it requires the municipality to abandon some of its fiscal powers to its intermunicipality, a municipality can belong to only one intermunicipality. Moreover, this IMC largely rests on a voluntary principle: municipalities choose to cooperate or not, with who and for which competence(s). At least, it was the case until recently.

Indeed, the RCT law (*Loi de réforme des collectivités territoriales françaises*) passed on the 16th December 2010 and deeply changed some fundamental principles of French

IMC. First, it required that all municipalities have to be part of an intermunicipality. Isolated municipalities that did not want to cooperate were forced to enter an intermunicipality.⁵ It put a serious strain on the voluntary principle, yet largely prevailing across European countries. But this needs to be put in perspective, as it concerned only 5% of the French municipalities, 95% of them having spontaneously entered an intermunicipality prior to the RCT law. In addition, the RCT law required that all intermunicipalities must contain at least 5,000 inhabitants⁶, forcing small existing intermunicipalities to merge with one another. This second requirement followed the recommendations made by the French Court of Auditors indicating that, in general, intermunicipalities were too small and should grow in order to achieve higher economies of scale. But this affected the ability of municipalities to freely choose who to cooperate with.

3 The theoretical model

3.1 Local public good and citizens' preferences

Consider a municipality x made of n_x citizens, where each citizen i owns an initial endowment y_i of private good. The municipality provides a local public good g that is financed through a uniform tax t_x levied on its citizens and produced at a cost c such as:

$$c(n_x) = k + \gamma(n_x) \tag{1}$$

where k is the fixed cost (such as $k > 0$), and $\gamma(n_x)$ the variable cost (such as $\gamma(n_x) \geq 0$ and $\partial\gamma(n_x)/\partial n_x > 0$).

Each citizen has its own preferences regarding the characteristics of the local public good, such as it can be located in a one-dimensional vector space called as the *preferences line*. Along this preferences line, citizens preferences are assumed to be single-peaked and l_i^* is the optimal location of g for the citizen i , while l_x is the location of g provided by the municipality x . Therefore, as soon as the municipality provides g such as it does not fit perfectly the citizen i 's preferences (*i.e.* $l_x \neq l_i^*$), he suffers from a utility loss that increases with the gap between l_x and l_i^* . Therefore, each citizen has a utility function u_i

la Alesina et Spolaore (1997, 2005), such as:

$$U_i = g - a(d_{xi})^2 + y_i - t_x \quad (2)$$

where d_{xi} is the distance between l_x and l_i^* along the preferences line (*i.e.* $d_{xi} = |l_x - l_i^*|$), g is the maximum utility that each citizen can benefit from the local public good when it fits perfectly its preferences (*i.e.* when $l_x = l_i^* \Leftrightarrow d_{xi} = 0$)⁷, and a is a positive parameter that measures the marginal cost of d_{xi} .

Within this framework, we shall study the case where the local public good is provided at the municipal level: which characteristics the local public good will be produced with for what cost (Subsection 3.2)? Then, we shall examine how the IMC modifies these two parameters, and under which conditions such a cooperation may occur spontaneously (Subsection 3.3).

3.2 Municipal public good provision

With an utilitarianism behaviour, the municipality maximizes the sum of its citizens utilities according to l_x - the location of g along the preferences line - subject to the balanced budget constraint, such as:

$$\left\{ \begin{array}{l} \max_{l_x} \sum_{i=1}^{n_x} U_i = \sum_{i=1}^{n_x} [g - a(d_{xi})^2 + y_i - t_x] \\ s.t. \quad n_x t_x = k + \gamma(n_x) \end{array} \right. \quad (3)$$

As the municipality is supposed to be utilitarian, the optimal location of g along the preferences line (l_x^*) is the location that minimises the sum of the distances with the optimal locations of g for the n_x citizens of the municipality, such as:⁸

$$\min_{l_x} \sum_{i=1}^{n_x} (d_{xi})^2 \Rightarrow l_x^* = \frac{\sum_{i=1}^{n_x} l_i^*}{n_x} \quad (4)$$

However, if locating g at l_x^* minimises the municipal preferences heterogeneity cost, it is not a sufficient condition to produce it. Indeed, the municipality will provide the local

public good if and only if the utility it brings to all its citizens, net of the preferences heterogeneity cost, is greater than the desutility of its financing:

$$\begin{cases} g > 0 & \text{if } n_x g - \sum_{i=1}^{n_x} a(d_{xi}^*)^2 > c(n_x) \\ g = 0 & \text{otherwise} \end{cases} \quad (5)$$

where d_{xi}^* is the distance between l_i^* and l_x^* along the preferences line. Then, the optimal uniform tax t_x^* can be deduced from the balanced budget constraint:

$$\begin{cases} t_x^* = \frac{c(n_x)}{n_x} & \text{if } n_x g - \sum_{i=1}^{n_x} a(d_{xi}^*)^2 > c(n_x) \\ t_x^* = 0 & \text{otherwise} \end{cases} \quad (6)$$

3.3 Intermunicipal public good provision

As a member of the intermunicipality X (where X denotes the set of the N member municipalities), the municipality x can choose, as each member municipality, to transfer or not the provision of the local public good g . In case of collective agreement, then g will be collectively financed through members lump sum contributions, computed as a share α_x of $c(n_X)$, the intermunicipal production cost of g (with $n_X = \sum_{x \in X} n_x$), such as:

$$\sum_{x \in X} \alpha_x = 1 \mid \forall x \in X, 0 \leq \alpha_x \leq 1 \quad (7)$$

Therefore, the municipality x will be in favour of transferring g to the intermunicipality if it allows increasing the total utility of its citizens. In other words, the municipality x will cooperate regarding g if and only if:⁹

$$n_x g + \sum_{i=1}^{n_x} [-a(d_{Xi}^*)^2 + y_i] - \alpha_x c(n_X) \geq n_x g + \sum_{i=1}^{n_x} [-a(d_{xi}^*)^2 + y_i] - c(n_x) \quad (8)$$

where d_{Xi}^* is the distance, along the preferences line, between the optimal location of g for the citizen i (l_i^*) and the location of g as provided by the intermunicipality (l_X^*). In

particular, as member municipalities, the intermunicipality is supposed to be utilitarian and facing the same utility maximisation problem (3), which yields:

$$l_X^* = \frac{\sum_{i=1}^{n_X} l_i^*}{n_X} \quad (9)$$

Hence, the **participation constraint** becomes:

$$\sum_{i=1}^{n_x} a(d_{X_i}^*)^2 + \alpha_x c(n_X) \leq \sum_{i=1}^{n_x} a(d_{x_i}^*)^2 + c(n_x) \quad (10)$$

$$\Leftrightarrow \sum_{i=1}^{n_x} a(d_{x_i}^*)^2 + c(n_x) - \sum_{i=1}^{n_x} a(d_{X_i}^*)^2 - \alpha_x c(n_X) \geq 0 \quad (11)$$

For the sake of clarity, the left-hand side of (11) is denoted by EC_x , the economies of cooperation that the municipality x get from transferring g to the intermunicipality, which is made of the heterogeneity cost (HC_x) and the economies of size (ES_x):

$$EC_x = \underbrace{a \sum_{i=1}^{n_x} [(d_{x_i}^*)^2 - (d_{X_i}^*)^2]}_{HC_x} + \underbrace{c(n_x) - \alpha_x c(n_X)}_{ES_x} \quad (12)$$

Therefore, the bigger EC_x , the more the municipality takes advantage from transferring g to the intermunicipality. In accordance with the decentralisation theorem, the choice to cooperate for g rests on a trade-off between economies of size -the cooperation financial incentives determined by the production cost function (Proposition 1)- and the cost of citizens' preferences heterogeneity (Proposition 2).

Proposition 1. *Economies of size can be achieved through cooperation thanks to pooling the fixed cost, even in case of decreasing return to scales, as soon as :*

$$k > \frac{\alpha_x \gamma(n_X) - \gamma(n_x)}{1 - \alpha_x}$$

Proof. See Appendix B p.38. □

Proposition 2. *The higher the intermunicipal heterogeneity of citizens' preferences, the*

lower are the economies of cooperation so that preferences heterogeneity may prevent cooperation, even when it would induce financial gains through economies of size.

Proof. See Appendix C p.39. □

Contrary to the classical decentralisation theorem (Oates, 1972), it is not the overall intermunicipal heterogeneity cost of citizens' preferences that is at stake (Tiebout, 1956), but only its increase derived from cooperation in comparison to its level without cooperation (HC_x).

Moreover, there might be significant indivisibilities in respect of many local public goods (such as zoos), leading that the community must reach a certain minimum size in order to be able to provide them. This is the so-called 'zoo effect' (Oates, 1988). Therefore, the bigger the intermunicipality, the more it is able to provide such local public goods, which is a necessary condition for transferring them from member municipalities to the intermunicipality (Proposition 3).

Proposition 3. *The bigger the intermunicipality, the more member municipalities are prompted to cooperate.*

Proof. See Appendix D p.40. □

Besides, this zoo effect occurs at the intermunicipal level, but also at the municipal level: the smaller a municipality, the less she is able to provide g by herself, the more she is prompted to cooperate (Proposition 4). This phenomenon will be referred as the *indirect zoo effect* hereafter.

Proposition 4. *The smaller member municipalities, the more they are prompted to cooperate.*

Proof. See Appendix E p.41. □

3.4 Intermunicipal public good financing

The last element being studied here is α_x , the share of the intermunicipal spending beared by the municipality x . Equalizing 12 to 0 yields $\bar{\alpha}_x$, the maximum share of the intermunicipal production cost that the municipality x can bear and still satisfying its participation constraint:

$$\bar{\alpha}_x = \frac{HC_x + c(n_x)}{c(n_X)} \quad (13)$$

However, it is not a sufficient condition for transferring g to the intermunicipality: it lays down the conditions so the municipality x will be in favour of transferring g , but the cooperation will occur if and only if the participation constraint is satisfied for at least m member municipalities, m being defined by the (qualified) majority rule in force.¹⁰

In such a case, g would be transferred as soon as $\alpha_x \leq \bar{\alpha}_x$ for at least m member municipalities, whatever the values of α_x for the other member municipalities. Then, if m member municipalities formed a coalition, they could impose their conditions to the other member municipalities regarding their financial contributions. However, institutional principles preserve to such a dictatorship of the majority.

Besides, if the cooperation allows overall economies of cooperation ($\sum_{x \in X} EC_x \geq 0$), they can be shared among all member municipalities so that $\alpha_x \leq \bar{\alpha}_x$ for all member municipalities, which means that transferring g would reach the absolute majority :

$$\sum_{x \in X} EC_x \geq 0 \Rightarrow \exists \{\alpha_x \mid x \in X\} \mid \forall x \in X, EC_x \geq 0 \quad (14)$$

But information asymmetry regarding the heterogeneity cost born by each municipality put practical limits, so that it is mostly omitted in the α_x computations. The most common methodologies consist in setting α_x based either on the relative demographic weights of member municipalities (denoted α_x^n), or based on their relative fiscal base t_x ¹¹ per capita (denoted α_x^t):

$$\alpha_x^n = \frac{c(n_x)}{c(n_X)} / \phi \qquad \alpha_x^t = \frac{t_x/n_x}{(\sum_{x \in X} t_x)/n_X} / \psi \qquad (15)$$

where $\phi = \sum_{x \in X} [c(n_x)/c(n_X)]$ and $\psi = \sum_{x \in X} [(t_x/n_x)/((\sum_{x \in X} t_x)/n_X)]$ allow respectively to standardise α_x^n and α_x^t so that $\sum_{x \in X} \alpha_x^n = \sum_{x \in X} \alpha_x^t = 1$.

On the one hand, it is straightforward that when $\alpha_x = \alpha_x^n$, the higher HC_x , the more α_x diverge from $\bar{\alpha}_x$ for overall member municipalities, the less likely the cooperation will occur. In other words, Proposition 2 is being reinforced by this financial mode.

On the other hand, when $\alpha_x = \alpha_x^t$, the richer the municipality x , the higher is its financial contribution α_x , the less likely it will vote for transferring g to the intermunicipality. Moreover, this lack of linkage between municipal cost of providing g and the municipality's financial contribution α_x is even worsened by the heterogeneity of fiscal bases par capita. Then, the Proposition 5 follows.

Proposition 5. *Heterogeneity of municipal fiscal bases per capita may prevent cooperation as soon as member municipalities contributions derive from it.*

Proof. See Appendix F p.41. □

This set of five propositions describes the choice made by each municipality for transferring or not a given local public good to the intermunicipal level. The rest of the paper involves testing it empirically.

4 Econometric strategy

From (12), the choice of transferring or not the production of a public good g to the intermunicipal level can be simply rewritten as a dummy variable, such as:

$$D_x^g = \begin{cases} 1 & \text{if } EC_x^g > 0 \\ 0 & \text{otherwise.} \end{cases} \qquad (16)$$

However, we do not observe this choice at the municipal level (we do not know the in-

dividual vote of each member municipality), but only at the intermunicipal level (we know the list of competences that have been transferred to each intermunicipality). Therefore, the choice being studied here is the collective decision of transferring g , as soon as it is supported by a (qualified) majority m of member municipalities:

$$D_X^g = \begin{cases} 1 & \text{if } (\sum_{x \in X} D_x^g) / N_X \geq m \\ 0 & \text{otherwise.} \end{cases} \quad (17)$$

where N_X denotes the number of municipalities that are member of the intermunicipality X . More specifically, applying the qualified majority rule enforced in France, the equation system (17) becomes :

$$D_X^g = \begin{cases} 1 & \text{if } \left(\sum_{x \in X} D_x^g \geq \frac{2}{3} N_X \wedge \sum_{x \in X} D_x^g n_x \geq \frac{1}{2} n_X \right) \\ & \vee \left(\sum_{x \in X} D_x^g \geq \frac{1}{2} N_X \wedge \sum_{x \in X} D_x^g n_x \geq \frac{2}{3} n_X \right) \\ 0 & \text{otherwise.} \end{cases} \quad (18)$$

Then, the set of propositions that has been deduced from the theoretical model defines our three variables of interest on which this collective decision is based: the total population of the intermunicipality n_X (proposition 3), the median¹² population of its member municipalities \tilde{n}_X (proposition 4), the intermunicipal heterogeneity h_X (proposition 2), measured both in terms of citizens' preferences and of municipalities fiscal bases. This choice can then be estimated using a probit model, such as:

$$\begin{aligned} \mathbb{P}_X^g &= \mathbb{P}(D_X^g = 1 | n_X, \tilde{n}_X, h_X, z_X) \\ &= \Phi(\beta_0 + \beta_1 n_X + \beta_2 \tilde{n}_X + h_X \beta_3 + z_X \beta_4) \end{aligned} \quad (19)$$

where $\Phi(\cdot)$ is the distribution function of the standard normal distribution, z_X is the vector of control variables, and the β are the parameters to be estimated.

In line with the decentralisation theorem, the choice of cooperating for g would be based on a trade-off between economies of size and the cost of heterogeneity. However, as argued previously, IMC involves two main differences with the classical decentralisation theorem. First, it is not the overall intermunicipal heterogeneity cost of citizens' preferences that

is at stake, but only its increase derived from cooperation in comparison to its level without cooperation (Proposition 2). Second, the heterogeneity of municipalities fiscal bases per capita may, as well as citizens preferences heterogeneity, prevent cooperation as soon as member municipalities' financial contributions derive (at least partially) from it (Proposition 5). Therefore, h_X is a vector of variables that measure these heterogeneities, which are all expected to have a negative effect on \mathbb{P}_X^g .

In addition, the zoo effect may also be at stake: the bigger the intermunicipality, the more likely it is able to reach the minimum critical size \hat{n}_X required to provide indivisible local public goods (Proposition 3). And as this phenomenon also occurs at the municipal level, the indirect zoo effect suggests that the smaller member municipalities, the more they are prompted to cooperate (Proposition 4). Therefore, n_X and \tilde{n}_X are respectively expected to have a positive and a negative effect on \mathbb{P}_X^g .

But then, a new phenomenon may arise here. For a given local public, if this minimum critical size \hat{n}_X is about the same for all intermunicipalities, a threshold effect could occur: \mathbb{P}_X^g would jump as soon as n_X overcomes \hat{n}_X . In such a case, a step threshold model would be better suited, otherwise β_1 in equation (19) would be upwardly biased (Figure 1b). At the opposite, if there is not such an evident zoo effect, but merely economies of scale that favours competences transfer with the size of the intermunicipality, \mathbb{P}_X^g would increase linearly with n_X , what the model (19) correctly accounts for (Figure 1a). Ultimately, a mix of both cases could occur, with a significant threshold effect and economies of scale. \mathbb{P}_X^g would jump at this threshold, and the slopes before and after could even be different according to the economies of scale sensitivity. In such a case, β_1 in equation (19) would be upwardly biased again, to which a segmented threshold model would be preferred (Figure 1c).

[Figure 1 about here.]

In order to identify which model has to be estimated, two questions have to be answered for each studied competence: Is there such a threshold? If so, where is this threshold along n_X ? In order to address this issue, we use the four steps LR tests strategy developed by Fong et al. (2017). First, the null model (19) -i.e. the model with no threshold- and the

following threshold model¹³ are both estimated:

$$\mathbb{P}_X^g = \Phi \left(\beta_0 + \alpha_0 e^+ + \alpha_1^- e^- n_X + \alpha_1^+ e^+ n_X + \beta_2 \tilde{n}_X + h_X \beta_3 + z_X \beta_4 \right) \quad (20)$$

where e is one change point among all M possible candidates (the range of observed values of n_X) from which a threshold effect may occur, and e^- (resp. e^+) is a dummy variable that takes the value 1 for all intermunicipalities where $n_X < e$ (resp. $n_X \geq e$), and 0 otherwise. Second, a likelihood ratio statistic $Q(e)$ is computed for comparing the null model (19) and the threshold model (20), such as:

$$\begin{cases} H_0 : \alpha = 0 \\ H_1 : \alpha \neq 0 \end{cases} \quad (21)$$

Third, steps one and two are repeated for all the M candidates change points e . Fourth, the threshold value e with the largest likelihood ratio is selected. In the case where its likelihood ratio leads to reject H_0 , the threshold model (20) is estimated with this change point value e . Then, α_1^- and α_1^+ are respectively the marginal effects of n_X below (e^-) and beyond (e^+) the threshold.

Lastly, we account for the presence of spatial autocorrelation in the model by introducing a spatial autoregressive term in the model, which becomes:

$$\mathbb{P}_X^g = \Phi \left(\beta_0 + \beta_1 n_X + \beta_2 \tilde{n}_X + h_X \beta_3 + z_X \beta_4 + \rho \sum_{Y \neq X} w_{XY} \mathbb{P}_Y^g \right) \quad (22)$$

with w_{XY} the element of the spatial weighting matrix (W) describing the neighbourhood relationship between the intermunicipalities X and Y . In our analysis, we consider X and Y as neighbours if they are contiguous (*i.e.* if they share a common border). As usual, the elements of the spatial weighting matrix (W) are row standardized. This model is then estimated by the maximum likelihood method proposed in Martinetti and Geniaux (2017).

There are several economic interpretations of the presence of spatial autocorrelation

in the choices of local jurisdictions (Brueckner, 2003). The first interpretation lies in the presence of mimetic behavior among neighboring jurisdictions (Rincke, 2006): an intermunicipal cooperation structure (EPCI) has a higher probability of transferring a specific competence if neighboring EPCIs are also transferring it, through information sharing on the costs and benefits of this transfer. Secondly, a part of the literature in political economics argues that this behavior is primarily driven by yardstick comparison : for reelection motives, elected officials have an incentive to align their choices with those of their neighbouring jurisdictions. However, we cannot exclude the possibility that this spatial autocorrelation is caused by the fact that spatially close intermunicipal cooperation structures (EPCIs) also share similar political characteristics (same political affiliation), implying similar choices in competence transfers. According to Di Porto et al., 2016 , we extend equation (22) by introducing an hybrid matrix which combines contiguity with political alignment :

$$\mathbb{P}_X^g = \Phi \left(\beta_0 + \beta_1 n_X + \beta_2 \tilde{n}_X + h_X \beta_3 + z_X \beta_4 + \rho \sum_{Y \neq X} w_{XY} \mathbb{P}_Y^g + \lambda \sum_{Y \neq X} w_{XY}^{geopol} \mathbb{P}_Y^g \right) \quad (23)$$

Following Di Porto et al. (2016), we built a political matrix P_{XY} such that:

$$P_{XY} = \begin{cases} 1 & \text{if } X \text{ and } Y \text{ are the same political color} \\ 0 & \text{otherwise.} \end{cases} \quad (24)$$

Then, we combine this matrix with our spatial weight matrix (W). This nested structure between W and W^{geopol} allows of disentangling the effect of political proximity (captured by λ in equation 23 from the effects of spatial mimetic behavior (captured by ρ in equation 23).

5 Data

5.1 Focus of the study

The 16th December 2010, the RCT law (cf. Section 2) passed and prevailed until then. Isolated municipalities were forced to enter an intermunicipality, and the role of the prefect was strengthened in order to ‘rationalize’ the intermunicipal map and to enlarge intermunicipalities perimeters. This law clearly affected the decision-making power of the municipalities in the management of their intermunicipality. But the implementation of the reform took place between 2011 and 2014, with very minor effects the first year (Tricaud, 2021). Therefore, we use 01/01/2012 data, the most recent observation period before this law could significantly interfere with the voluntary cooperation choices of municipalities.

Besides, this study focuses on the most integrated IMC form, that is on the intermunicipalities that have fiscal powers. It includes the *communautés de communes*, *communautés d’agglomération*, *communautés urbaines* and *syndicats d’agglomération nouvelle* (the *métropoles* being more recent). Then, as spatial interactions are accounted for, we exclude geographically isolated intermunicipalities, *i.e.* intermunicipalities in overseas departments and regions, and Corsican intermunicipalities from the scope of the study. Thus, our data sample includes 2,543 intermunicipalities with their own fiscal powers.

For each one of these intermunicipalities, the DGCL’s national database on intermunicipality (BANATIC) lists the competencies it is in charge among the 84 possible municipal competencies that can be transferred. Among these 84 competencies, we have pre-selected 23. Indeed, some powers are only very rarely transferred, such as the competence *Archives* undertaken by a single intermunicipality over the 2,543 in the sample. On the other hand, other competencies are almost systematically transferred, such as the competence *Creation, development, maintenance and management of industrial, commercial, tertiary, craft or tourist activity zones*, undertaken by 90.7% of the intermunicipalities in the sample. With such a low variability, it is then difficult to hope to draw any lessons as to whether or not to transfer these competencies to the intermunicipal level. Thus, only the competencies transferred between 25 per cent and 75 per cent of the intermunicipalities in the sample were pre-selected (see Figure 2).

[Figure 2 about here.]

Intermunicipalities with their own fiscal powers are one form of IMC in France, to which must be added intermunicipalities without fiscal powers (*SIVU*, *SIVOM*, *SMF* and *SMO*, referred as ‘associations’ hereafter). Municipalities can therefore choose whether or not to transfer a competence to the intermunicipal level, but also *via* which form of IMC. However, due to the overlapping of their perimeters, it is not possible to integrate associations into the econometric analysis. In order to limit this issue, the 10 competencies the least frequently transferred to associations, among the 23 preselected competencies, were finally selected for this study (see Figure 3). The 10 selected competencies are: social housing policy; planned housing improvement operation; local housing program; urban planning (SCOT); sector scheme; land-banking; creation of enterprise areas (ZAC); creation/maintenance of socio-cultural facilities; creation/maintenance of sport facilities; and sport activities.

[Figure 3 about here.]

We have carefully selected these competences in order to mitigate both the precision issues in our estimates (where competences are transferred too rarely/frequently leading to class imbalance; King and Zeng, 2001) and the quality of our analysis plan, which could be compromised by other forms of collaboration. However, we test the impact of this selection on the generalization of our findings in the section 6.3.

5.2 Data

The data used in this paper mainly come from the INSEE 2012 population census, except for the per capita fiscal potential which is disseminated by the DGCL. All these variables are measured at the municipal level, and then computed at the intermunicipal level based on intermunicipalities perimeters as of 1st January 2012.

In particular, the intermunicipal heterogeneity h_X is a vector made of five variables. On the one hand, the heterogeneity of citizens’ preferences is multidimensional by nature and difficult to capture with only one variable. To deal with it, the strategy of Frère and

Védrine (2017) is replicated here (see Appendix G p.42 for more details): two PCAs are conducted in parallel -one on 5 demographic Gini indices, the other on 10 employment Gini indices- and their first two main components ($CP1_X^{demo}$; $CP2_X^{demo}$ and $CP1_X^{emp}$; $CP2_X^{emp}$) form our synthetic measurements of citizens' preferences heterogeneity.

On the other hand, the heterogeneity of member municipalities fiscal bases per capita is measured by a Gini index ($GI_X^{fisc_potential}$) based on the financial potential¹⁴ of member municipalities, weighted by their population. Therefore, $GI_X^{fisc_potential}$ varies from 0 when the distribution of the fiscal potential faithfully follows the distribution of the population among the member municipalities, to 1 in case of extreme inequality. According to Proposition 5, this variable is expected to have a negative effect on \mathbb{P}_X^g : the higher $GI_X^{fisc_potential}$, the more the per capita financial potential is unevenly distributed among member municipalities, the more the financial contributions of member municipalities are disconnected from their own incentives, the less likely a collective agreement for transferring a competence can be reached.

In addition, the vector z_X is composed of the following nine control variables :

- The surface area of the intermunicipality in square kilometres ($Surface_area_X$). By determining the extent of potential economies of size, production costs play a decisive role in the choice of cooperation between municipalities (Proposition 1). However, many local public goods are, by their very nature, sensitive to network effects (*e.g.* road maintenance, water treatment and distribution or energy production and distribution). For such competencies, the greater the size of the intermunicipality, the lower are the cooperation incentives. We expect $Surface_area_X$ to have a negative impact on \mathbb{P}_X^g , especially for competencies sensitive to network effects.
- The unemployment rate of the intermunicipality ($Unemp_rate_X$). The expected sign for this variable is not certain: if cooperation is perceived as a solution to some local labour market imbalances, municipalities would be more likely to transfer key competences when the unemployment rate is high. However, municipalities may also prefer to keep their decision-making power over these electorally important competences, and thus maintain a direct relationship with their citizens.

- The median income of the citizens of the intermunicipality ($Median_income_X$). Assuming that local public goods are normal goods, citizens' demand is expected to grow with their income. Then, if the intermunicipality is better able to satisfy this new demand, transfers of competences should be more marked. Otherwise, the opposite result would appear.
- The percentage of the population of the intermunicipality aged under 14 (Pct_b14yo_X) and over 75 (Pct_o75yo_X). Here again, the expected sign for these two variables remains a priori undetermined, depending on whether the intermunicipality is better suited to satisfy their specific local public goods demand, or if the municipalities prefer to keep their decision-making power over for electoral purposes.
- The legal status of the intermunicipality (CU_CA_X), a dummy variable that takes the value 1 when the intermunicipality is either a *communauté urbaine* or a *communauté d'agglomération*, and the value 0 otherwise. These legal statuses induce important differences between intermunicipalities, both in terms of the minimum demographic thresholds to be reached and in terms of compulsory, optional or elective competences. Indeed, according to its legal status, an intermunicipality has to be in charge of at least one competence relating to specific fields.¹⁵
- The location of the intermunicipality along the rural-urban gradient based on the INSEE typology of zoning in urban areas (ZAU 2010), made up of three main types of space: large urban areas space, space of other areas, other multipolarized and isolated municipalities. As this typology is built at the municipal level, the type of space of an intermunicipality is the one that groups the most member municipalities, weighted by their population. Three dummy variables are created, each dedicated to one type of space: $Large_area_X$, $S\&M_area_X$ and $Rural_area_X$. But as our model includes a constant, $Large_area_X$ is excluded from estimations.

An herfindhal index of political preferences between member municipalities. This index is based on the results of the 2007 presidential election, *i.e.* the most recent one prior to our data version. In order to have a comprehensive overview of political preferences, we utilize the outcomes of the first round.

6 Results

The result section is organised in two parts. In the first part, we test whether the selected competencies are subject to a threshold effect and determine their values. The second part focuses on the interpretation of the results of our estimates.

6.1 Test of threshold effects on inter-municipal population size

Result 1a: *Social housing Policy, Creation of joint development zones, Creation/maintenance of (socio)-cultural facilities, Territorial consistency scheme and Sport activities are not subject to a zoo effect.*

The LR statistics over the intermunicipalities' population (n_X) are presented in Figures 4 and 6. The five competences grouped in Figure 4 display p-values associated to the maximal value of the LR test higher than 10%. In other words, we are in the H_0 acceptance region of the LR test (21): the probit model without threshold effect (19) is taken on for these competences, suggesting that they are not subject to a zoo effect.

[Figure 4 about here.]

In order to compare with more classic methods used in the literature (Breunig and Rocaboy, 2008), we study the shape of the relationship between intermunicipal population size and competences transfers by using a General Additive Model (Wood, 2017). Figure 5 shows that these relations are clearly linear for *social housing policy, creation of joint development zones* and *creation/maintenance of (socio)-cultural facilities*, but slightly non-linear between 8 and 10 regarding the competence *territorial consistency scheme*, range for which the marginal effect seems higher. Interestingly, this competence is also the one among these four for which the p-value of the LR test was the lowest (0.1707 on Figure 4). Our results are therefore broadly similar regardless of the method used.

[Figure 5 about here.]

Result 1b: *Local housing programme, Sector scheme, Planned housing improvement*

operation, Land banking and Creation/maintenance of sports facilities are subject to a zoo effect, which occurs at very different demographic thresholds from one competence to the other. This result is robust to the control of spatial dependence.

The five competences grouped in Figure 6 display p-values associated to the maximal value of the LR test lower than 10%. In other words, the probit model with threshold effect (20) is now taken on for these competences, suggesting that they are subject to a zoo effect. Moreover, the strategy detailed in Section 4 allows to identify the precise value of the threshold location along n_X that best fits to the data, which reveals that this zoo effect occurs at very different population sizes from one competence to the other¹⁶.

[Figure 6 about here.]

Here again, the GAM approach depicts very similar results, which is even more obvious when the thresholds identified thanks the LR tests are added to the GAM plots (vertical dotted blue lines in Figure 7). ...

[Figure 7 about here.]

6.2 Probit estimation results

Result 2a: *Citizens' preferences heterogeneity does not hinder municipal competences transfers to the intermunicipal level (except for Social housing policy).*

The citizens' preferences heterogeneity does not have a significant impact on the transfer of municipal competences, except regarding the Social housing policy for which an increase of 1% in the heterogeneity of preferences leads to a decrease of 0.06% in the probability of transfer (Table 1, column 1.1). This sheds a new light on the results of Di Porto et al. (2016), who found that the choice of a municipality to join an intermunicipality decreases with the distance to the other member municipalities in terms of socio-economic characteristics. The argument of Tiebout (1956) - stipulating that centralization, taking less account of the spatial heterogeneity of citizens' preferences, generates a significant social cost - would hinder IMC across heterogeneous municipalities, but would not be relevant anymore regarding the municipalities competences transfers choice.

Result 2b: *Municipalities fiscal potential heterogeneity hinders competences transfers to the intermunicipal level.*

However, fiscal potential heterogeneity has a much more significant impact. Higher fiscal potential heterogeneity tends to reduce the probability of transfer of many municipal competences, as Proposition 5 predicted theoretically. In line with Di Porto and Paty (2018) findings, this reinforces the idea that IMC is a non-cooperative game, where municipalities cooperate only when they have individual interest for it.

[Table 1 about here.]

Result 3: *Economies of scale foster municipal competences transfers to the intermunicipal level.*

As expected, the coefficients associated with the population of intermunicipality n_X are significant and positive. This indicates that important economies of scale are at stake: the bigger the intermunicipal, the bigger are the economies of scale that can be achieved by cooperating, the more the municipalities are inclined to transfer their competences. This argument is especially relevant for *Social housing policy*, *Sports activities* (1, column 1.5), *Creation and maintenance of sports facilities* (2, column 2.5) and *Creation and maintenance of (socio-)cultural facilities* (1, column 1.5), where fixed cost are high and variable costs are low (Proposition 1).

[Table 2 about here.]

Result 4: *A zoo effect appears, which implies important threshold effects in the municipalities cooperation choices according to the demographic size of the intermunicipality.*

Estimation results for the six competences subject to threshold effect (cf. Sub-section 6.1) exhibit non-linear relationship between the probability to IMC and intermunicipal population size (Table 2). In particular, *Local housing programme*, *Sector scheme* and *Creation/maintenance of sport facilities* show the same phenomenon: intermunicipalities population size foster the transfer of competence until a threshold of respectively 12, 350; 25, 000; 12, 900 and 29, 350 inhabitants. Beyond these values, any additional increase in

population does not affect the probability of cooperation anymore (Table 2, all columns, excepting column 2.4). In comparison, *Land banking* exhibits an increase in the marginal effect of the population on the transfer probability (from 0.354 to 0.795), once exceeded a threshold of 16 900 inhabitants (table 2, column 2.4).

These threshold effects are the expression of discontinuities in the economies of size that can be achieved through cooperation. But the most clear-cut evidences of a zoo effect appear for *Local housing programme Sector scheme* and *Creation/maintenance of sports facilities* for which the estimate of α_0 (the parameter associated to $e+$ in equation 20) is significant and positive. In other words, the transfer probability suddenly jumps upward at the threshold, which suggest that these thresholds correspond to the critical minimal size \hat{n}_X to reach in order to be able to provide them.

Result 5: *An indirect zoo effect is also at stake for specific competences.*

When significant, the median population of member municipalities \tilde{n}_X displays a negative sign, as predicted by the Proposition 4 (Table 1, column 1.3; Table 2, columns 2.3 and 2.3): the smaller member municipalities, the less they are able to finance expensive and indivisible local public goods by their own, the more they are willing to cooperate.

Result 6: *The choice to transfer competencies to the intermunicipal level greatly depends on the choice of neighbouring intermunicipalities, indicating a mimicking behaviour among contiguous intermunicipalities. Political proximity between neighbouring municipalities does not play a significant role.*

Lastly, estimates of the SAR-probit model always show a positive and significant spatial lag term (3 and 4). In other words, municipalities are more willing to transfer a competence when this competence has already been transferred to the contiguous intermunicipalities. We could interpret this result as a mimicking behavior, a phenomenon widely confirmed in the literature (Di Porto et al., 2016; Frère et al., 2011).

[Table 3 about here.]

As robustness check, we also estimate the equation 23 to disentangle political proximity effect from neighbouring mimicking behaviour. The results reveal that interactions be-

tween our EPCI are mainly captured by the spatial contiguity matrix (ρ coefficient values keeps similar to those reported in tables 3 and 4) , while the coefficient λ associated with the geo-political matrix are low and mostly non significant (figure 8).

[Figure 8 about here.]

6.3 Robustness checks

This section considers the robustness of our main results in various way. Firstly, we conducted the estimates by grouping the competences into 12 major themes (figures 8). Then, we extend our analysis to all other competences transferred by municipalities to EPCI (Figures 9). We propose to summarize these results using a specification curve analysis (Simonsohn et al., 2020) for $\log(n_X)$, $\log(\tilde{n}_X)$ and $GI_X^{fisc_potential}$. Our previous results based on the 10 selected competencies are widely confirmed, particularly the sign of relationships between our main variables and the probability of transferring competences.

Among the other competences studied, we observe 37 competences for which we detect a threshold in the zoo effect (see online appendix table), extending the result from 1b. Similarly, we observe that 5 out of 12 thematic competences groupings exhibit a demographic threshold for the zoo effect (see online appendix table). We observe that economies of scale positively and significantly influence the transfer of competences.

[Figure 9 about here.]

[Figure 10 about here.]

The indirect zoo effect is also well identified for 5 out of the 12 thematic groupings and 17 out of the 70 competences. Our findings regarding the negative effect of fiscal potential heterogeneity are confirmed for 1/4 of the studied competences. However, this result is not supported by our estimations based on thematic groupings.

[Figure 11 about here.]

[Figure 12 about here.]

[Figure 13 about here.]

[Figure 14 about here.]

7 Conclusion

In this paper, we proposed to reinterpret the decentralisation theorem (Oates, 1972) in the case of voluntary IMC. This widespread voluntary principle, where municipalities individually choose the competence(s) for which they cooperate or not, led to an original theoretical model where IMC took the shape of a non-cooperative game. This ended in a set of five theoretical propositions that drove our empirical model specification and econometric strategy. We estimated a probit model over the French municipalities choice to transfer specific competences to the intermunicipal level, taking into account two features. First, the presence of potential thresholds in such transfer decisions, due to a suspected 'zoo effect', has been revealed using a LR tests strategy (Fong et al., 2017), and even confirmed by GAM estimations (Wood, 2017). Second, spatial dependence in cooperation choice were accounted for and revealed a mimicking behaviour. This empirical work finally led to six results, among which two of them are of great public policy implications.

First, looking for a zoo effect finally revealed important discontinuities in the competences transfer choices according to the intermunicipalities demographic size. If this non-linear relationship varies from one competence to another, the dominant trend shows that intermunicipalities population size foster the transfer of competence until a threshold, at which transfer probability jumps even higher, but beyond which any additional increase in population does not affect the transfer probability anymore. In other words, beyond these thresholds, increasing the demographic does not allow to generate additional economies of cooperation that would encourage member municipalities to finally transfer their competence. This seriously questions the idea according which *the bigger the better* that, however, partly drove recent reforms in France¹⁷. Indeed, it intended to *rationalize* the intermunicipal map by forcing small existing intermunicipalities to merge with one another until they reached at least 5,000 inhabitants. However, the thresholds we detected are far beyond 5,000 inhabitants for most of the competences. By doing so, the increase

in demographic size should allow for higher economies of scale, and therefore, foster competences transfer from municipalities to intermunicipalities. And as for most competences (where a threshold effect is detected), the threshold is above 10,000 inhabitants, we could even imagine to go further by raising this intermunicipalities' minimal demographic size consequently. However, increasing the demographic size has also its downsides that are not included in this analysis, such as the access time to local public goods for instance.

Second, intermunicipality heterogeneity appears to hinder municipal competences transfers. But contrary to expectations, it is the municipalities fiscal potential heterogeneity that is at stake, and not citizens' preferences heterogeneity. Each competence transferred to an intermunicipality is financed by local taxes directly levied at the intermunicipal level. Therefore, municipalities contributions may not be proportional to the use of the local public goods provided. A relatively rich municipality, meaning a municipality with high per capita fiscal potential in comparison to the other member municipalities, will contribute more to finance the intermunicipality's competences. This phenomenon is even reinforced by fiscal drawbacks mechanisms, made intentionally by law in order to foster horizontal equalisation inside intermunicipalities. As a result, when intermunicipalities are made of municipalities with very disparate wealth levels, *i.e.* when municipal fiscal bases per capita is heterogeneous, richest municipalities could be prone to vote against competences transfer.

In line with Di Porto and Paty (2018) findings, this result reinforces the idea that IMC is a non-cooperative game, where municipalities cooperate only when they have individual interest for it. But then, municipalities non cooperative choices may not be optimal in a more collective perspective: it could be relevant to transfer a competence at the intermunicipal level, even if a majority of member municipalities voted against. This precisely to solve this issue, that recent reforms in France¹⁸ have reinforced the prefect (regional official of the central government) decision-making who can take part in the intermunicipalities perimeters, and in the choice of the transferred competences. It reveals major tensions between the spontaneous non-cooperative behaviour of municipalities, resting on their own citizens' interests, and the cooperative objectives of IMC as supported by the central government, where the collective interests prevails over the individual interests

of member municipalities. This is a dilemma at stake in any voluntary IMC, that goes beyond the French borders.

In parallel, it also reveals a serious conflict in the aims of IMC in France. On one hand, in order to solve efficiently the municipal fragmentation issue, IMC is expected to gain in competences. To facilitate municipal competences transfers, IMC should then take place between municipalities with homogeneous fiscal potential. But on the other hand, IMC are also expected to favour horizontal equalisation, *i.e.* to reduce local fiscal disparities inside their perimeter thanks to costs and financial resources pooling. To do so, intermunicipalities perimeters should then cover areas with high municipal fiscal potential heterogeneity. The two objectives lead to opposite IMC features, which make it impossible to efficiently reach both at the same time. A choice has to be made in defining the priority order of IMC aims: should intermunicipal integration prevail over horizontal equalisation? In general, it also questions on the ability to pursuit multiple objectives at the same time, putting at risk that two objectives conflict with one another.

Our paper has three limits that call for future research. First, our empirical results are based on 2012 French data. Then, they may not be directly transposable to other countries municipal cooperation, as the French institutional context is very specific. Also, the recent reforms¹⁹ that occurred in France since then should now have affected the spontaneous municipalities cooperating behaviour we studied. We expect that the non cooperative behaviour we observed has been constrained by the reinforcement of the role of the prefect, whose objective is to drive intermunicipal cooperation from a more collective perspective. These changes in the cooperation implications point of view constitute a natural experiment that can be exploited accordingly, as it has been done in Tricaud (2021) using a difference-in-differences strategy. Has it significantly changed the intermunicipalities size and heterogeneity, or the competences they are in charged?

Second, our analysis highlights the key determinants affecting the transfer of competences, disregarding local specificities. Building on the recent advancements in the treatment of spatial heterogeneity (Billé et al., 2017), a dedicated empirical model would be able to explain the local specific characteristics in action through the municipal competences transfer choices.

Third, our analysis revealed that some competences transfer choices seemed to be driven by economies of scale opportunities (Sports activities, Creation and maintenance of sports facilities, Creation and maintenance of (socio-)cultural facilities), or coordination gains for others (Social housing policy). Therefore, it contributes to the wide literature that aims at identifying what drives IMC (Bel & Warner, 2016). Yet, the present econometric strategy developed here does not allow us to go further in these interpretations. Indeed, this would require an accurate analysis of production costs of each competence, and how they vary with communities population sizes. A dedicated empirical model, based on the analysis of local public goods production costs, using for instance data envelopment analysis (DEA) methods, should be constructed and estimated to confirm (or refute) these interpretations.

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Notes

¹In France, during the municipal elections, the member municipalities candidate that will sit at the intermunicipal council if the list is elected are clearly identified.

²From 603 in 1944, only 320 Finnish municipalities left in 2013.

³From 2015, few mergers are noticeable. It is the consequence the law of 16 March 2015 on the improvement of the *commune nouvelle* regime, which intends to encourage municipal mergers through financial incentives, as 44 years before. The number of French municipalities reduced timidly by 4.7%, from 36,681 in 2014 to 34,968 in 2019, before remaining stable since then.

⁴These include the *Communautés de communes*, *Communautés d'agglomération*, *Communautés ur-*

baines, Métropoles and Syndicats d'agglomération nouvelle.

⁵The only exceptions were Paris and three surrounding municipalities (Hauts-de-Seine, Seine-Saint-Denis and Val-de-Marne) because they are part of the *Great Paris Project*, which aims at consolidating the Paris metropolitan area, as well as four single-municipality islands (Yeu island, Bréhat island, Sein island and Ouessant island).

⁶This threshold did not apply to intermunicipalities in mountain zones, where municipalities are far from each other.

⁷It is assumed that $g > 0$ when the local public good is provided by the municipality, and $g = 0$ otherwise.

⁸Proof is provided in Appendix A p.38.

⁹The case where the municipality does not produce g (*i.e.* $g = t_x^* = 0$) is examined apart in Appendix E p.41. However, all the other propositions hold for this case.

¹⁰For instance, in France, such a collective decision requires the favourable votes from at least two thirds of the member municipalities representing 50% of the population of the intermunicipality, or vice versa.

¹¹ t_x is levied on households and firms, ignored until now for sake of simplicity, but could be included as a second type of citizens.

¹²The choice of the median population rather than the mean population of member municipalities derives from the qualified majority rule enforced in France, where the decision to cooperate or not of the median member municipality, in terms of population, is determining (see the equation system 18. Even if we are not in a pure median voter style decision, the median municipal population is expected to be more relevant than the mean municipal population.

¹³The step model (Figure 1b) matches to the specific case where $\alpha_0 > 0$ and $\alpha_1^- = \alpha_1^+ = 0$

¹⁴The financial potential of a municipality is its fiscal potential (the amount of tax revenue that a municipality would receive if its four local tax bases were taxed at the average national rates calculated for all French communes) plus the lump-sum share of the DGF (the main operating grant paid by the central government to local governments).

¹⁵For instance, a *communauté d'agglomération* has to be in charge of at least one competence relating to urban policy, which is not the case for a *communauté de communes*. Thus, these statuses define compulsory fields of competences rather than precisely identified competences, otherwise these would systematically be transferred to the intermunicipal level (see Figure 2).

¹⁶12 350 inhabitants for *Sport activities*, 25 000 inhabitants for *LHP*, 12 900 inhabitants for *Sector scheme*, 4 300 inhabitants for *OPAH*, 16 900 inhabitants for *Land banking* and 29 350 inhabitants for *Creation/maintenance of sports facilities*

¹⁷The Territorial Authorities Reform Act of the 16th December 2010 (RCT law) and the New Territorial Organisation of the Republic of the 7th August 2015 (NOTRe law).

¹⁸The Territorial Authorities Reform Act of the 16th December 2010 (RCT law) and the New Territorial Organisation of the Republic of the 7th August 2015 (NOTRe law).

¹⁹The Territorial Authorities Reform Act of the 16th December 2010 (RCT law) and the New Territorial Organisation of the Republic of the 7th August 2015 (NOTRe law).

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Appendixes

Appendix A - Proof of (4)

The first-order condition yields:

$$\begin{aligned}\frac{\partial \sum_{i=1}^{n_x} a|l_x - l_i^*|^2}{\partial l_x} = 0 &\Leftrightarrow \sum_{i=1}^{n_x} 2a(l_x - l_i^*) = 0 \Leftrightarrow n_x l_x - \sum_{i=1}^{n_x} l_i^* = 0 \\ &\Rightarrow l_x^* = \frac{\sum_{i=1}^{n_x} l_i^*}{n_x}\end{aligned}$$

The second-order condition confirms that its is a global minimum:

$$\frac{\partial^2 \sum_{i=1}^{n_x} a|l_x - l_i^*|^2}{\partial l_x^2} = 2an_x > 0$$

Appendix B - Proof of Proposition 1

Using the production cost function (1) to substitute $c(\cdot)$ into (12) yields:

$$EC_x = \sum_{i=1}^{n_x} a \left[(d_{xi}^*)^2 - (d_{Xi}^*)^2 \right] + k + \gamma(n_x) - \alpha_x (k + \gamma(n_X)) \quad (\text{A.1})$$

The derivative of EC_x (A.1) with respect to k yields:

$$\frac{\partial EC_x}{\partial k} = 1 - \alpha_x \geq 0$$

The higher the fixed costs, the higher the economies of cooperation by pooling these fixed costs. As this result holds for all the N member municipalities, it yields at the intermunicipal level:

$$\sum_{x \in X} \frac{\partial EC_x}{\partial k} = \sum_{x \in X} (1 - \alpha_x) = N - 1$$

Transferring g to the intermunicipality allows to pool the fixed cost and to bear it only one time, rather than N times when the member municipalities do not cooperate.

Therefore, when k is high enough, it can offset decreasing return to scales.²⁰

First, let's find out the critical value of k over which the cooperation generates economies of size:

$$ES_x > 0 \Leftrightarrow k + \gamma(n_x) - \alpha_x(k + \gamma(n_X)) > 0 \Leftrightarrow k > \frac{\alpha_x \gamma(n_X) - \gamma(n_x)}{1 - \alpha_x} \quad (\text{A.2})$$

Second, let's find out the critical value of k under which there are decreasing return to scales:

$$c\left(\sum_{x \in X} n_x\right) > \sum_{x \in X} c(n_x) \Leftrightarrow k + \gamma(n_X) > Nk + \sum_{x \in X} \gamma(n_x) \Leftrightarrow k < \frac{\gamma(n_X) - \sum_{x \in X} \gamma(n_x)}{N - 1} \quad (\text{A.3})$$

Therefore, we deduce from (A.2) and (A.3) that the cooperation generates economies of size (*i.e.* $ES_x > 0$), even when there are decreasing return to scales, in the case where:

$$\frac{\alpha_x \gamma(n_X) - \gamma(n_x)}{1 - \alpha_x} < k < \frac{\gamma(n_X) - \sum_{x \in X} \gamma(n_x)}{N - 1} \quad (\text{A.4})$$

Appendix C - Proof of Proposition 2

l_x^* , defined in (4), is the global minimum of $\sum_{i=1}^{n_x} a|l_x - l_i^*|^2$, which is convex for all l_x in \mathbb{R} (see Appendix A p.38). Hence:

$$\forall l_X^* \in \mathbb{R} \mid l_X^* \neq l_x^* \Rightarrow \sum_{i=1}^{n_x} a|l_X^* - l_i^*|^2 > \sum_{i=1}^{n_x} a|l_x^* - l_i^*|^2 \Leftrightarrow HC_x > 0$$

Moreover, we deduce from this strict convexity on \mathbb{R} that:

$$\forall l_X^* \in \mathbb{R} \mid l_X^* \neq l_x^* \Rightarrow \frac{\partial HC_x}{\partial |l_X^* - l_x^*|} \frac{d|l_X^* - l_x^*|}{dl_X^*} > 0 \quad (\text{A.5})$$

Then, using (4) and (9) to substitute l_x^* and l_X^* yields:

$$|l_X^* - l_x^*| = \left| \frac{\sum_{i=1}^{n_X} l_i^*}{n_X} - \frac{\sum_{i=1}^{n_x} l_i^*}{n_x} \right| \quad (\text{A.6})$$

which increases with the heterogeneity between the optimal locations of citizens of the municipality x and, the optimal locations of citizens of the intermunicipality X .

Therefore, the greater the intermunicipal heterogeneity of citizens' preferences (A.6), the higher the heterogeneity cost (A.5), the lower the economies of cooperation (12), the lower the incentives to cooperate for the municipality x . As a consequence, if the intermunicipal heterogeneity of citizens' preferences is high enough, it can offset the economies size²¹ so that the economies of cooperation are negative and therefore, cooperating is not interesting anymore for the municipality x , that is:

$$\exists \{l_i^* \mid i \in X\} \mid (|HC_x| > |ES_x| \wedge ES_x > 0) \Leftrightarrow (EC_x < 0 \wedge ES_x > 0)$$

Appendix D - Proof of Proposition 3

If we denote this critical minimum size by \hat{n}_X , we can reformulate Oates' 'zoo effect' (Oates, 1988) for the intermunicipality X as follows:

$$\exists \hat{n}_X \mid \begin{cases} n_X g - \sum_{i=1}^{n_X} a(d_{Xi}^*)^2 < c(n_X) \text{ if } n_X < \hat{n}_X \\ n_X g - \sum_{i=1}^{n_X} a(d_{Xi}^*)^2 \geq c(n_X) \text{ otherwise} \end{cases}$$

Therefore, the bigger the intermunicipality, the more likely its population exceeds \hat{n}_X , which is a necessary condition for transferring g to the intermunicipality. Indeed, if the intermunicipality were not able to provide g (*i.e.* $n_X < \hat{n}_X$), there would be no incentive for all member municipality to transfer g to the intermunicipality, even if the municipality could not provide g by itself either (for details, see Appendix E p.41).

Appendix E - Proof of Proposition 4

The ‘zoo effect’ occurs at the intermunicipal level, but also at the municipal level. Therefore, denoting the critical minimum size²² of the municipality x by \hat{n}_x , four cases may occur:²³

	$n_X < \hat{n}_X$	$n_X \geq \hat{n}_X$
$n_x < \hat{n}_x$	$EC_x^1 = 0$	$EC_x^2 = n_x g - \sum_{i=1}^{n_x} a(d_{Xi}^*)^2 - \alpha_x c(n_X)$ (≥ 0)
$n_x \geq \hat{n}_x$	$EC_x^3 = -n_x g + \sum_{i=1}^{n_x} a(d_{xi}^*)^2 + c(n_x)$ (≤ 0)	$EC_x^4 = \sum_{i=1}^{n_x} a \left[(d_{xi}^*)^2 - (d_{Xi}^*)^2 \right] + c(n_x) - \alpha_x c(n_X)$ ($\leq 0 / \geq 0$)

When the intermunicipality does not reach the critical minimum size (*i.e.* $n_X < \hat{n}_X$) the trivial cases 1 and 3 follows where there is no incentive for the municipality x to cooperate. But the story is different as soon as $n_X \geq \hat{n}_X$: any municipality x with $n_x < \hat{n}_x$ will always be in favour of transferring g to the intermunicipality ($EC_x^2 \geq 0$), whereas it is not necessarily the case for a municipality with $n_x < \hat{n}_x$ ($EC_x^3 \leq 0$ or $EC_x^3 \geq 0$). Then, Proposition 4 follows.

Appendix F - Proof of Proposition 5

For the sake of simplicity, we only study the derivative of the non-standardised value of α_x^t (denoted $\tilde{\alpha}_x^t$), *i.e.* when ψ is removed from (15). This simplification affects its value but not its sign:

$$\frac{\partial \tilde{\alpha}_x^t}{\partial t_x} = \frac{n_X}{n_x (\sum_{x \in X} t_x)} \left(1 - \frac{t_x}{n_x (\sum_{x \in X} t_x)} \right) > 0 \quad (\text{A.7})$$

The higher the fiscal base of the municipality x , the higher is its contribution to the intermunicipal spending ($\partial \tilde{\alpha}_x^t / \partial t_x > 0$), but the wealthier all the member municipalities, the lower is this effect ($\partial \tilde{\alpha}_x^t / \partial t_x$ decreases with $\sum_{x \in X} t_x$).

Therefore, the higher t_x , n_x being fixed, the higher is α_x^t whereas $\bar{\alpha}_x$ is kept constant ($\bar{\alpha}_x$ does not vary with t_x). In other words, the economies of cooperation the municipality x benefits from cooperating decrease with its tax base relatively to the other member municipalities' tax bases. So the more heterogeneous per capita fiscal bases of member municipalities, the worsen the linkage between municipal cost of providing g and the municipalities' financial contributions. It yields very heterogeneous economies of cooperation among member municipalities, which makes the collective agreement for transferring g more difficult to reach. Then, Proposition 5 follows.

Appendix G - Measuring intermunicipal heterogeneity

Theory predicts that the heterogeneity of citizens' preferences plays a key role in the cooperation choices of municipalities. However, as there is no empirical measure of these preferences, we usually use proxy(ies) based on the economic and social composition of the studied population. However, these variables are highly correlated with each other, so that it is generally not possible to include them all in the same model. Now, citizens' preferences can be expressed on multiple characteristics, and it may seem reductive to approximate it with only two or three variables (Gross, 1995). To deal with this issue, we compute a set of synthetic indicators of citizens' preferences heterogeneity, based on 15 socio-demographic variables.

First, a Gini index is computed for each one of these 15 variables. More precisely, these indices measure the intra-community heterogeneity, *i.e.* heterogeneity between municipalities that are members of the same intermunicipality. Second, two PCAs are conducted in parallel. One is based on 5 demographic variables²⁴ Gini indices, the other one is based on 10 employment variables²⁵ Gini indices.

The percentage of inertia of the first two components reaches 72.16% for the demographic variables ($PC1_C^{demo}$ and $PC2_C^{demo}$), and 67.89% for the employment based variables ($PC1_C^{emp}$ and $PC2_C^{emp}$). In this case, these principal components can be used as synthetic indicators (Hosseini and Kaneko, 2011), which summarize most of the information of the 15 initial Gini indices.

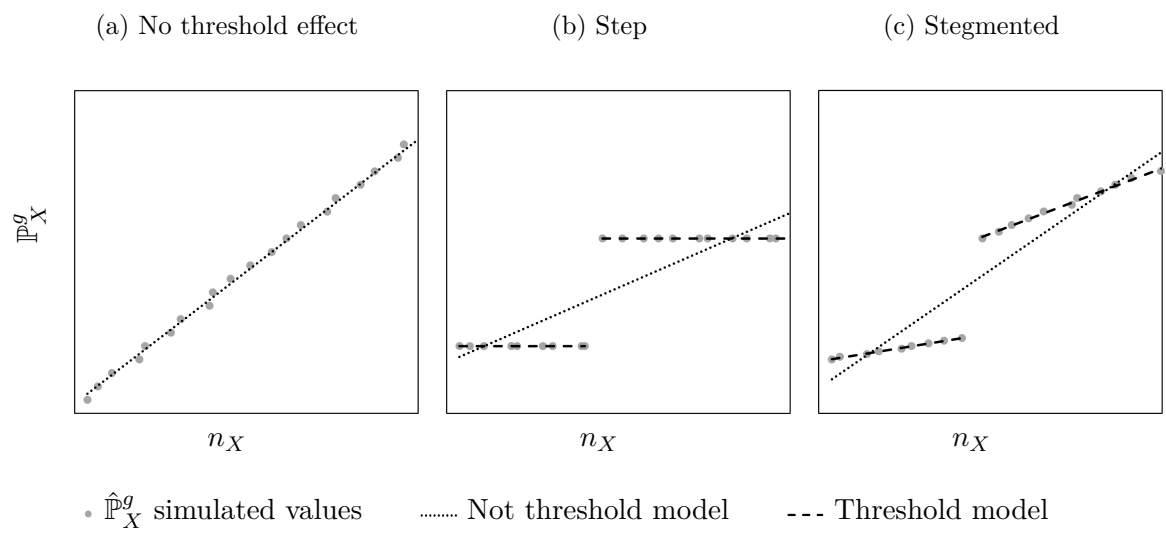


Figure 1: Empirical implications of a zoo effect

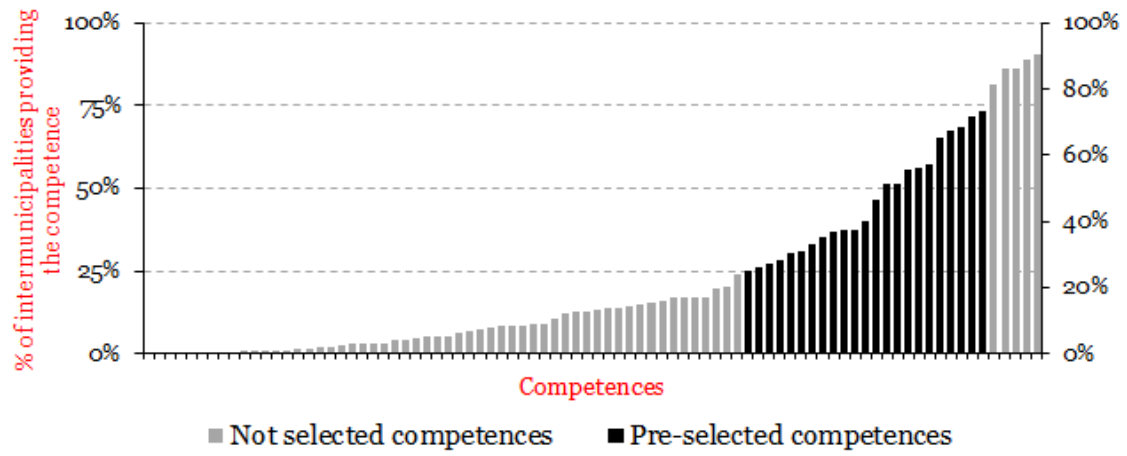


Figure 2: Percentages of the studied intermunicipalities providing each competence

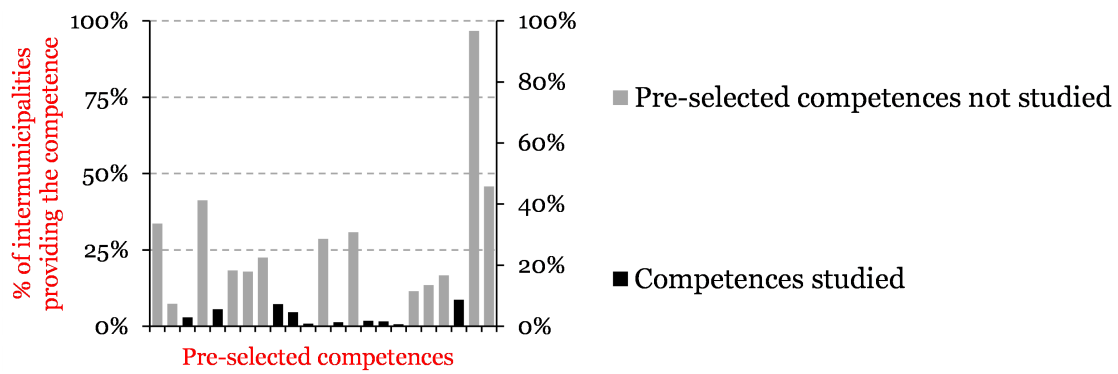


Figure 3: Percentages of the municipalities having transferred one of the 23 pre-selected competences to an intermunicipality without fiscal powers

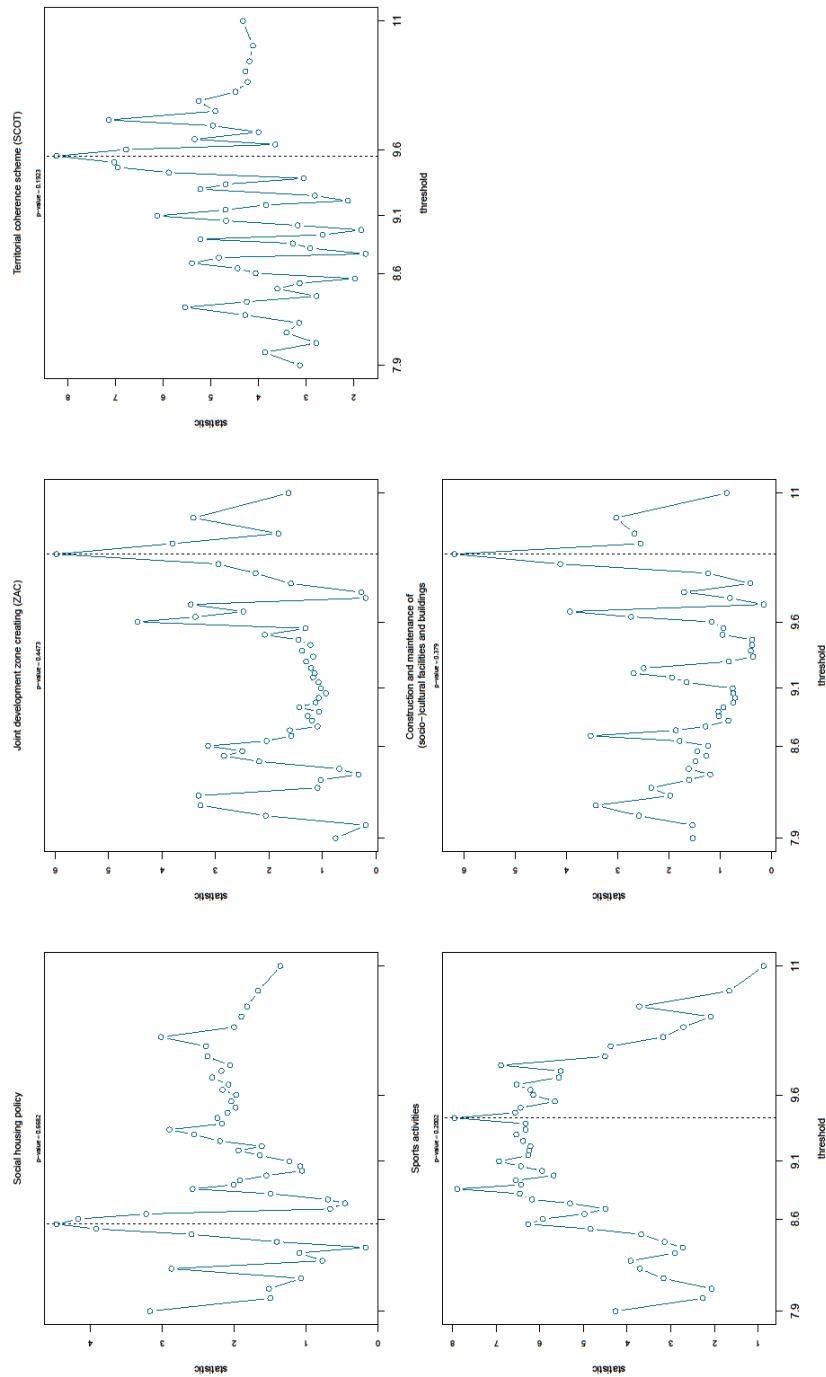


Figure 4: Looking for a zoo effect: A threshold approach (1/2)

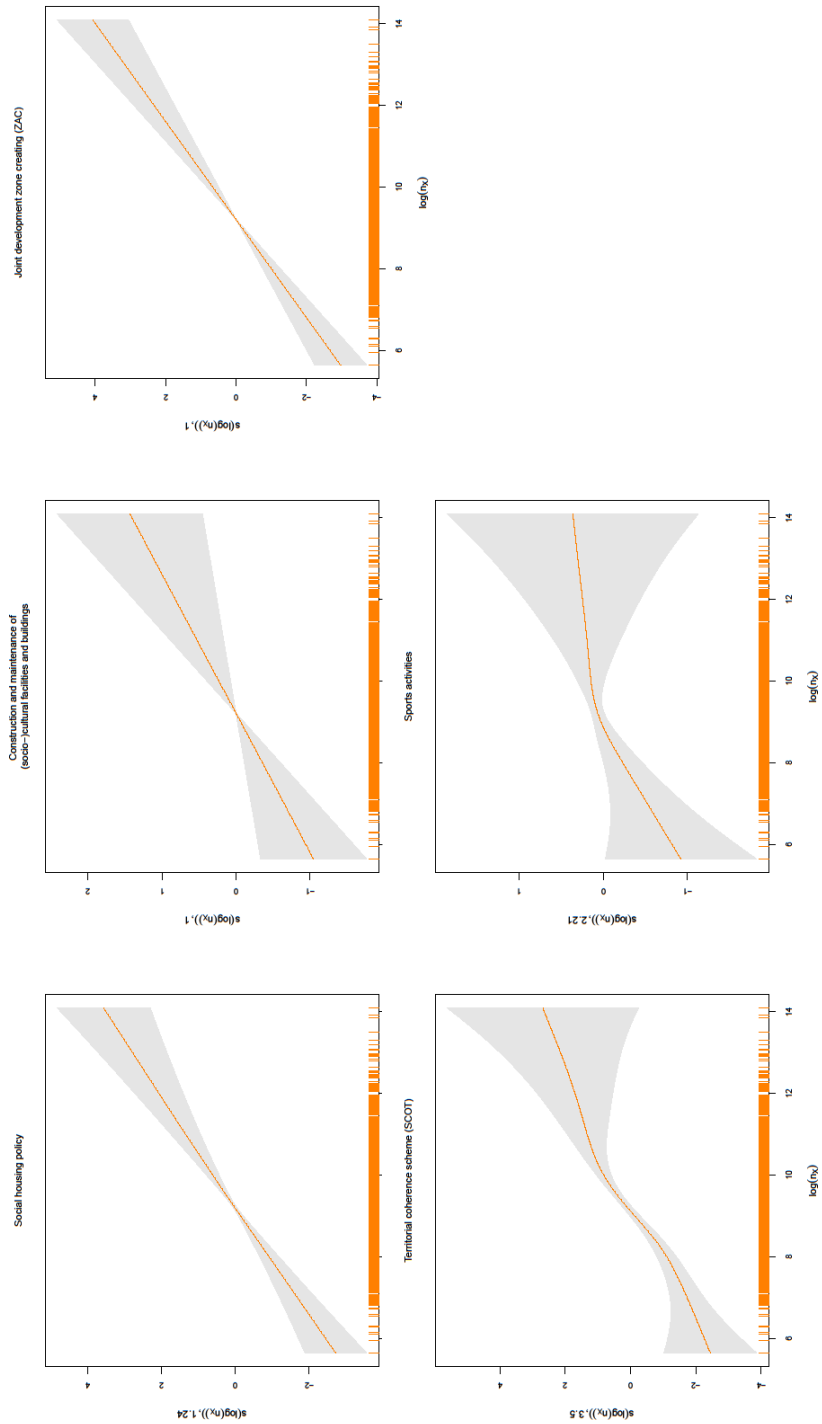


Figure 5: Looking for a zoo effect: A non parametric approach (1/2)

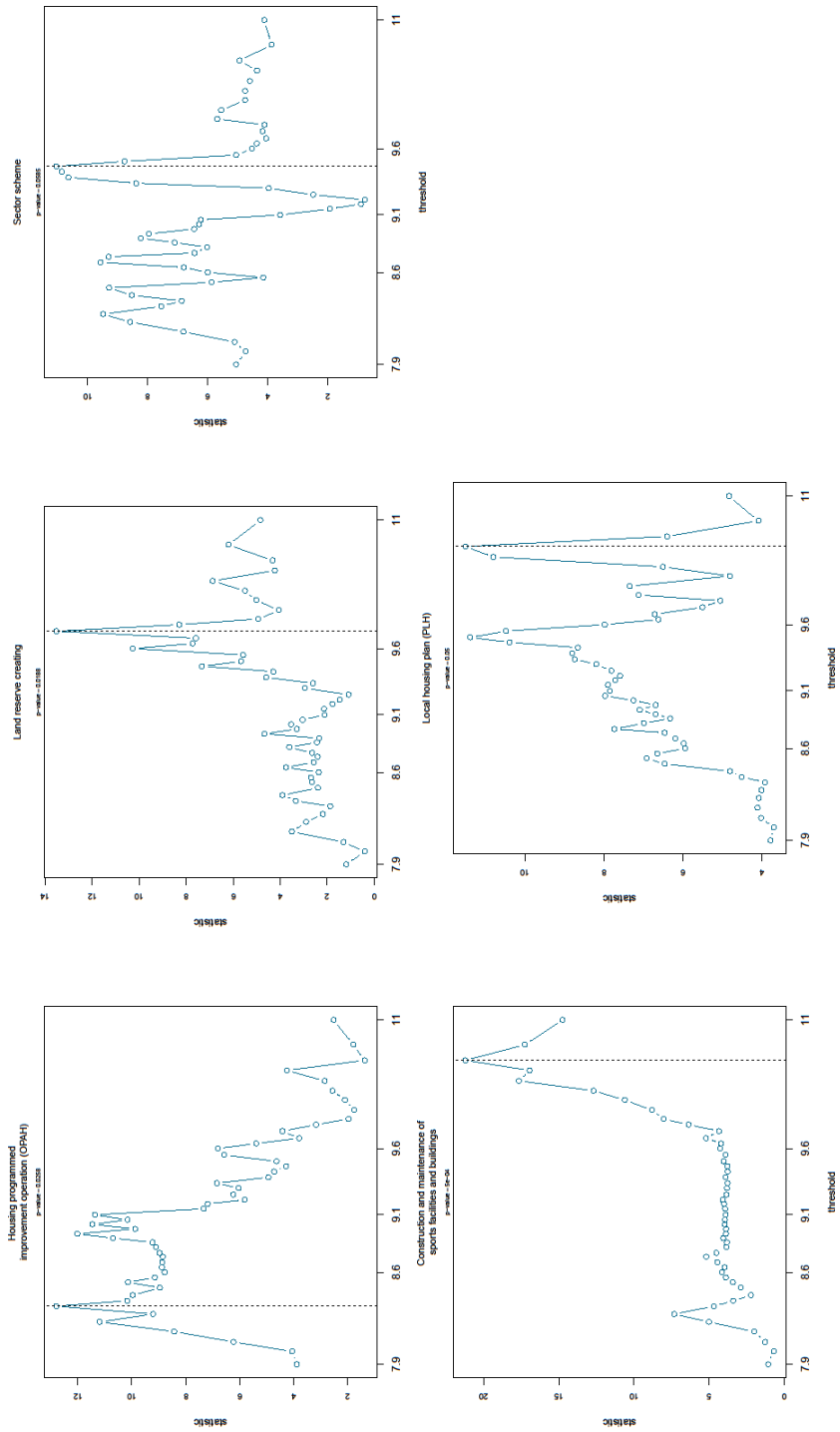


Figure 6: Looking for a zoo effect: A threshold approach (2/2)

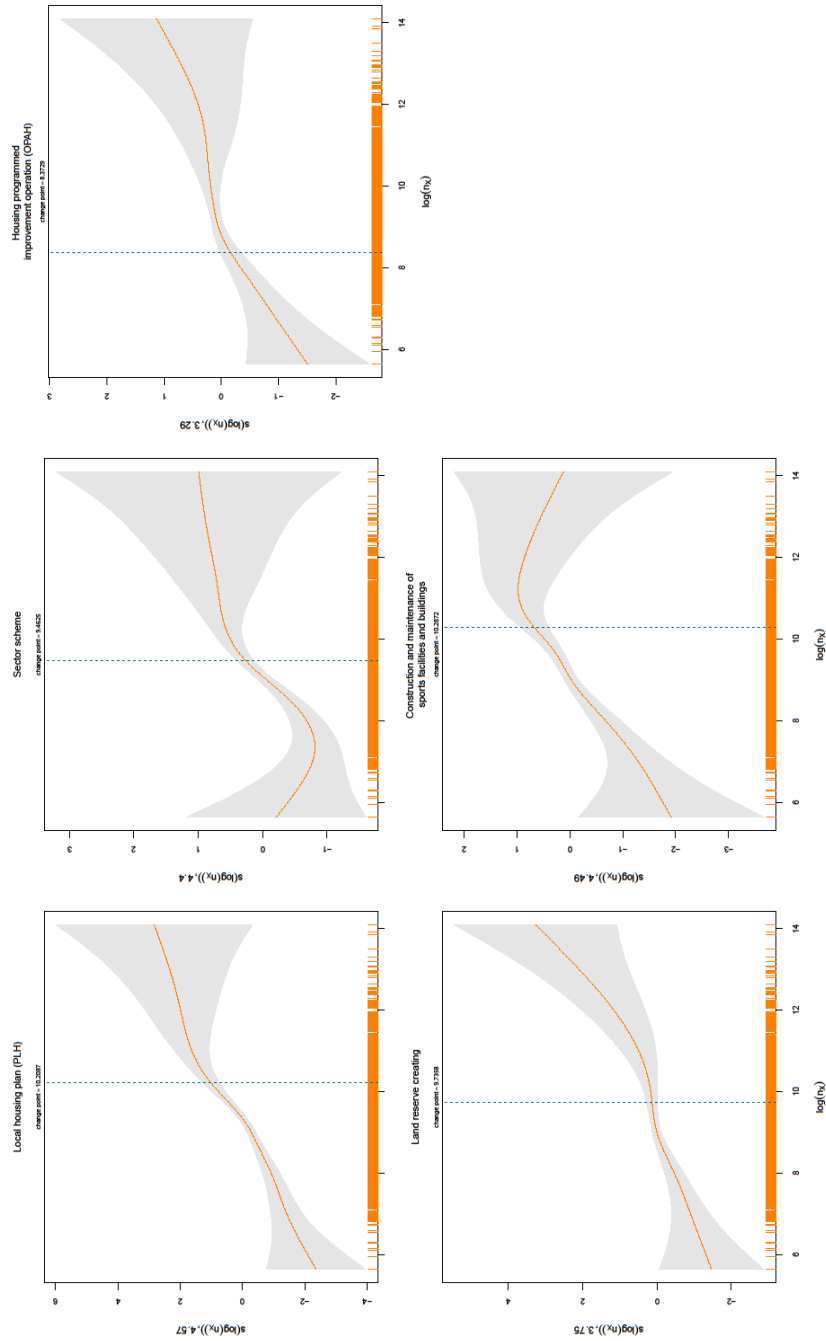


Figure 7: Looking for a zoo effect: A non parametric approach (2/2)

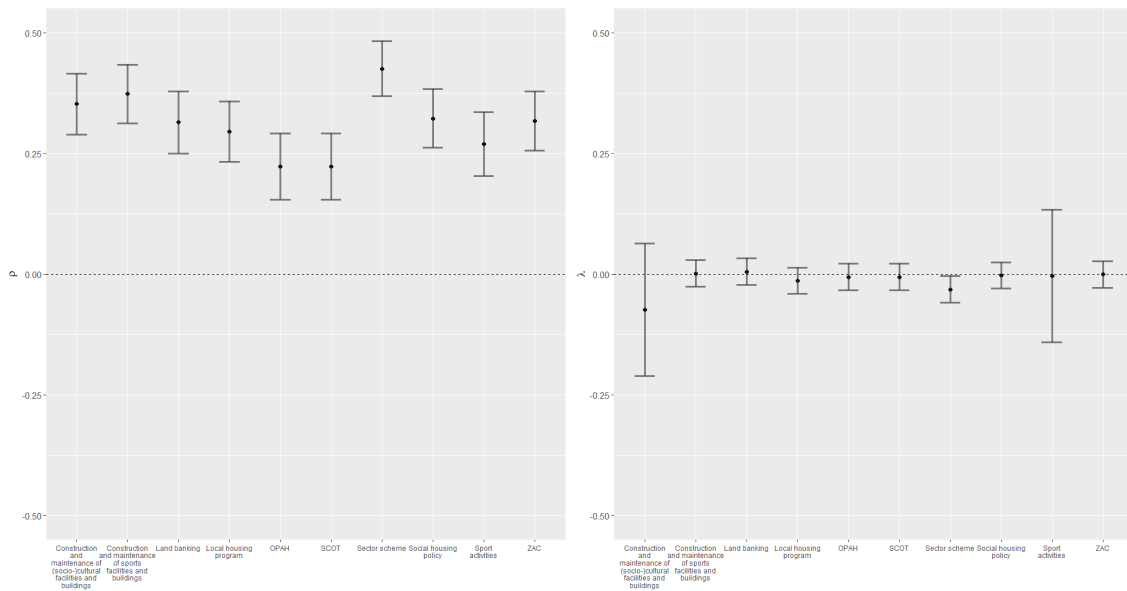


Figure 8: ρ (spatial effect) and λ (geo-political effect) estimates from equation (23)

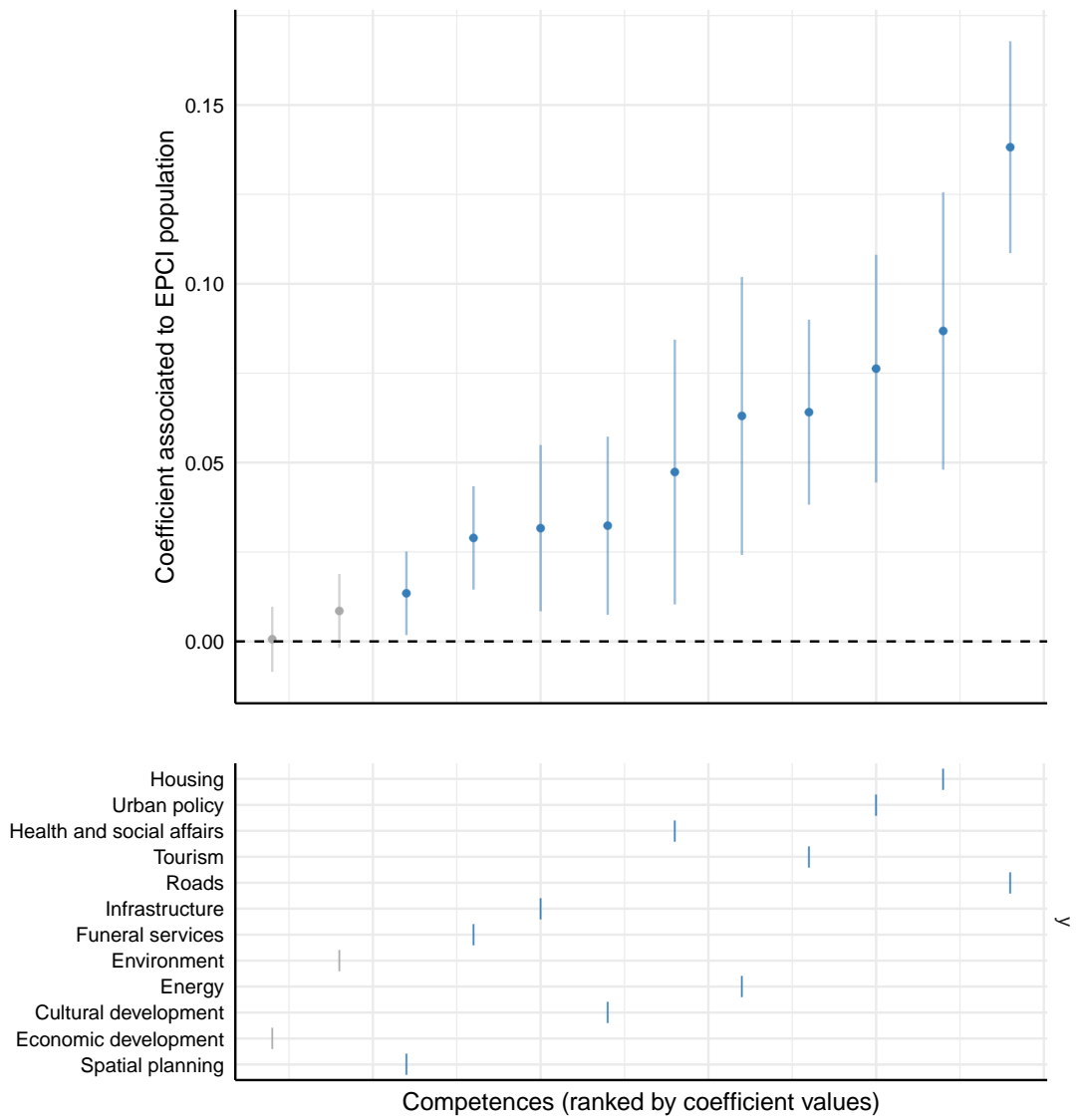


Figure 9: Specification curve for $\log(n_X)$ on thematic grouping

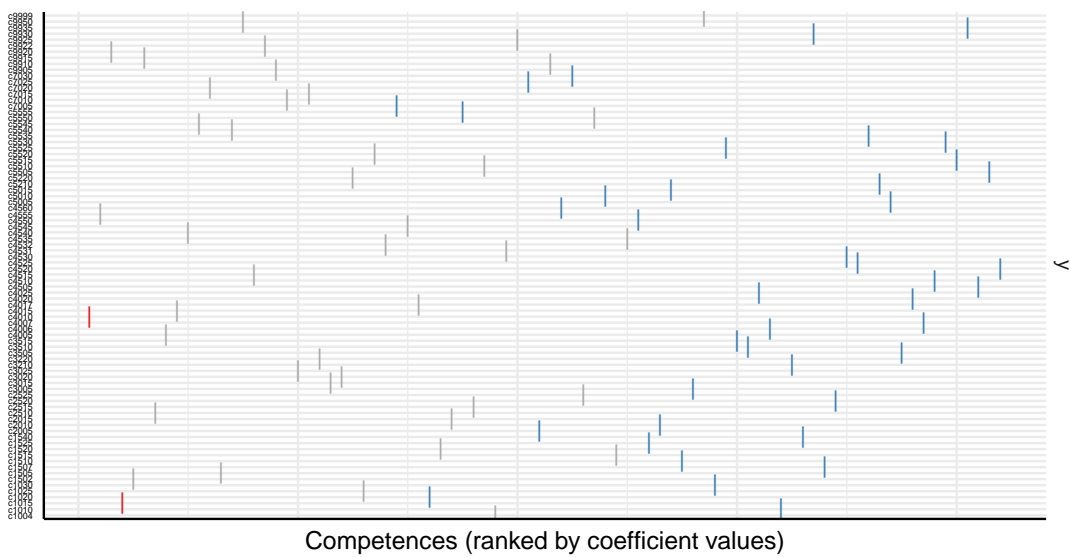
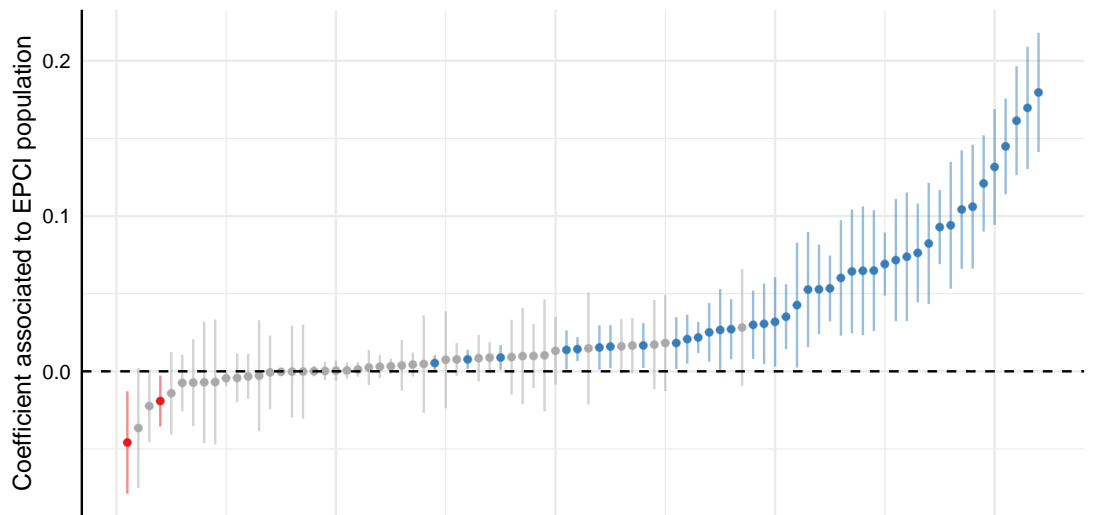


Figure 10: Specification curve for $\log(n_X)$ on 70 competences

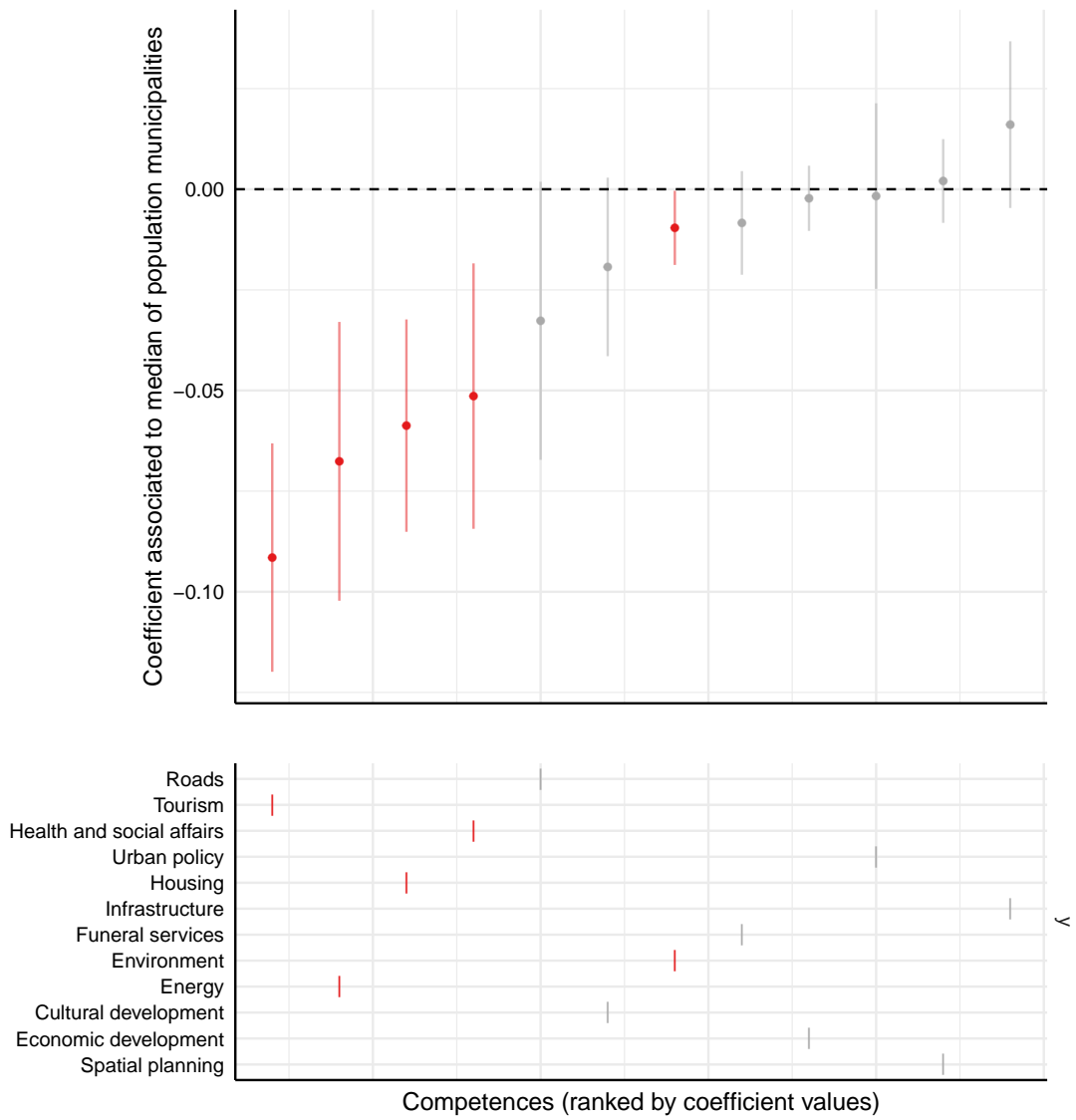


Figure 11: Specification curve for $\log(\tilde{n}_X)$ on thematic grouping

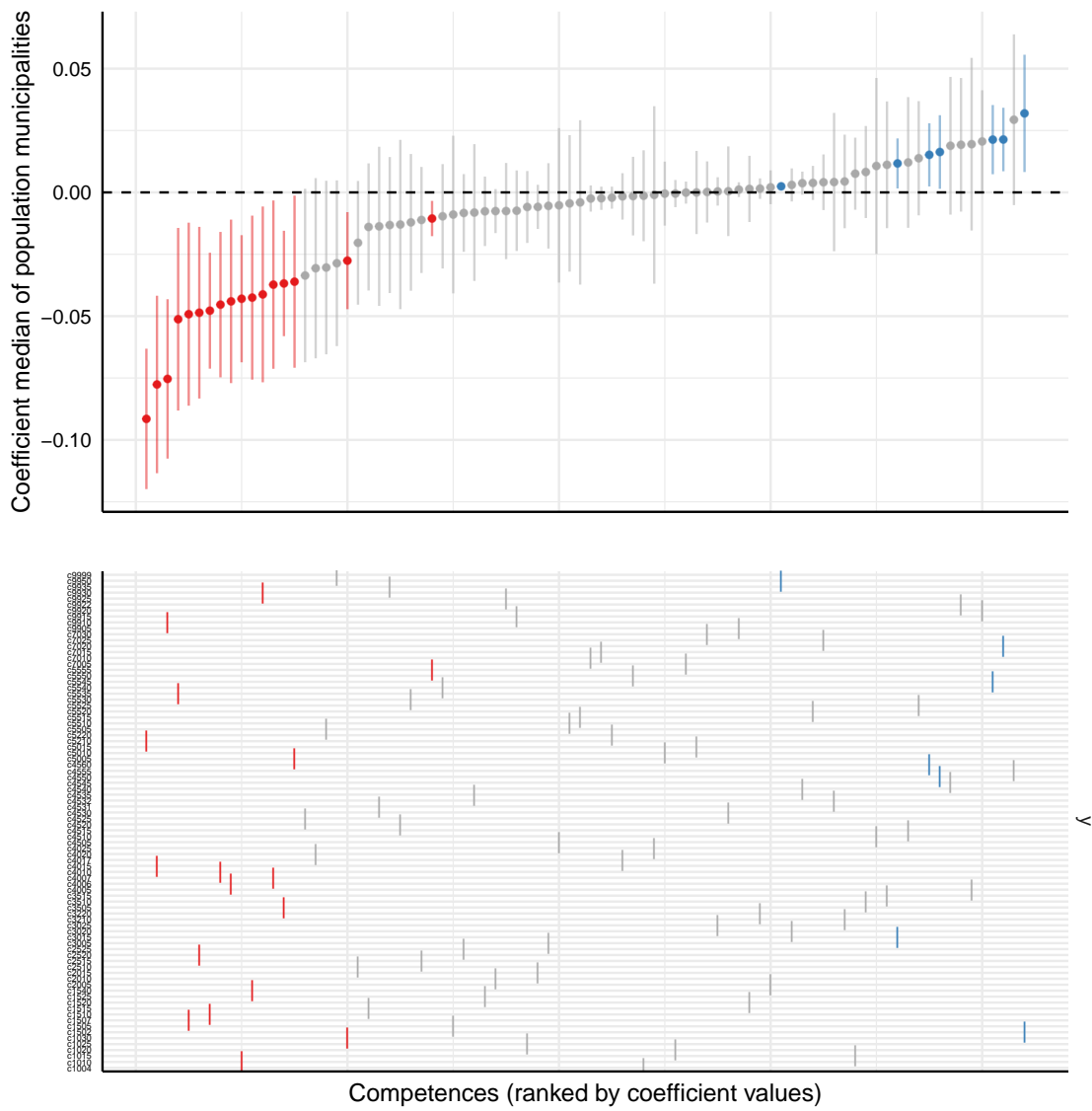


Figure 12: Specification curve for $\log(\tilde{n}_X)$ on 70 competences

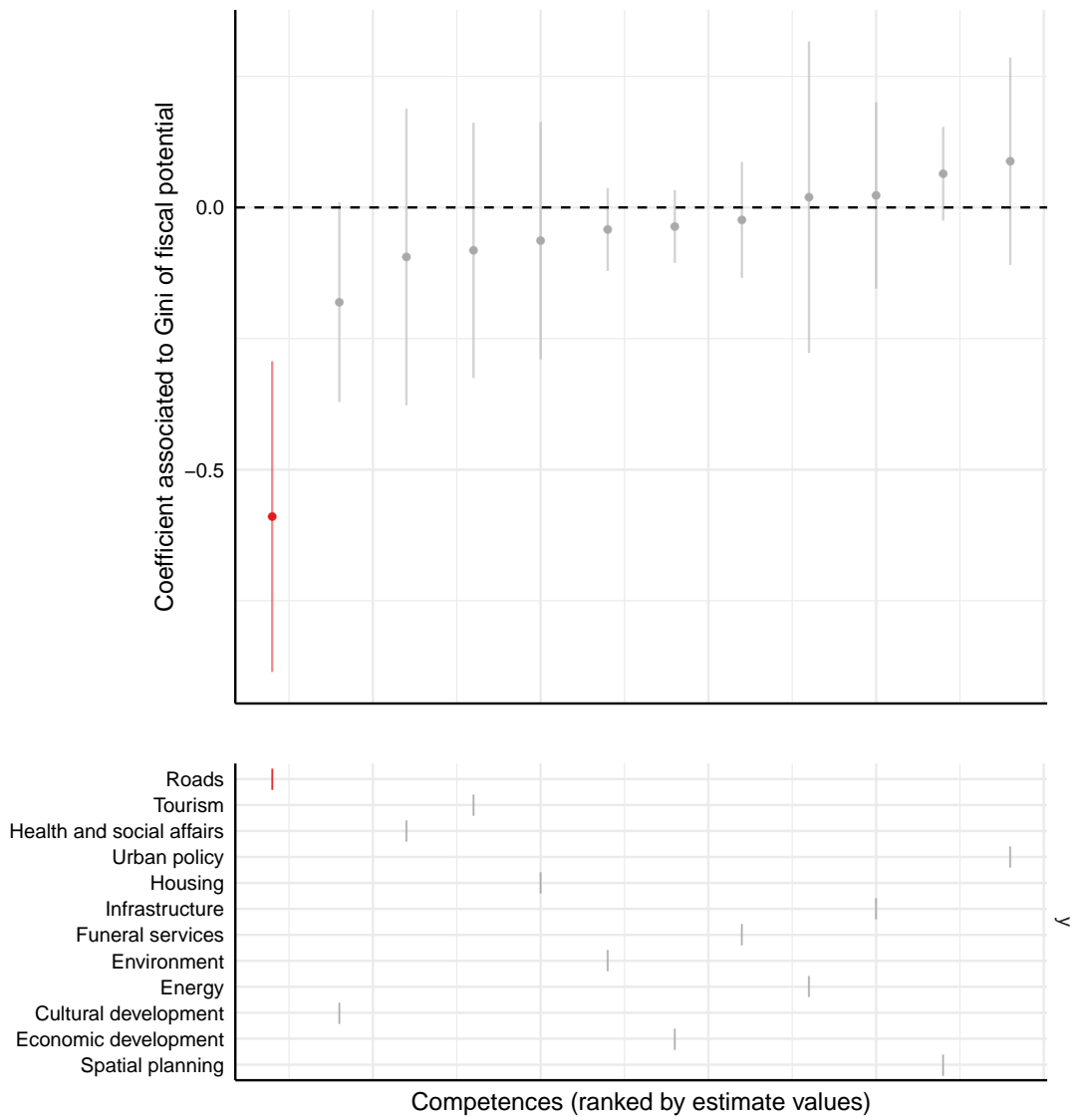


Figure 13: Specification curve for $GI_X^{fisc_potential}$ on thematic grouping

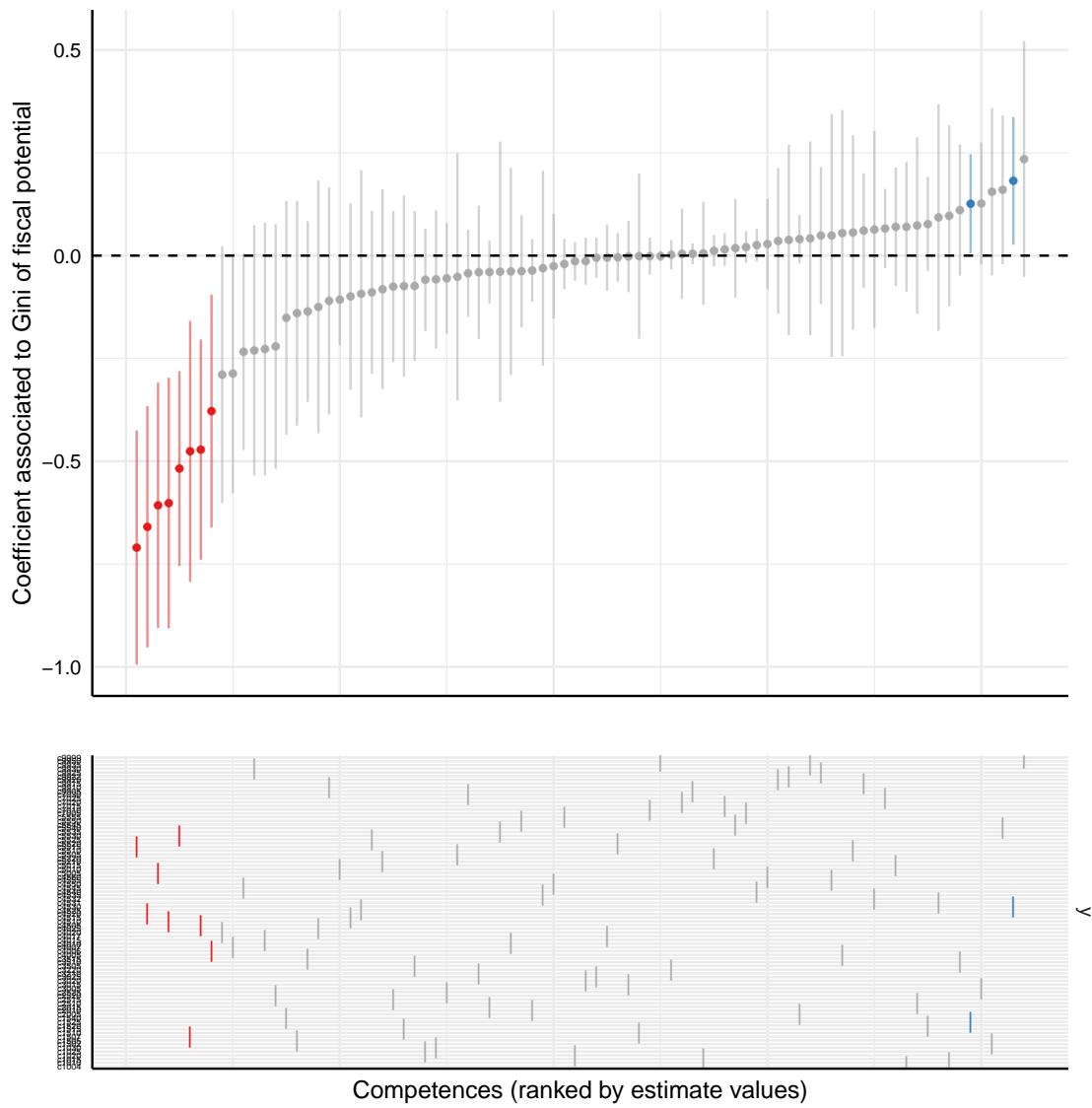


Figure 14: Specification curve for $GI_X^{fisc_potential}$ on 70 competences

Table 1: Probit estimates for competencies not subject to threshold effects

	(1.1) Social housing policy	(1.2) Creation of ZAC ^a	(1.3) Creation/maintenance of (socio-)cultural facilities	(1.4) SCOT ^b	(1.5) Sport activities
$\log(n_X)$	0.641*** (0.121)	0.820*** (0.103)	0.260** (0.100)	0.842*** (0.112)	0.276** (0.100)
$\log(\tilde{n}_X)$	-0.050 (0.089)	-0.040 (0.091)	-0.256** (0.088)	0.017 (0.100)	0.003 (0.081)
$PC1_X^{emp}$	-0.062* (0.027)	-0.003 (0.030)	-0.021 (0.027)	-0.029 (0.032)	0.018 (0.024)
$PC2_X^{emp}$	-0.098 (0.071)	0.013 (0.085)	-0.004 (0.065)	0.063 (0.089)	-0.048 (0.062)
$PC1_X^{demo}$	-0.011 (0.026)	0.022 (0.026)	0.025 (0.025)	0.068* (0.029)	0.015 (0.022)
$PC2_X^{demo}$	0.117 (0.069)	0.102 (0.067)	-0.032 (0.059)	0.027 (0.074)	-0.027 (0.057)
$GI_X^{fisc_potential}$	-4.532*** (0.909)	-3.223*** (0.764)	-2.250*** (0.833)	-2.379*** (0.772)	-0.547 (0.707)
$Surface_area_X$	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)
$Unemp_rate_X$	-0.040 (0.021)	-0.013 (0.020)	0.067*** (0.020)	-0.107*** (0.021)	-0.051*** (0.019)
$Median_income_X$	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Pct_b14yo_X	0.113*** (0.030)	0.069** (0.029)	0.043 (0.030)	0.066** (0.031)	0.065* (0.027)
Pct_o75yo_X	0.135*** (0.033)	0.060* (0.031)	0.046 (0.033)	-0.056* (0.033)	0.017 (0.030)
CU_CA_X	1.594*** (0.272)	1.417*** (0.463)	0.289** (0.230)	-0.304 (0.347)	-0.314 (0.216)
$S\&M_area_X$	0.394*** (0.144)	0.2228 (0.142)	0.088 (0.149)	-0.513*** (0.155)	0.152 (0.138)
$Rural_area_X$	0.304* (0.138)	0.236 (0.130)	0.002 (0.139)	-0.418** (0.137)	0.254* (0.127)
Herfindhal on political preferences	-6.631* (2.842)	-5.484* (2.649)	-3.126 (2.716)	-2.276 (2.726)	-9.769*** (2.610)
$Intercept$	-7.232*** (1.521)	-7.943*** (1.405)	-3.903** (1.395)	-2.799 (1.437)	-1.424 (1.340)
Observations	2,543	2,543	2,543	2,543	2,543
Correct predictions	72.08%	74.30%	72.83%	74.99%	63.11%

Notes: *p<0.1; **p<0.05; ***p<0.01 ; standard errors in brackets.

a: Joint development zones; b: Territorial consistency scheme.

Table 2: Probit estimates for competencies subject to threshold effects

	(2.1) Local housing programme	(2.2) Sector scheme	(2.3) Planned housing improvement operation	(2.4) Land-banking	(2.5) Creation of sports facilities
e_g^+	7.286* (3.574)	5.169* (2.546)	0.898 (2.109)	-4.757 (2.514)	7.982*** (2.219)
$e_g^- \log(n_X)$	0.691*** (0.101)	0.512*** (0.099)	0.356*** (0.092)	0.354** (0.100)	0.533*** (0.106)
$e_g^+ \log(n_X)$	0.055 (0.354)	0.006 (0.256)	0.234 (0.214)	0.795*** (0.254)	-0.199 (0.225)
$\log(\tilde{n}_X)$	-0.113 (0.089)	0.071 (0.084)	-0.193* (0.080)	-0.181* (0.084)	-0.165 (0.086)
$PC1_X^{emp}$	-0.012 (0.029)	-0.032 (0.026)	-0.002 (0.025)	-0.030 (0.026)	0.017 (0.026)
$PC2_X^{emp}$	-0.092 (0.076)	-0.011 (0.069)	-0.062 (0.067)	-0.128 (0.064)	0.046 (0.068)
$PC1_X^{demo}$	-0.024 (0.025)	0.026 (0.026)	0.005 (0.022)	-0.011 (0.023)	0.017 (0.023)
$PC2_X^{demo}$	0.096 (0.066)	0.061 (0.061)	-0.086 (0.058)	0.065 (0.061)	0.025 (0.060)
$GI_X^{fisc_potential}$	-0.219 (0.695)	-2.923*** (0.766)	-0.143 (0.668)	-0.453 (0.725)	-1.514 (0.783)
$Surface_area_X$	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)
$Unemp_rate_X$	0.021 (0.019)	-0.017 (0.019)	-0.020 (0.018)	0.009 (0.020)	0.022 (0.021)
$Median_income_X$	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.000 (0.000)
Pct_b14yo_X	0.094** (0.028)	0.036 (0.027)	0.112*** (0.026)	0.040 (0.028)	0.037 (0.029)
Pct_o75yo_X	0.048 (0.031)	0.046 (0.030)	0.114*** (0.029)	0.108*** (0.031)	0.023 (0.033)
CU_CA_X	1.923*** (0.527)	1.222*** (0.339)	0.092 (0.284)	1.039*** (0.303)	0.251 (0.286)
$S\&M_area_X$	0.176 (0.140)	-0.122 (0.138)	0.453*** (0.137)	0.208 (0.140)	0.194 (0.146)
$Rural_area_X$	0.285* (0.127)	-0.104 (0.127)	0.233 (0.123)	0.132 (0.131)	0.362*** (0.137)
Herfindhal on political prefs	0.383 (2.571)	-3.312 (2.581)	-0.973 (2.407)	-7.382** (2.588)	-3.997 (2.727)
$Intercept$	-7.341*** (1.345)	-4.824*** (1.323)	-4.742*** (1.248)	-5.892*** (1.351)	-5.481*** (1.413)
Observations	2,543	2,543	2,543	2,543	2,543
Correct predictions	63.55%	63.90%	64.18%	66.42%	

Notes: *p<0.1; **p<0.05; ***p<0.01 ; standard errors in brackets.

Table 3: Spatial Probit estimates for competencies not subject to threshold effects

	(4.1) Social housing policy	(4.2) Creation of ZAC	(4.3) Creation/maintenance of (socio-)cultural facilities	(4.4) SCOT ^b	(4.5) Sport activities
$\log(n_X)$	0.127*** (0.019)	0.168*** (0.001)	0.047*** (0.018)	0.127*** (0.017)	0.037* (0.019)
$\log(\tilde{n}_X)$	-0.029* (0.016)	-0.032** (0.017)	-0.042*** (0.016)	-0.152 (0.107)	-0.002 (0.018)
$PC1_X^{emp}$	-0.066** (0.029)	-0.002 (0.005)	-0.004 (0.005)	-0.009* (0.005)	0.005 (0.025)
$PC2_X^{emp}$	-0.065 (0.074)	-0.008 (0.013)	0.007 (0.012)	0.111 (0.091)	-0.013 (0.063)
$PC1_X^{demo}$	-0.009 (0.028)	0.005 (0.005)	0.005 (0.004)	0.066 (0.031)	0.012 (0.022)
$PC2_X^{demo}$	0.089 (0.072)	0.022 (0.019)	-0.004 (0.012)	-0.012 (0.088)	-0.037 (0.057)
$GI_X^{fisc_potential}$	-0.604*** (0.140)	-0.589*** (0.144)	-0.330** (0.137)	-0.417*** (0.128)	-0.719 (0.711)
$Unemp_rate_X$	-0.036 (0.023)	-0.002 (0.004)	0.007* (0.004)	-0.014*** (0.002)	-0.006* (0.001)
$Median_income_X$	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001*** (0.001)	0.001 (0.001)
Pct_b14yo_X	0.160*** (0.050)	0.007 (0.006)	0.003 (0.005)	-0.007 (0.033)	0.011* (0.006)
Pct_o75yo_X	0.019*** (0.006)	0.012* (0.006)	0.004 (0.006)	-0.052 (0.034)	-0.009 (0.030)
$Surface_area_X$	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
CU_CA_X	0.309*** (0.043)	0.082* (0.044)	0.118*** (0.042)	-0.089** (0.039)	-0.305 (0.211)
$S\&M_area_X_2$	0.089*** (0.028)	0.055* (0.029)	0.015 (0.026)	-0.208 (0.162)	0.087 (0.14)
$Rural_area_X$	0.054 (0.026)	0.032 (0.026)	0.001 (0.001)	-0.078*** (0.023)	0.147 (0.129)
Herfindhal on political preferences	-0.715 (0.500)	-1.049** (0.514)	-0.314 (0.495)	-0.176 (0.452)	-1.767*** (0.547)
Spatial lag term	0.318*** (0.026)	0.317*** (0.026)	0.333*** (0.027)	0.426*** (0.024)	0.270*** (0.028)
Intercept	-6.976*** (1.589)	-0.998*** (0.258)	-0.209 (0.240)	-0.368 (0.248)	-1.081 (1.290)
Observations	2,543	2,543	2,543	2,543	2,543

Notes: *p<0.1; **p<0.05; ***p<0.01 ; standard errors in brackets.

b: Territorial consistency scheme.

Table 4: Spatial Probit estimates for competencies subject to threshold effects

	(5.1) Local housing programme	(5.2) Sector scheme	(5.3) Planned housing improvement operation	(5.4) Land-banking	(5.5) Creation/maintenance of sports facilities
e_g^+	1.415*** (0.274)	1.021*** (0.283)	0.556 (0.409)	-0.706** (0.278)	1.904*** (0.456)
$e_g^- \log(n_X)$	0.145*** (0.020)	0.090*** (0.023)	0.337*** (0.093)	0.093*** (0.021)	0.083*** (0.019)
$e_g^+ \log(n_X)$	0.021 (0.047)	-0.008 (0.037)	0.23 (0.224)	0.137*** (0.041)	-0.083* (0.046)
$\log(\tilde{n}_X)$	-0.040** (0.018)	0.011 (0.017)	-0.037** (0.019)	-0.251*** (0.089)	-0.035** (0.016)
$PC1_X^{emp}$	-0.012 (0.029)	-0.006 (0.005)	0.002 (0.006)	-0.005 (0.005)	0.003 (0.005)
$PC2_X^{emp}$	-0.084 (0.082)	0.006 (0.012)	-0.004 (0.014)	-0.023* (0.014)	0.015 (0.013)
$PC1_X^{demo}$	-0.024 (0.025)	0.005 (0.005)	0.001 (0.001)	-0.002 (0.004)	0.004 (0.012)
$PC2_X^{demo}$	0.084 (0.066)	0.013 (0.013)	-0.021 (0.013)	0.014 (0.012)	0.001 (0.012)
$GI_X^{fisc_potential}$	-0.101 (0.715)	-0.538*** (0.015)	-0.051 (0.158)	-0.002 (0.147)	-0.233* (0.140)
$Unemp_rate_X$	0.018 (0.019)	-0.002 (0.021)	-0.003 (0.004)	0.001 (0.021)	0.008 (0.020)
$Median_income_X$	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Pct_b14yo_X	0.014** (0.006)	0.034 (0.028)	0.022*** (0.006)	0.028 (0.029)	0.003 (0.005)
Pct_o75yo_X	0.045 (0.031)	0.04 (0.030)	0.022*** (0.007)	0.013* (0.006)	0.002 (0.006)
$Surface_area_X$	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001* (0.001)
CU_CA_X	0.196*** (0.063)	0.291*** (0.369)	0.024 (0.060)	0.261*** (0.062)	0.034 (0.060)
$S\&M_area_X$	0.038 (0.030)	-0.11 (0.144)	0.100*** (0.029)	0.049* (0.030)	0.048* (0.028)
$Rural_area_X$	0.053* (0.027)	-0.102 (0.126)	0.051* (0.029)	0.030 (0.529)	0.063*** (0.026)
Herfindhal on political preferences	0.065 (0.533)	-0.490 (0.526)	0.003 (0.569)	1.204** (0.529)	-0.645 (0.503)
Spatial Lag term	0.277*** (0.027)	0.384*** (0.025)	0.213*** (0.029)	0.321*** (0.027)	0.374*** (0.026)
(Intercept)	-0.965*** (0.274)	-0.407 (0.283)	-4.599*** (1.226)	-0.706*** (0.278)	-0.323 (0.257)
Observations	2,543	2,543	2,543	2,543	2,543

Notes: *p<0.1; **p<0.05; ***p<0.01 ; standard errors in brackets.