EMPIRICAL STUDIES ON PUBLIC EXPENDITURE INTERACTION AMONG NEIGHBORING JURISDICTIONS: AN OVERVIEW

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Abstract

This study has identified and organized the major trends of recent studies on strategic interaction in public expenditure among subnational neighboring governments around the world.   Expenditure spillovers, yardstick competition, fiscal competition are three principal determinants of local governments' spending interactions in the study sample, among inter-government cooperation, political ideology, and social learning.   We also present appealing notes on particular cases of interdependence in deciding budget allocation.   This study finds a lack of applied work on spending interaction of neighboring localities in developing countries and almost none of the similar research in the least developed countries.   There is still a lack of comparative studies on strategic spending interactions at national, regional, and local levels.   Finally, it is promising to use additional sources of exogenous variation for the identification of spatial fiscal interaction effects in a quasi-experimental approach.

Keywords: Public expenditure, spatial interaction, local government, neighboring jurisdictions.

1. Introduction

In the past three decades, decentralization has been a focal point of policy reform in most parts of the world.   The delegation of more fiscal autonomy to assign more public expenditures and revenues from the central government to local governments have been widely advocated by policy advisors. The key driver for the growing interest in fiscal decentralization is "to increase efficiency, transparency, and accountability in the public sector" (Ebel & Yilmaz, 2002, p.3).

Greater autonomy of local governments opens up the likelihood of local fiscal interactions.   The traditional belief was that a jurisdiction's spending solely depends on its income, its grants from other levels of government, and its demographic and/or political characteristics.   However, subnational governments do not make their decisions in isolation.   Case et al. (1993) is among the first who

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proposed and formalized that there is another important determinant of the state and local government expenditures: the expenditures of neighboring authorities.　Citizens and public servants are likely to be influenced by the actions of nearby jurisdictions.

Spatial interactions in the level and structure of expenditures used to be given less attention in the literature than tax interactions.　However, in the last two decades, there has been a substantial rise in empirical works that examine whether sub-national governments make their spending decisions by taking into account the behavior of their neighbors (López et al., 2017; Ferraresi et al., 2018).　The increasing concern is because local governments rarely have large tax competencies, for that reason "spending decisions gain much more weight" (Langer, 2019).

Although the subject, as mentioned above, has reached an identifiable state of maturity, there is no extensive review that generalizes and synthesizes the recent empirical studies on the horizontal spending interaction among neighboring governments.　The only review paper found about strategic interaction among governments was roughly 20 years ago (Bruecker, 2003), while expenditure interaction was merely one among the three fundamental parts of the article.　This article aims to fill this gap, by addressing those following research questions:

1．What are the frequent model specifications and estimation strategies used in recent studies on the neighboring government's expenditure interaction?

2．What are the main types of interactions and their evidence found in the recent studies?

3．What is the role of higher-level governments in control and eliminate negative spending[1] interaction among the local governments?

The remains of the paper are structured as follows: the next section describes the research method of the article; Section 3 introduces the theoretical background of the research subject.　In Section 4, methods and evidence of previous empirical studies are presented and discussed.　Section 5 suggests further research and concludes.

2．Research method

This research article adheres to a comprehensive review process suggested by Webster and Watson (2002).　We have reviewed the literature on the strategic interaction in public expenditure among neighboring governments published in academic journals from 2005 to 2019.

2.1．Search method
A structured review process would start by searching for materials from leading journals in the field (Webster & Watson, 2002).　Since public expenditure interaction topic belongs to the larger field

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1 ）"Spending" and "expenditure" in this paper have the same meaning and are used as substitutes for one another.

of regional science, we searched for relevant studies in top journals, which are Regional Studies, Urban Studies, Journal of Urban Economics, Regional Science and Urban Economics, Journal of Public Economics.   Based on our context, the following keywords were selected: "Strategic interaction, local government, neighboring jurisdictions, government spending, public expenditure, yardstick competition, fiscal competition, spillover".

The search method is improved by snowball sampling.   We scanned and used the reference lists of relevant papers obtained in the previous searches to continue looking for further articles in Web of Science, Scopus, ScienceDirect, ProQuest, Springer, and Wiley Online.

2.2．Selection method

The articles selected to be included in the review must fulfill the following five inclusion criteria, namely: (i) published in peer-review journals or cited working papers in the period 2005 - 2019; (ii) written in English; (iii) examine spatial horizontal interaction on public expenditure at subnational levels; (iv) ensure the balance among regions (continents) and institutional settings (federal and unitary state; developed and developing countries); and (v) available (full text) to the researcher.   32 articles satisfied all the above criteria.

2.3．Analysis method

We adopted the concept-centric idea from (Webster & Watson, 2002) to investigate the current state of research on the interdependence of public expenditure among neighboring governments. For this purpose, 32 articles were categorized based on their primary foci.   This concept-centric view, in terms of foci, guided us to identify areas where an excess of research exists and areas where further research is needed in the field.

To address the question about spending interactions among neighboring governments, we employed the content analysis method (Vaismoradi et al., 2013).   We have read each paper carefully, captured the methods and results related to strategic interaction on public expenditure among local governments, compared those evidence, and grouped them into main dimensions using the open coding.

3．Theoretical background

This section sets out the working definitions and dimensions of fiscal interaction among local governments that frame this study, along with the framework used for understanding and classifying different spending interactions.

The existence of strategic interactions in public spending between local governments is theoretically explained by several models, including yardstick competition, spillover (expenditure

externality), fiscal competition, political affiliation, and inter-government cooperation. Strategic interaction could be cooperative and non-cooperative behavior.

3.1. Non-cooperative regime

In the non-cooperative setup, the principal sources are expenditure spillovers, fiscal competition, and yardstick competition (Sťastná, 2009).

3.1.1. Expenditure spillovers

Public expenditure spillovers occur when one local government's activities affect the welfare function of another jurisdiction (Gordon, 1983). Public expenditures of a local government may have beneficial or detrimental effects beyond its own boundary, thus affecting the preferences of neighboring jurisdictions. As a result, local governments might decide the level of their expenditure by strategically taking into account the expenditures of their neighbors (Case et al., 1993; Baicker, 2005; Werck et al., 2008; Costa et al., 2015).

3.1.2. Yardstick competition

Yardstick competition was introduced by Salmon (1987) and first modeled theoretically and estimated empirically by Besley and Case (1995). It based on the idea that residents take the policies of a neighboring jurisdiction as a yardstick and compare them to the policies of their government because they do not have perfect information about their government. In the case of public spending, if the neighboring governments spend less for a similar public good endowment, then politicians' chances of being re-elected decrease. Therefore, politicians have an incentive to mimic neighboring fiscal policies to increase the chance of re-election. This hypothesis is in favor of the notion that the likelihood of a government adopting a new policy is higher if other governments have already adopted the idea. The likelihood becomes higher still if the policy has been adopted by a jurisdiction viewed by policymakers as a point of legitimate comparison (Walker, 1969).

3.1.3. Fiscal competition

The third probable explanation for fiscal non-cooperative interactions can be gleaned from the literature on fiscal competition (Zodrow & Mieszkowski, 1986). Fiscal competition can be two-sided. On the one hand, jurisdictions may increase expenditures to attract residents and enterprises (Šťastná, 2009) and thus indirectly affect other governments' policies, resulting in competition among governments for citizens and firms. Fiscal interactions can engender a "race-to-the-top" where competition for preferable factors results in much excessive spending on public inputs; or even have no net effect on spending at all (Costa-Fonts, 2015).

Governments may also strategically choose their welfare spending fearing that overly generous

benefits will attract poor migrants.　Local governments compete to lower their spending, resulting in a "race to the bottom" (Wang, 2018).

3.2. Cooperative regime

A cooperative framework between neighboring local jurisdictions can be found when incumbency belongs to the same political party or is from the same ideology and benefits orientation, so they can work together to find ways using public expenditures accurately, then may enhance budget efficiency (Barreira, 2011).

3.2.1. Inter-government cooperation

Spatial spending interaction can also be found due to cooperation and coordination mechanisms between neighboring local governments.　Governments with common ideologies and/or benefits may work together to reduce the cost of providing public goods thanks to the achievement of economies of scale.　Fiscal cooperation also allows jurisdictions to internalize spending spillovers, as benefits of public expenditure could spread across boundaries and affect the welfare of the neighboring jurisdictions (Frère et al., 2014).

3.2.2. Political affiliation

Spending interaction can be driven by a common political interaction, where politicians sharing the same political affiliation would tend to mimic each other out of any electoral goal (Foucault et al., 2008). This comes from the assumption that the local incumbent politician references only to those neighbor governments belonging to the same political party when deciding on taxes and expenditure (Geys & Vermier, 2008).

4．Empirical studies on strategic interaction in public expenditures

4.1. Data

The set of data in the 32 articles are diverse.　In some cases, only the information derived from a single cross-section are analyzed (e.g., Werck et al., 2008; St'astná, 2009; Yang & Lee, 2018), while in other cases, panel data techniques are employed (Lundberg, 2006; Akai & Suhara, 2013; Fossen et al., 2017).　The lengths of panel data are varied, ranging from 02 cross-sections in Revelli (2006) to 25 cross-sections in Caldeira (2012).　The dataset in Ferraresi et al.　(2016) and Ferraresi et al. (2018) together include 61,204 observations, making them the largest samples examined in empirical work on strategic interactions in spending decisions at the local level.

The datasets in the sample vary in types of expenditures.　Some studies analyze the total expenditure of local governments (e.g., Solé-Ollé, 2006; Breuillé & Le Gallo, 2017), while others analyze

specific items: Culture (e. g., Lundberg 2006), public service (e. g., Gebremariam et al., 2012), Environment (e.g., Deng et al. 2012), public safety (e.g., Yang & Lee, 2018), to name a few.

As mentioned in the research method section, the datasets should balance research among continents and institutional settings. The database includes empirical research from 16 countries across 04 continents, with the presence of both developed countries (e.g., the US, the UK, Sweden, Germany, France) and developing countries (e.g., Benin, Indonesia), both federal and unitary states. The articles are time evenly distributed from 2005 to 2019.

4.2. Econometric Models
4.2.1. Spatial models

All of the papers in the sample employ different spatial econometrics models, to capture spatial spillovers in the regression model (Anselin, 1988). However, there is no consensus regarding how to include spatial effects in the model and the specifications vary.

In standard linear regression models, three different types of interaction effects in a spatial econometric model are used to distinguish strategic expenditure interaction among local neighboring jurisdictions: endogenous interaction effects among the dependent variable (Y), exogenous interaction effects among the independent variables (X), and interaction effects among the error terms (ε).

The classic specification strategy, the so-called 'specific-to-general' approach, is based on the results of the Lagrange multiplier test and its robust version. It consists of starting with a non-spatial linear regression model (OLS) and testing whether the model needs to be extended with the inclusion of spatial interaction effects. Statistics to test for spatial lags and/or spatial errors in local public expenditure determination are based on the OLS estimates. This approach is applied in most empirical studies within the sample, including, but not limited to, Baicker (2005), Solé-Ollé (2006), Werck et al. (2008), and Ferraresi et al. (2018).

Fairly recently, Elhorst (2013) suggests a "general-to-specific" approach, starting the specification strategy from the Spatial Durbin Model (SDM), which consists of spatial lags of the dependent and independent variables as well as exogenous and endogenous interaction effects, while the autocorrelated error term is excluded. LeSage and Pace (2009) demonstrate that the cost of ignoring the spatial dependence of endogenous and/or exogenous variables is comparatively higher than the inconsiderable loss of efficiency resulting from the ignorance of the autocorrelated error. This approach is employed in some studies in the sample (e.g., Yu et al., 2013; Wang, 2018; Langer, 2019). In an empirical implementation, several specification tests can be conducted to examine whether the SDM model can be simplified into a spatial lag model, a spatial error model, or an OLS model.

The spatial lag model, also known as the spatial autoregressive (SAR) model is the model of central focus in our sample. It is used as the main model of analysis in 22 papers, including 15 static (e.g., Werck et al., 2008; Kim & Park, 2019) and 07 dynamic ones (e.g., Foucault et al, 2008; Akai & Suhara,

2013).   The SARAR model, which includes both endogenous interaction effects and interaction effects among the error terms, is used in 04 studies (Šťastná, 2009; Rincke, 2010; Gebremariam et al., 2012; Hayashi & Yamamoto, 2017).

Spatial dependence could be a result of considering similar characteristics and citizens' preferences among the local governments.   However, the model that captures exogenous spatial effects alone (SLX) is overlooked and this type of effect is not considered in any studies in the sample.   It is merely incorporated with endogenous effects into the SDM model in 04 studies (e.g., Yu et al., 2013) and in the General Nesting Spatial SUR (SUR-GNS) model in 01 study (López et al., 2017).

4.2.2. Weight matrix

The selection of proper weight matrix is key to spatial analysis.   Due to the infeasibility of estimating weighting matrix, it is up to the researcher to specify the matrices prior to estimation (Case et al., 1993; Brueckner, 2003).   Hence, the selection of weight matrices in the sample is diverse.

Geographic proximity has frequently been used as a starting point in the sample's studies.   This is related to the well-known first law of geography: "Everything is related to everything else, but near things are more related than distant things" (Tobler, 1970, p. 236).   There are several ways to assign weights based geographic proximity in the previous research, namely the contiguity matrix of higher-order (e.g., Werck et al., 2008), the k-nearest neighbor matrix (e.g., Barreira, 2011), the distance-based neighbor matrix (e.g., Yu et al., 2013) and the inverse distance matrix (e.g., Wang, 2018, Ferraresi et al., 2018).

Since the selection of weighting matrices represents prior beliefs about the inter-government interaction, estimating the model with non-distance-based is useful in determining whether spatial proximity is the proper definition of neighborhood.   Wang (2018) uses the population-weighted matrix and finds that the degree of spatial dependence is greater than in the case of the geographic-based weight matrix.   Using the expenditure competition effect on local police spending as an example, Rincke (2010) shows that commuting-based weighting schemes give estimates which differ substantially from those obtained using a standard contiguity matrix.

Since the weights must be determined a priori, some researchers compare the fit of the model under different weighting schemes.   Most of the time, the weight matrices are row-normalized.

4.3. Estimation strategies
4.3.1. Methods of estimation

Maximum likelihood estimator used to cause computational difficulties for econometrician, that was one of the reasons to develop IV/GMM estimators (Kelejian & Prucha, 1998, 1999).   The studies in the sample have shown that these difficulties have become a thing of the past, while the maximum likelihood estimator dominates all the other IV/GMM and GS2SLS (for cross-section only) in cross-

section and panel datasets settings.　It is used as the estimator of result implication in 16 studies.

The system generalized method of moments (SYS-GMM) estimator is adopted for all 07 studies concerning dynamic panels in the sample (e.g., Bartolini & Santolini, 2012; Costa et al., 2015).　There are several explanations for this popularity.　The estimator handles important modeling concerns – fixed effects and endogeneity of regressors – while avoiding dynamic panel bias (Nickell, 1981).　The flexible GMM framework accommodates unbalanced panels and multiple endogenous variables (Roodman, 2009).　The SYS-GMM estimator is more efficient than the maximum likelihood estimators developed for spatial panel models, and easier to implement, as it does not require the inversion of the spatial weight matrix (Kukenova & Monteiro, 2009).

4.3.2. Reflection problem

A major challenge in estimating spatial fiscal interactions, and more broadly all types of interactions, is to separately identify three types of effects, namely endogenous social effects, contextual effects, and correlated effects.　The difficulty to disentangle the above types of effects is called the "reflection problem" (Manski, 1993).　Some studies in the sample have attempted to solve the problem.

Breuillé and Le Gallo (2017) adopted an inventive approach to handle the reflection problem in a cross-sectional data set proposed by Lee et al.　(2010), consists of using a spatial autoregressive model (SAR) combined with group fixed effects.　The group fixed effects allow capturing the effects of common observable and unobservable variables that are met by all members of each group and may be mistaken with endogenous interaction effects.　This group interaction model, contrary to the standard spatial interaction model, is estimated for each group with as many weight matrices as the number of groups and requires a transformation to avoid the incidental parameter problem.

Some studies use the quasi-experimental approach by exploiting exogenous variation in the neighbors dependent variable for identification in the context of spatial fiscal interactions.　Baicker (2005) uses state-level variation inflated by federally mandated increases in Medicare spending to capture a state-specific, exogenous budget shock that should be independent of local economic conditions and changes in local medical prices.

Ferraresi et al. (2018) consider the exogenous variation in the neighbors' expenditure induced by a severe natural disaster that occurred in Abruzzo region in the year 2009, which provides an "external" instrument.　Similarly, Fossen et al. (2017) exploit oil price shocks that affect finances of some municipalities receiving royalties from oil extracted on their soil, but not all municipalities, by combining information on oil endowments of those municipalities with variation in oil prices on the world market over time to extract quasi-experimental variation in spending changes of neighboring municipalities.

4.4. Empirical evidence

To find an adequate explanation for the local government's spending interaction is challenging, because the reduced form of the estimated model, "can generate indistinguishable pattern in spatial interactions" (Barreira, 2011). Exceptionally, Šťastná (2009) argues that total five different explanations which result in spending interactions in different sub-categories in her study.

Evidence in 30 articles, account for 94% of the previous studies in the sample, suggest the presence of independence in local governments' spending decisions. The remaining two articles account for 6% of the sample, belong to the case of Birkelöf (2010) who investigates interaction on spending for the functionally impaired people in Sweden, and Fossen et al. (2017) who look for interaction in public spending of neighboring municipalities in Columbia.

Next, we consider the frequency of spending interactions found in the sample. Expenditure spillover is mentioned the most times in the sample as a determinant of budget decisions among local governments with 17 times, followed by yardstick competition with 11 times, fiscal competition with 05 times. Two sub-types of the cooperative regime, i.e., inter-government cooperation and political affiliation, are mentioned 04 times and 03 times respectively. Social learning is suggested to be the key determinant of spending interaction in 01 study.

4.4.1. Interactions due to non-cooperative regime

Interactions due to expenditure spillovers. Spending spillovers are found in most categories and subcategories of public spending, including total expenditure (e.g., Ferraresi et al., 2016), spending for culture (e.g., Akai & Suhara, 2013), public service (e.g., Gebremariam et al., 2012), environment (e.g. Deng et al., 2012), health (e. g., Yu et al., 2013), education (Gu, 2012), industry-infrastructure (Šťastná, 2009) and economic development (Langer, 2019). It induces the most spatial interactions in sub-category level spending in the sample. In those cases, mostly the estimates for parameters of interest are negative, meaning that the spending provided by neighboring municipalities are substitutes.

It accounts for spending interaction in 80% of the governments at the state/prefecture/province level in the sample. The only exception is provincial spending for economic development in Caldeira (2012), which we will discuss further in Section 4.5.

Spending in administrative services found no significant effect of spillovers. The explanation could be that this sub-category is to some extent fixed and thus does not strongly depend on neighbors' spending.

Notably, Solé-Ollé (2006) identified and categorized two different types of expenditure spillovers among Spanish municipalities, namely "benefit spillovers," originating from the provision of local public goods, and "crowding spillovers," originating from the crowding of facilities by residents in neighboring municipalities.

Table 1: Evidence of expenditure spillovers stimulating spending interactions among neighboring jurisdictions

Studies	Data	Models	Evidences/ Conclusions
Baicker (2005)	48 US contiguous states, 1983-1992	SAR; Conley GMM	Each dollar of state spending causes spending in neighboring states to increase by almost 90 cents
Solé-Ollé (2006)	2610 Spanish municipalities, 1999	SAR; S2SLS	There is a negative spatial dependency in neighboring municipalities' overall spending decisions
Lundburg (2006)	276 Swedish municipalities, 1981-1990	Spatial SUR; ML	Municipalities with similar expenditure levels are clustered to a greater extent than would be expected from just a coincidence.
Werck et al. (2008)	304 Flemish municipalities in Belgium, 2002	SAR; S2SLS	Flemish municipalities' cultural spending is generally positively affected by that in neighboring municipalities.
Šťastná (2009)	205 Czech municipalities, 2006	SAR/SARAR/ SEM; ML/GS2SLS	Negative spatial interdependence was observed for environmental expenditures and for capital expenditures on industry and infrastructure.
Rincke (2010)	559 local units in New England, 2000	SARAR; GS2SLS	Estimations are well in line with the findings in previous studies on expenditure competition and **spillovers** from public goods provision
Gebremariam et al. (2012)	418 counties in Appalachia, 2000	SARAR; GS2SLS	The results indicate significant spillover effects among local governments with respect to spending on public services.
Gu (2012)	1520 Chinese counties, 2000	SAR & SEM; ML	We suggest that the presence of spatially integrated social learning mechanisms with **spillovers** and yardstick competition may be a likely reason for the spatial interaction among counties in China
Deng et al. (2012)	249 Chinese cities, 2005	SARMA; ML	Chinese cities appeared to free-ride and cut its own spending as a response to the rise in environmental spending by their neighbors
Yu et al. (2013)	31 Chinese provinces, 1997-2008	SDM; ML	Provincial governments appear to decrease their own health spending as a response to the rise of health spending of their neighboring provinces
Akai & Suhara (2013)	45 Japanese prefectures, 1997-2007	SAR; S2SLS	There exists free-rider behavior between local cultural expenditures that produce beneficial spillover effects
Caldeira et al. (2015)	77 communes in Benin, 2002-2008	Dynamic SAR; System GMM	Any increase in the local public provision in one jurisdiction should induce a similar variation among the neighboring jurisdictions
Costa et al. (2015)	278 Portuguese municipalities, 1986-2006	Dynamic SAR; System GMM	Portuguese municipalities react to each other's expenditures due to spillovers that require coordination in expenditure items
Ferraresi et al. (2016)	5564 Italian municipalities, 2001-2011	Dynamic SAR; System GMM	There is a negative relationship between spatial interaction and the size of the municipality for current expenditure.
Ferraresi et al. (2018)	5564 Italian municipalities, 2001-2011	Dynamic SAR; System GMM	There is a positive horizontal interdependence in spending decisions due to spillover effects
Yang & Lee (2018)	48 US contiguous states, 2007-2012	SAR; ML	Public safety spending of a municipal government can be negatively related to those of its neighbors,
Langer (2019)	396 municipalities in NRW state, 2009-2015	SDM; QML	Negative and significant coefficients in the subcategories TIC, culture, sport, and Health, which can be explained as expenditure spillovers

Source: Own compilation.　　Notes: *TIC = Transport, Infrastructure and construction.

Table 2: Evidence of yardstick competition stimulating spending interactions among neighboring jurisdictions

Author(s)	Data	Models	Evidences/ Conclusions
Revelli (2006)	146 UK local units, 2 cross-sections	SAR/ SARMA; S2SLS/ ML	The auto-correlation emerged in financial year 2000/2001 were due to yardstick competition, and it is weakened after the introduction of the performance rating system.
Granado et al. (2008)	279 Indonesian districts, 2004	SAR; ML	There is interdependence among neighboring districts regarding total discretionary expenditures and administrative service expenditure
Šťastná (2009)	205 Czech municipalities, 2006	SAR/SARAR/SEM; ML/GS2SLS	We argued that municipalities mimic each other in cultural expenditures, in current expenditures on municipal services
Elhorst & Freret (2009)	93 departments in France, 1992-2000	SDM two-regime; ML	Results provide significant empirical evidence in support of political yardstick competition.
Gu (2012)	1520 Chinese counties, 2000	SAR & SEM; ML	We suggest that the presence of spatially integrated social learning mechanisms with spillovers and yardstick competition may be a likely reason for the spatial interaction among counties in China
Bartolini & Santolini (2012)	246 Italian municipalities in Marche, 1994-2003	SAR/ Dynamic SAR; ML/ System GMM	The static specification shows that in the pre-election year the yardstick behavior is common to any municipality; the dynamic specification confirms the yardstick hypothesis only for municipalities not subject to the DSP*
Caldeira (2012)	29 Chinese provinces, 1980-2014	Dynamic SAR; System GMM	Yardstick competition acts as a corruption-taming mechanism: higher local public spending implies a higher likelihood of re-appointment for provincial officials
Costa et al. (2015)	278 Portuguese municipalities, 1986-2006	Dynamic SAR; System GMM	Portuguese municipalities also react to each other's expenditures due to mimicking behavior of the others, possibly to attract households and firms
Hayashi & Yamamoto (2017)	1637 Japanese municipalities, 2008-2010	SARAR; ML	Spending interaction among Japanese municipalities originates from yardstick competition
López et al. (2017)	1201 Spanish municipalities, 2010-2012	Spatial SUR (GNS); ML	Positive spatial dependence reflects how municipalities interact through yardstick or coordination mechanism
Kim & Park (2019)	57 Californian counties, 2001-2014	SAR; S2SLS	The spending pattern of a local government is positively influenced by neighboring governments that are similar in terms of personal income and geographic proximity

Source: Own compilation.

Note: *DSP = domestic stability pact, a fiscal rule introduced to limit the budget deficit of local administrations.

Interactions due to yardstick competition. Yardstick competition plays a dominant role in influencing local spending in terms of total expenditure in the study sample (e.g., Granado et al., 2008; Hayashi & Yamamoto, 2017). There are striking pieces of evidence that the extent of mimicking policy decisions in a jurisdiction depends on its fiscal autonomy (Kim & Park, 2019) and political majority of its incumbent (Elhorst & Freret, 2009). The latter evidence is in agreement with

previous evidence found in the tax competition setting (Allers & Elhorst, 2005).

Yardstick can even be seen in cultural expenditure (Šťastná, 2009), a sub-category that otherwise closely related to expenditure spillovers in the other four studies (Lundberg, 2006; Werck et al., 2008; Akai & Suhara, 2013; Langer, 2019). A feasible explanation in this situation[2] is that higher expenditures on leisure activities in neighboring municipalities can put pressure on the domestic government. Because of information spillovers, the absence of any leisure activities in the domestic municipality appears worse when neighboring municipalities provide new cultural services and goods (Šťastná, 2009).

Interactions due to fiscal competition. There are two studies in the sample concerning the interdependence among local governments' decisions on economic development spending, and evidence of both point toward fiscal competition as the core contributing factor. In order to stay competitive, municipalities in (Langer, 2019) and states in (Wang, 2018) increase their expenditures on business development to attract mobile factors as private investment and employment. Additionally, Wang (2018) compares between expenditure for different economic development incentives (EDI) and suggests that "strategic interaction is more intense in out-of-pocket EDI spending than EDI in the form of foregone tax revenues".

In three other studies, fiscal competition results in spending interactions on health in the Philippines (Kelekar & Llanto, 2015), housing construction in Czech (Šťastná, 2009), and police in New England, the

Table 3: Evidences of fiscal competition stimulating spending interactions among neighboring jurisdictions

Studies	Data	Methods	Evidences/ Conclusions
Šťastná (2009)	205 Czech municipalities, 2006	SAR/SARAR/ SEM; ML/GS2SLS	The main aim of housing construction support is to attract new people to settle in the region, attributed to the fiscal competition.
Rincke (2010)	559 local units in New England, 2000	SARAR, GS2SLS	Estimations are well in line with the findings in previous studies on expenditure competition and spillovers from public goods provision.
Kelekar & Llanto (2015)	1419 Philippines local government units, 2007	SAR, S2SLS	Results indicate that health spending is characterized by a strong positive interaction between municipalities, consistent with the existence of a horizontal fiscal interaction.
Wang (2018)	48 US contiguous states, 2007-2012	SAR, ML	Evidence suggests that states exhibit some degree of interdependence in EDI spending decisions. States react to neighbor's increases in EDI spending by increasing their own EDI* expenditures.
Langer (2019)	396 municipalities in NRW state, 2009-2015	SDM, QML	There is a positive and significant spatial effect for business development, which indicates that fiscal competition is present.

Source: Own compilation. Note: *EDI = Economic Development Incentives.

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2) This situation here means the presence of yardstick competition in cultural spending

US (Rincke, 2010).

4.4.2. Interactions due to cooperative regime

Interactions due to inter-government cooperation.   Taking into account the correlated unobservable characteristics of municipalities with inter-municipal group fixed effects, Breuillé and Le Gallo (2017) uncovered that the endogenous effects turn from positive into negative ones for capital expenditures.   The research also showed that current expenditure items selected by municipal governments are "strategic complements" whereas capital expenditure items are "strategic substitutes", possibly owing to the inter-municipal cooperation fosters the exchange of good practice and requires the coordination of fiscal decisions.

Interactions due to political affiliation.   Foucault et al. (2008) and Barreira (2011) propose that strategic expenditure interactions in their sample neighboring municipalities are due to political affiliation only.   They clarify that bordering municipalities with incumbency of the same party are

Table 4: Evidence of inter-government cooperation stimulating spending interactions among neighboring jurisdictions

Studies	Data	Methods	Evidences/ conclusions
Šťastná (2009)	205 Czech municipalities, 2006	SAR/SARAR/ SEM; ML/ GS2SLS	Interaction among municipalities may stem from cooperation because neighboring municipalities can work on joint projects
Gu (2012)	1520 Chinese coun ties, 2000	SAR & SEM; ML	There exist local counties partnerships in determining local education expenditures among neighboring counties.
Breuillé & Le Gallo (2017)	33,484 French municipalities, 2008	SAR; ML	Inter-municipal cooperation favors the exchange of good practice and requires the coordination of fiscal decisions, especially capital expenditures.
López et al. (2017)	1201 Spanish municipalities, 2 010-2012	Spatial SUR (GNS); ML	Positive spatial dependence reflects how municipalities interact through yardstick or coordination mechanism.

Source: Own compilation.

Table 5: Evidence of political ideology stimulating spending interactions among neighboring jurisdictions

Studies	Data	Methods	Evidences/ conclusions
Foucault et al. (2008)	90 French municipalities, 1983-2002	Dynamic SAR	Spending interactions are shown to exist between municipalities that share same political affiliation.
Šťastná (2009)	205 Czech municipalities, 2006	SAR/SARAR/ SEM; ML/ GS2SLS	Political characteristics affect the size of spending; left-wing parties tend to increase expenditures on culture and decrease expenditures on industry and infrastructure.
Barreira (2011)	86 municipalities in North Portugal, 1998-2008	SAR; S2SLS	Strategic interaction among municipalities is an outcome of spillover effects stimulated by neighboring local governments with similar political orientation.

Source: Own compilation.

more prone to engage in cooperation that leads to an increase in public expenditures.

It should be noted that nearly half of already small sample of municipalities in Barreira (2011) face shrinking phenomena in and do not being economically attractive; while Foucault et al. (2008) only use a sample of 90 municipalities with over 50,000 inhabitants out of total 36,600 municipalities in France. As argued in Padovano and Petrarca (2014), limiting the analysis to a subsample whose borders do not coincide with the limit imposed by institutional differences may undermine the validity of the results.

Interactions due to social learning.　There is a new type of interaction found in the particular case of educational spending in China.　Gu (2012) suggests that the presence of a spatially integrated social learning mechanism is likely to be the major determinant for the spatial interaction in education expenditure among counties in China.　This pattern, within the context of the review, is considered a way of social cooperation, since it promotes the transfer of good practices in education sector one county to nearby other counties.　Ferraresi et al. (2018) acknowledge that this type of interaction in spending may have some role in deciding the spending of local governments. However, they cannot find evidence for it.

4.5. Spending interaction in developing countries

Indifferent to developed countries, developing countries are turning to decentralization to escape from the traps of ineffective and inefficient governance, macroeconomic instability, and inadequate economic growth (Bird and Vaillancourt, 1999).　To fully understand the consequences of decentralization, reliable estimates of the extent of strategic fiscal interactions of local governments are crucial (Caldeira et al., 2015).　However, far less is known about local fiscal interactions in developing countries, since large and complete fiscal policy datasets rarely exist in these regions, or sometimes inaccessible.　It is important to investigate developing countries separately because they are in the focus of decentralization reform efforts (Fossen et al., 2017).

Our sample includes 08 studies regarding spending interaction among neighboring local governments in Benin (01), China (04), Columbia (01), Indonesia (01), and the Philippines (01).

Benin.　A study on 77 communes in Benin over a period from 2002 to 2008 demonstrates that any increase in the local public provision in one jurisdiction should induce a similar variation among the neighboring jurisdictions.　The existence of strategic complementary among local governments in developing countries as in Benin raises coordination among local governments and suggests

Table 6: Evidence of social learning stimulating spending interactions among neighboring jurisdictions

Study	Data	Methods	Evidences/ conclusions
Gu (2012)	1520 Chinese counties, 2000	SAR & SEM; ML	Social learning is possibly the main determinant for spending interaction in education

Source: Own compilation.

attractive consequences for decentralization in these countries (Caldeira et al., 2015).   For example, decentralized foreign aid should be reinforced in such a context.

China.   Apart from other studies in Chinese context which, as elsewhere noted, mainly evidence the presence of expenditure spillovers in education, health, and environment, Caldeira (2012) confirmed that the magnitudes of yardstick competition amongst Chinese neighboring provinces are higher for economic (urban transportation infrastructure) than for social expenditures (e.g., culture, education, science, and health care) and non-significant for expenditures unrelated to performance evaluation criteria adopted by the central government.   This typical behavior can be named a yardstick competition 'from the top', in which the central government creates competition among local governors by judging them based on economic-performance.

Columbia.   Fossen et al. (2017) show contradictory results to those in the rest of the studies in the developing world.   The author assures policymakers about a race to the bottom regarding local public expenditures when pursuing decentralization reform in a developing country, considering insignificant spatial interactions for total local public spending and most expenditure types in a sample of 1093 Columbian municipalities over an eleven-year period.

Indonesia.   Yardstick competition is also witnessed in Indonesia's case.   Granado et al. (2008) found evidence for yardstick competition in total discretionary expenditure and its administrative service sub-category among Indonesia's districts; and acknowledged that the presence of such inter-jurisdiction competition suggested that accountability mechanisms in decentralized developing countries may be strengthened.

The Philippines.   Local governments in the Philippines have great discretionary powers in determining the allocation of 80% of the spending (Brinkerhoff, 2012), and administrative and political freedom.   This high level of autonomy can lead them to a race of spending for preferable goals. Results indicate that health spending is characterized by a strong positive interaction between municipalities, consistent with the existence of a positive fiscal interaction, which could have potentially been due to competition for health resources such as doctors (Kelekar & Llanto, 2015).

4.6. Intervention practices from central governments

When local governments choose their expenditures/taxes - which can affect the welfare of their neighbors – by maximizing their own welfare without taking into account their neighbors' welfare, they end up into inefficient levels of expenditure and/or taxes (Gordon, 1983).   The wrongful and uncontrolled spending level could lead to the failure of adequately designing and delivering the public services that local people need.   The two following central governments have solutions to providing widely public information with the aim to better control such interdependence in making fiscal decisions at their local government level.

The Japanese government had an initiative to proactively trigger yardstick behavior among its

municipalities, through provides information on local fiscal performance in the Fiscal Index Tables for Similar Municipalities (FITS-M).　Similar localities were grouped, their fiscal indices of each individual were provided to all the group's members, enabling them to refer to their fiscal information as a "yardstick" for fiscal planning (Hayashi & Yamamoto, 2017).　Empirical evidence suggested that the FITS-M work as intended, indicating that spending interaction among Japanese municipalities originates from yardstick competition and not from other types of fiscal competition.

In another way of approach, the government of the United Kingdom disseminating information on nationwide practice in social service provision to all citizens, by introducing a social service performance rating system.　Its public aim is to "ensure that social care issues are properly addressed, to promote good practice and to identify councils that are performing poorly" (Revelli, 2006).　Evidence shows that the system has weakened the mimicking effect among neighboring jurisdictions arising from local information spillovers.

5．Conclusion

Fiscal and other forms of spatial interactions among local governments can help shape important institutional features and outcomes of decentralization.　The forms of decentralization and the institutional and budgetary constraints with which local governments operate in those two categories of countries may mean that the role played, and the outcomes produced by local fiscal competition may differ considerably between the developing and developed worlds and may bring about a totally different picture in the least developed countries.　This article raises the need for further research on local government spending interaction in non-developed parts of the world.　The findings and suggestions drawn from such research might provide useful insights for central governments in effective regional planning and fiscal policies to make expenditure flow at sub-national levels more equal and efficient.　Also, there is a need for comparative studies of spending interaction among different government levels of a country as well as practices of central government intervention to fiscal interaction at their sub-level governments.

Regarding the determinants of strategic interaction among neighboring jurisdictions, the fundamental sources identified are spillovers, fiscal competition, yardstick competition.　However, the rising evidence of cooperative mechanisms may lead the field to a more positive direction, in which researchers can find persuasive evidence of local governments cooperating to provide the best services from them.　Among those, further research on social learning mechanism could be a wonderful start.

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