When does inter-jurisdictional competition engender a "race to the bottom"?: a meta-regression analysis

Working paper

The international platform of Ludwig-Maximilians University's Center for Economic Studies and the Ifo Institute

CESifo Working Papers
www.cesifo.org/wp

When Does Inter-Jurisdictional Competition Engender a "Race to the Bottom"? A Meta-Regression Analysis

Joan Costa-Font
Filipe De-Albuquerque
Hristos Doucouliagos

CESIFO WORKING PAPER NO. 5212
CATEGORY 1: PUBLIC FINANCE
FEBRUARY 2015

ISSN 2364-1428

CESifo
Center for Economic Studies & Ifo Institute

CESifo *Working Paper No. 5212*

When Does Inter-Jurisdictional Competition Engender a "Race to the Bottom"? A Meta-Regression Analysis

Abstract

A growing literature documents the existence of strategic political reactions to public expenditure in one jurisdiction on either neighboring or reference jurisdictions. The latter might give raise to downward expenditure spiral, or "race to the bottom". However, in ascertaining the empirical triggers of such a process evidence is suggestive of markedly heterogeneous findings. Most of such heterogeneity can be traced back to study design and institutional differences. This paper contributes to the literature by applying meta-regression analysis to quantify the size and the direction of strategic inter-jurisdictional expenditure interactions controlling for study and institutional characteristics. We find several robust results beyond confirming that jurisdictions do engage in strategic expenditure interactions; namely that (i) interactions are weakening over time; (ii) strategic interactions are stronger among municipalities than among intermediate levels of government; and (iii) strategic interactions appear to emerge from tax competition rather than yardstick competition, with capital controls and fiscal decentralization shaping the magnitude of fiscal interactions. Hence, we conclude political decentralization structures that draw upon the political agency (yardstick competition) does not necessarily engender a 'race to the bottom'.

JEL-Code: H100, H500.

Keywords: inter-jurisdictional competition, yardstick competition, meta-regression, expenditure competition.

Joan Costa-Font
London School of Economics and Political Science
Cowdray House
United Kingdom – London WC2A 2AE
j.costa-font@lse.ac.uk

Filipe De-Albuquerque
London School of Economics and Political Science / Cowdray House
United Kingdom – London WC2A 2AE
F.De-Albuquerque@lse.ac.uk

Hristos Doucouliagos
Deakin University
Burwood, 3121
Victoria / Australia
douc@deakin.edu.au

1. Introduction

Decades of political and social science research have revealed the existence of government strategic interactions (Breton, 1996). One of the most common interactions to take place within a democracy is the shaping of expenditures to suit the median voter's preferences in a given jurisdiction. Yet, both competitive and cooperative interactions between rival jurisdictions can emerge in the provision of public goods and services (Volden, 2005). Rivalry between jurisdictions can occur at the same level (*e.g.* municipalities horizontally competing with each other) or between different levels (*e.g.* States competing with Federal governments). Government strategic interactions are likely to be heterogeneous across countries depending upon the limits of fiscal capacity,[1] the contours of the political agency control, the informal rules of political culture and the effectiveness of electoral institutions.

Competition between rival jurisdictions is important because it affects spending decisions (Berry, 2008; Besley and Rosen, 1998; Fiva and Rattso, 2006).[2] However, the theoretical literature offers conflicting predictions regarding the existence and consequences of inter-government interactions; the direction of the reaction to a rival government's fiscal policies is theoretically ambiguous (Eggert, 2001; Brueckner, 2003). Intervening variables such as in the design of political incentives and institutional constraints are found to be important in shaping both the direction and magnitude of inter-government interactions (Oates, 1999; Besley, 2006; Rom, 2006; Simeon, 2006). For example, "race to the bottom" models predict that inter-government competition results in a downward bias in public expenditure (Oates, 1972). In these models, rival jurisdictions are assumed to have strong political and fiscal incentives to compete for mobile factors. Taxes and subsidies are used to compete for mobile capital and attract high-

[1] By fiscal capacity we mean a class of factors such as the tax base, tax rates, the softness of the jurisdiction's budget constraint and the availability of debt financing.

[2] Inter-jurisdictional competition can also affect policy adoption (Berry and Baybeck, 2005; Murillo and Martínez-Gallardo, 2007).

income households, while also trying to discourage low-income households and welfare dependents.[3] In a simple model where no other variables are accounted for, inter-jurisdictional competition is argued to erode redistributive expenditure, especially the provision of important either public or publically provided private goods. Consequently, public expenditure levels are argued to be sub-optimal.

In contrast, when yardstick competition models are used to describe the mechanisms of fiscal competition the emergence if a 'race to the bottom' is far from clear. Strategic expenditure interactions can arise from yardstick competition mechanisms where the fear of electoral punishment induces incumbent governments to compete with their rivals (Salmon, 1987; Besley and Case, 1995; Breton, 1996). Median voter type models predict that when faced with re-election, governments might be reluctant to lower social services if the median voter uses them more than proportionally. Governments might also be reluctant to reduce public spending, particularly on "merit goods" such as health and education. Basinger and Hallerberg (2004) point out that the pressure on expenditure behavior to converge with rival jurisdictions is moderated by "domestic costs to reform".

Given the above considerations, it is theoretically unclear what the effects of inter-government competition will be. Theoretical ambiguity increases when considering strategic interactions within multi-tiered governments (Besley and Rosen, 1998; Wilson, 1999).[4] There is also a lack of consensus on the *causes* of fiscal interdependence.

Theoretical ambiguity is matched by scattered and inconclusive empirical evidence, especially with respect to the size of interactions, as well as the institutional and economic determinants underpinning them. Berry (2008, p. 817) argues that: "… the evidence of wasteful

[3] 'Desirable' factors contribute to regional growth and development and to revenues for the jurisdiction, while 'undesirable' factors add to social welfare expenditures (Craw, 2010).

[4] Ambiguity emerges also with regard to regulatory competition. For example, inter-jurisdictional competition can result in a race to the bottom in environmental regulations resulting in sub-optimal regulation that makes all states worse off, or it can lead to a "race to the top" (Konisky, 2007).

tax competition is largely anecdotal; the field has produced no systematic evidence of a fiscal race to the bottom …".

Our main contribution to the literature is to show that there is actually sufficient evidence from which to conclude that jurisdictions do play expenditure games and engage in strategic expenditure interactions. We also show that it is possible to identify the causes of inter-government competition; interactions appear to emerge from tax competition rather than yardstick competition.

In this paper we assess comprehensively and systematically the evidence on inter-jurisdictional strategic interactions (competition). We apply the statistical tools of meta-regression analysis (MRA) to the existing evidence base. An assessment of the empirical literature is presently missing. Our MRA is not a literature review. Rather, we use MRA to analyze statistically several dimensions of the literature, some of which have not been explored in the primary literature. To use a comparable source of data, we rely on total expenditure interactions rather than interaction in different types of public or publicly provided private goods (e.g., health, education, cultural goods). We restrict our analysis to studies that address strategic interactions; hence studies examining spatial dependence per se are not not automatically included in our sample unless they offers a specific empirical treatment of strategic interactions.

Through MRA, we take stock of the existing evidence and address four sets of issues. First, we depart forma very simple first exercise where we explore whether strategic interactions or competition between rival jurisdictions does indeed affect government behavior and shape expenditure levels. Second, we examine whether such expenditure interactions are more likely to occur in homogenous communities (*e.g*. local authorities within states) than at higher levels of aggregation of the government unit (*e.g.* at the state or national level). We then extend our analysis to differences between countries. Third, we seek to identify the institutional and

regulatory factors that shape between-country differences. Specifically, we investigate whether expenditure interactions arise from tax competition and/or yardstick competition. Both give raise to different mechanisms, namely either react to the threat of mobility or to the thread of 'no re-election' of the jurisdictional incumbent (Salmon, 1987; Besley and Case, 1995; Breton, 1996). Finally, we wish to explain the large degree of heterogeneity in reported results between studies. Why do studies report different results? Our variable of interest is the partial correlation between expenditures made by rival jurisdictions, controlling for the effects of a range of other factors. That is, the paper focusses on the analysis of expenditure interactions: meta-analysis of tax competition literature is beyond the scope of this study.

MRA is particularly well suited to drawing inferences from a literature that reports diverse estimates and where there is heterogeneity in the institutional settings and econometric models adopted. Applications of MRA include Doucouliagos and Paldam (2008) on the growth effects of aid, Efendic, Pugh and Adnett (2011) on institutions and economic performance, Feld and Heckemeyer (2011) on FDI and taxation, and Alptekin and Levine (2012) on military expenditure and growth. Our innovation is to apply MRA to explore dimensions that were not considered by the primary studies. We take advantage of the between-study heterogeneity to provide further insights into inter-jurisdiction competition and to explore additional dimensions. We do this by collecting information on the degree of capital controls, voter turnout, and the degree of decentralization of the jurisdictions investigated by primary studies. That is, we assess the evidence base by drawing upon data from within the studies themselves (such as reported estimates of strategic interactions) as well as information that was not considered by the authors, such as the degree of political participation and regulation of capital mobility that applied at the time the samples were taken. This enables us to model both the heterogeneity within the primary studies themselves (through their chosen econometric model), plus the heterogeneity in the samples used by different studies that was not previously modeled by the studies.

2. From Primary Analysis to Meta-Analysis

The fiscal interactions literature has progressed through several waves of research. The earlier empirical literature focused on welfare migration caused by competition for mobile resources.[5] The subsequent and much larger empirical literature has focused on neighborhood effects by directly estimating fiscal reaction functions. Some of these studies investigate tax competition, while others focus on expenditure competition. The literature then moved on to estimate reaction functions between jurisdictions at different levels. Expenditure interactions are modeled as reaction functions of the ith jurisdiction's expenditure choices (E_{it}) in year t, depending on the choices of the jth neighboring jurisdiction at time t, plus other variables that also explain the jurisdiction's expenditure:

$$E_{it} = \gamma_0 + \gamma_1 \sum_{j \neq i} \omega_{jt} E_{jt} + \gamma_2 \sum_{v \neq i} \omega_{vt} E_{vt} + \mathbf{X}_{it}\gamma_3 + \alpha_i + \delta_t + \mu_{it} \qquad (1)$$

where $\gamma_0, \gamma_1, \gamma_2, \gamma_3$ are parameters to be estimated, E_{jt} refers to the fiscal choices of the j neighboring jurisdiction at time t (horizontal competition), E_{vt} refers to the fiscal choices of the *v* higher level governments at time t (vertical competition)[6], ω_{jt} and ω_{vt} are the associated 'spatial weights' that account for the influence of rival jurisdictions, $\mathbf{X}_{it}$ is a vector of other variables that affect a jurisdiction's expenditure, and α_i and δ_t are region and time fixed effects, respectively.

In estimating Eq. (1) researchers need to make several choices. First, there is the choice of the expenditure to be modeled; total expenditure or a specific component, such as health or

[5] There have also been some important recent papers on this theme, *e.g.*, Schaltegger, Somogyi and Sturm (2011).

[6] Actually, in contrast to the tax competition literature, very few spending/welfare competition studies include the vertical competition term.

education. A second choice involves the appropriate weight to assign to rival jurisdictions. Most studies weigh geographical contiguity positively in the spatial weights matrix (ω), though studies attach different weights to geographical neighbors (*e.g.*, Case 1993 and Case, Rosen and Hines 1993), or use some alternative weighing scheme, such as cross state news media influences (Edmark, 2007) or migration patterns (Figlio, Kolpin and Reid, 1999). The third choice variable is the most efficient estimator. The main concern with Eq. (1) is the simultaneity problem created by the strategic interaction of competing governments. This is a type of "spatial lag" that can create an omitted variable bias under OLS estimation. Alternatives to OLS are the Maximum Likelihood estimator, IV, and spatial GMM (Saavedra, 2000; Edmark, 2007; Kelejian and Prucha, 1998 and 1999).

Estimation of Eq.(1) generates estimates of strategic interactions (γ_1, γ_2) . Meta-analysis involves identifying studies that report such estimates and coding these as well as other characteristics of the studies that generate them. When suitably converted, these estimates can be made comparable between studies and then included in the MRA; they form the 'meta-data' for our meta-analysis. The MRA model involves regressing estimates of inter-jurisdictional expenditure interactions against a constant and a set of variables that can explain the heterogeneity in estimates, such as data, specification and estimation differences in research design:

$$r_{ij} = \beta_0 + \beta_k \mathbf{Z}_{jk} + v_{ij} \qquad \text{(j=1, 2, …L)} \qquad (2)$$

Where r_{ij} are c*omparable* estimates of the ith inter-jurisdictional expenditure interactions from study j, *i.e.* the transformations of estimates of γ_1 for horizontal inter-governmental expenditure competition from Eq. (1), v_{ij} is the random error term and $\mathbf{Z}_{jk}$ are moderator variables used to explain the large within and between study heterogeneity routinely found in economics research (Stanley and Jarrell, 1989). The logic of Eq. (2) is that reported estimates will vary as a result of

sampling error (the v_{ij} term) and a set of variables used to capture features of the data used and the way in which the studies were conducted (Roberts and Stanley, 2005; Doucouliagos and Ulubasoglu, 2008). Eq. (2) enables us to quantify the impact of misspecification and omitted variable biases in the primary literature.

Estimation of the MRA model, Eq. (2), is carried out using weighted least squares (WLS) with standard errors adjusted for data clustering. Eq. (2) uses multiple estimates per study. Multiple estimates reported within a single study might not be statistically independent of each other, violating one of the OLS assumptions. Hence, we adjust the standard errors for data clustering, using each study in our meta-dataset as a distinct cluster (estimates are assumed to be clustered within studies).[7] Estimates of strategic interactions and their partial correlation transformations will have different variances (heteroscedasticity): This is evident from the funnel plot, Figure 1 discussed below. WLS corrects this heteroscedasticity. We use precision as the weights, assigning larger weight to estimates with greater precision.

3. The Meta-Data

The data for the meta-regression analysis needs to satisfy three criteria: they should be comprehensive, comparable and representative. We followed the MAER-NET guidelines in constructing the database and conducting the MRA (see Stanley *et al.* 2013).

3.1 Study selection

We carried out a comprehensive search for all empirical studies that reported comparable estimates of inter-government welfare competition. The search for studies involved numerous

[7] An alternative approach is to use a linear hierarchical model (typically estimated using Restricted Maximum Likelihood, or REML). However, the random effects introduced by REML may not be independent of the underlying heterogeneity in the meta-data. If this is the case, then random effects estimates will be biased (Stanley, 2008). We report REML estimates as part of robustness tests.

keywords and search engines, as well as checking all references cited within prior studies. We searched both published material (books and journal papers), as well as the so-called "Grey literature" (unpublished working papers, conference papers and dissertations). We searched for all studies published in either English or French. The search was terminated in December 2012. We excluded several studies that did not provide sufficient information from which we could calculate comparable effect sizes (in our case the partial correlations discussed below). This search process identified 33 studies of horizontal expenditure competition that report 369 estimates and 3 studies of vertical expenditure competition that report 20 estimates. Due to the small number of studies and estimates, we do not consider vertical expenditure competition in the rest of this paper.[8] The studies included in our meta-dataset cover only developed countries, predominantly the USA, Sweden, the UK, and Switzerland (see Table 1, column 1).[9]

Table 1: Country Composition of Estimates of Inter-Jurisdictional Expenditure Interactions

Country	Number of studies (estimates) (1)	Tax revenue decentralization (2)	Capital controls (3)	Voter turnout (4)
USA	15 (156)	38.10 (6.75)	8.12 (0.75)	54.04 (8.19)
Sweden	6 (68)	44.07 (1.05)	7.91 (1.71)	81.58 (3.26)
UK	5 (30)	6.33 (3.06)	9.17 (0.45)	44.37 (3.35)
Switzerland	2 (21)	55.67 (0.56)	9.53 (0.14)	44.70 (0.84)
All studies	341 (32)	32.08 (15.02)	7.92 (1.22)	62.38 (14.87)

Note: Cells in columns 2 to 4 report averages with standard deviations in brackets.

[8] This poses no problems for our MRA of horizontal expenditure competition, as the inclusion of vertical expenditure competition in the primary econometric study does not to have any noteworthy difference on the estimates of horizontal expenditure competition.

[9] The data are available from (*website suppressed for refereeing purposes*) to enable replication and extension of our study. An appendix with the studies included in the meta-analysis is also available at this address.

As noted above, studies estimate some version of Eq. (1). In doing so, they differ in the way in which the dependent and explanatory variables are measured. Moreover, there are often differences in the scale of measurement used. Hence, the regression coefficients from Eq.(1) are not directly comparable across all studies (and estimates) included in the dataset (Becker and Wu, 2007). Following Djankov and Murrell (2002) and Doucouliagos and Ulubasoglu (2008), we converted the study results into partial correlations. Our focus in this paper is purely on the direct effect of the neighboring governments' choice variable. Hence, we abstract from the various spatial impacts (LeSage and Fischer, 2007).[10]

The partial correlations measure the degree of correlation between expenditures made by rival jurisdictions, controlling for the effects of variables that are unrelated to strategic interactions. Partial correlations are interpreted in the same manner as simple correlations. They are a unit-less measure of the strength and direction of jurisdictional interaction: The higher the partial correlation, the stronger the strategic interaction. While the partial correlation is a correlation, the underlying econometric models it is derived from are deemed to be causal models by their authors. Hence, to the extent that estimates of inter-jurisdictional competition are causal (they measure the effect of the spending decisions of other jurisdictions), then the partial correlations can also be interpreted as a causal measure.

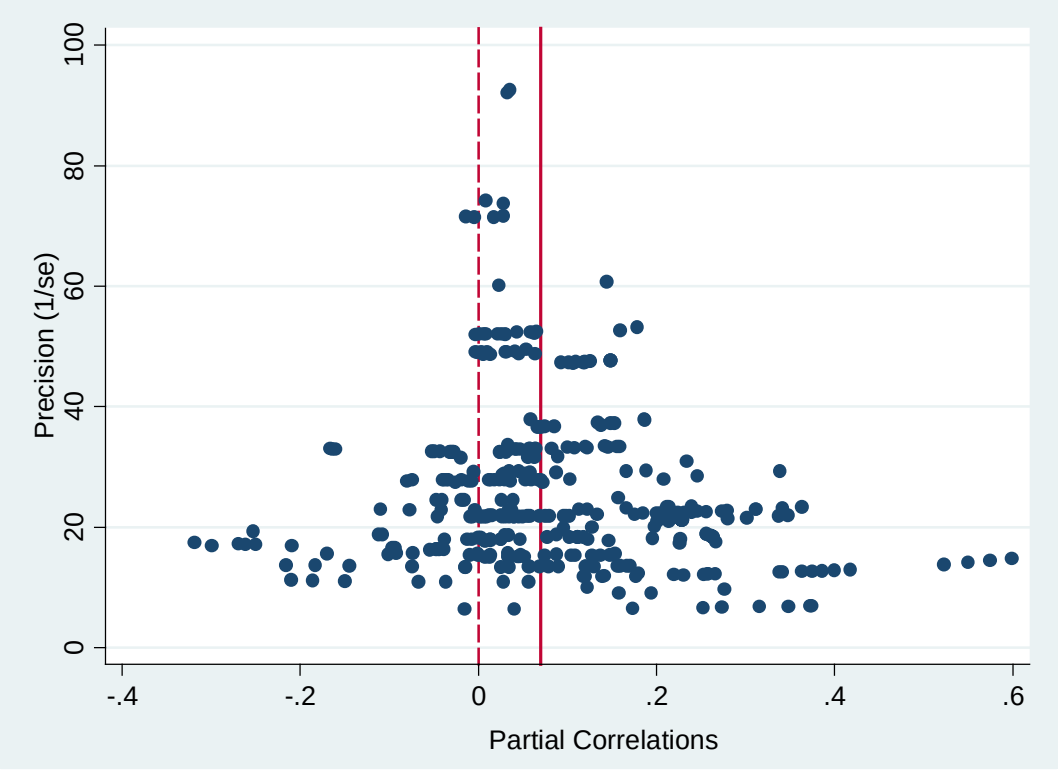
While there are 369 reported estimates from 33 studies, in the empirical analysis we use 341 observations from 32 studies. Some observations are lost because (i) we are unable to match some estimates with data on capital controls, voter turnout and tax revenue decentralization (see section 4 below) and (ii) we removed 7 observations which were clear outliers.[11]

[10] Unfortunately, studies rarely report enough information from which these other effects can be calculated and included in a meta-analysis. Hence, by necessity, the MRA can only be conducted on the direct effect of rival jurisdictions.

[11] We used standardized residuals to identify outliers. Removing these outliers is also justified statistically as this improves the MRA model diagnostics.

The partial correlations for welfare competition are illustrated in figure 1, in the form of a funnel plot. The funnel plot illustrates the distribution of the partial correlations. Specifically, they trace the association between partial correlations and their associated precision, measured here as the inverse of the associated standard error (Stanley and Doucouliagos, 2010; Stanley and Doucouliagos, 2012). The funnel plot shows two important pieces of information. First, it illustrates that the greater majority of estimated partial correlations are positive, indicating positive strategic interactions. There is, however, a fairly wide range of results reported in the literature. MRA can be used to explain this heterogeneity (see section 5 below). Second, it highlights the position of the central tendency of the results. The more precise estimates are closer together and tend to converge towards what might be considered to be the 'real' underlying effect. In our dataset, the weighted average of all partial correlation is +.07, suggesting a small positive degree of inter-jurisdiction expenditure interactions.

Figure 1: Funnel Plot for Estimates of Horizontal Welfare Competition



Notes: The solid line denotes the position of weighted average partial correlation (+.07). The dash line denotes the position of a zero partial correlation. The vertical axis measures precision calculated as the inverse of the standard error of the partial correlation.

3.2 Data comparability

It is essential that the estimates included in the meta-dataset are comparable so that they can be included in the MRA. Our data consists of all estimates of welfare competition in published and unpublished studies. We confirmed data comparability by running three tests. First, we tested whether partial correlations differed significantly between published and unpublished studies. Second, we tested whether study results differ according to the quality of the journal in which they were reported. We used the 2009 Social Science Citation Index Journal Impact Factors as proxies for study quality, assigning a zero weight to unpublished studies and to any journal that is not indexed in the SSCI. Third, we regressed the precision of the estimated partial correlations against the same Impact Factors. The results of these tests are reported in Table 2, columns 1, 2 and 3, respectively.[12] We found no significant difference in partial correlations between published and unpublished studies (column 1) and no difference on the basis of the quality of the journal as measured by journal Impact Factors (columns 2 and 3). In contrast, we show below that the partial correlations do vary as a result of measurement, data, specification, and estimator differences.

Our dataset purposefully includes estimates from different dimensions: estimates at different jurisdiction levels, in different countries, at different time periods, and for different types of expenditures. Expenditure on health, security, and infrastructure expenditures can be regarded as three different types of policy choices; internal redistributive, external threat, and internal developmental. Fiscal interactions might vary along these dimensions, *e.g.*, redistributive

[12] For these estimates we include all observations except the outliers discussed in above.

spending may result in race-to-the-bottom while public spending on development might yield efficient competitive processes and positive effects. The benefit of pooling these estimates together is that it enables us to formally test whether there are significant differences between fiscal interactions along these dimensions. The key advantage of MRA is that it can deal with such heterogeneity. MRA enables the identification of multiple dimensions of heterogeneity. That is, instead of *a priori* assuming that strategic interactions differ along these dimensions, we statistically test whether they do differ.

Table 2: Meta-data Comparability and Publication Selection Bias Tests

	(1)	(2)	(3)	FAT-PET (4)
Constant	.058 (2.39)	.056 (2.72)	29.339 (6.24)	.026 (1.09)
Published	.011 (0.37)	-	-	-
SSCI impact factor	-	.009 (0.65)	-3.164 (-1.46)	-
Standard error	-	-	-	1.245 (1.82)
Adjusted R^2	.001	.005	.063	.042

Notes: The number of observations is 355 estimates from 33 studies. The dependent variable in columns 1, 2 and 4 is the partial correlation. The dependent variable in column 3 is the precision of the partial correlation. Columns 1, 2 and 4 are estimated using WLS, with precision as the weights. Column 3 is estimated using OLS. Brackets report t-statistics using standard errors corrected for the clustering of observations within studies.

3.3 Publication selection bias

Publication selection bias occurs when authors and/or journals have a preference for statistically significant results or a preference for results consistent with a certain theory (Doucouliagos and Paldam, 2008). In such cases, authors do not report all of the results they uncover. Rather, they select results that are consistent with their priors, or results which they believe have a stronger chance of being published. The effect of this process is that certain

findings are suppressed while others are over-represented. Consequently, inferences drawn from an empirical literature maybe biased.[13] Typically, the bias is in favor of rejecting the null hypothesis of a zero effect. Hence, publication selection bias will tend to inflate the magnitude of an empirical effect.

Stanley (2005, 2008) advocates a simple, though powerful, test for publication bias – the funnel asymmetry precision effect size test (FAT-PET). This involves regressing the partial correlations against a constant and the partial correlation's standard error (SE_{ij}). The logic of this test is that estimates should not be correlated with their standard errors if a literature is free of publication selection bias (Egger *et al.*, 1997; Stanley 2005, 2008). If researchers search for estimates that are statistically significant, then they will re-estimate their models until the relationship between *r* and *SE* achieves some acceptable standard of statistical significance (*e.g.* a t-statistic of 1.96). This process will generate a correlation between the partial correlations with their standard errors (Stanley, 2008).[14] The FAT-PET results are reported in Table 2, column 4. We find no evidence of a statistically significant association between the partial correlations and their standard errors. Hence, we conclude that this literature is free of publication selection bias. This is a rather heartening finding given evidence reported elsewhere that there is a large degree of selection bias in economics (see the papers in Roberts and Stanley, 2005) and in political science (see Gerber, Malhotra, Dowling and Doherty, 2010).

4. Regulation, political participation and decentralization

Heterogeneity may arise from genuine empirical differences in the underlying government reaction functions (*e.g.* differences in the expenditure function, countries and time

[13] This bias affects all reviews of the evidence based, be they systematic reviews of the evidence, qualitative literature reviews, or formal statistically based assessments like MRA.

[14] Stanley and Doucouliagos (2012) argue that publication selection bias is analogous to sample selection biases and that it can be modeled as a Heckman-type regression; the MRA with a selection bias adjustment replaces the inverse Mills ratio term with the effect size's standard error.

period analyzed), or it can arise from differences in the specification of Eq. (1). (*e.g.* differences in the weights used, control variables and estimator). We use the MRA model in Eq. (2) to help us to quantify both the effects of misspecification and genuine differences in strategic interactions.

One advantage of MRA is that it is able to explore associations that might not have been considered by the primary studies. We hypothesize that strategic interactions will be moderated by regulation, political participation, and the structure of federations.

4.1 Capital mobility

By impacting upon revenues, tax competition can drive and shape inter-jurisdictional expenditure spillovers. Tax driven strategic interactions require capital mobility; the more mobile capital is the more likely that jurisdictions will engage in tax competition. For federations such as the EU, we posit that easing capital controls increases capital mobility, stimulating tax competition which in turn generates expenditure interactions. If this is the case, the partial correlation of expenditure choices between rival jurisdictions will be positively related to the degree of regulation in capital controls.[15] A similar process is postulated for jurisdictions within single country federations (*e.g.*, the USA), particularly when jurisdictions have a balanced budget requirement. This causal relationship between capital mobility and tax competition

We explore this association by including the variable *CapitalControl* in the MRA. If *CapitalControl* has a positive coefficient in the MRA, then this is consistent with the notion that expenditure interactions are driven by tax competition. We use data from the Fraser Institute on

[15] Some authors have found that that capital mobility might have no effect on tax rates and that it might even increase them (Lockwood and Makris, 2006 and Lai 2010 and references therein). Our hypothesis is that capital controls will shape the magnitude of fiscal interactions. The resulting impact on the direction of tax rates – driving tax rates down or pushing them up – is an entirely different issue.

International Capital Market Controls.[16] This series is available only at the national level. Nevertheless, the national data should serve as a reasonably good proxy for capital controls at the sub-national government level, as capital controls are often imposed at the national level but their effect is felt throughout the economy and state and federal regulations often move together[17]

A positive relationship between the partial correlation of expenditure choices between rival jurisdictions and the degree of capital control regulations can also emerge when countries loosen capital controls and also devolve authority and financial resources to lower level jurisdictions. In this scenario, jurisdictions are given more to spend from the Federal government and they have greater choice in regulations and taxes they can impose, and public expenditures they can made. Consequently, in our MRA we control for the degree of tax revenue decentralization and we also control for whether the primary estimates controlled for grants received from the Federal government.

4.2 Political participation

Our second constructed variable relates to political participation.[18] According to yardstick competition theory, voters make inter-jurisdictional comparisons as an attempt to overcome agency problems (Besley and Case, 1995; Wilson and Gordon, 2003). If this process holds, then there should be a positive correlation between inter-jurisdiction interactions and the degree of political competition. As a measure of this process, we considered the Polity series on political competition (Polity2). However, this series displayed no variation for the countries included in

[16] This is the series 4E, International Capital Market Controls. The maximum value of the series is 10, which denotes the most liberal regime, free of all international capital market controls.

[17] For example, analysis of US sub-national labor market regulation data for the 1981 to 2010 period (Bueno, Ashby and McMahon, 2012) shows that labor market regulations are highly correlated in the majority of regions, with most correlations exceeding 0.70.

[18] Political participation is a different phenomenon from political competition. We would prefer to have data on political competition, such as the electoral margin of the top two candidates in each set of elections, but this information is unavailable for many of the samples used in our meta-study.

our dataset. Instead, we chose to use data on voter turnout, *VoterTurnout;* this is the total number of votes cast (both valid and invalid) divided by the number of names on the voters' register. We constructed this series using data from the International Institute for Democracy and Electoral Assistance and from various national and sub-national electoral bodies. We matched as closely as possible the level at which expenditure competition is occurring with voter turnout. Thus, for competition between nations we used voter turnout in national elections, while for competition at the municipality level we used voter turnout at municipal elections. We were able to do this for 86% of the observations. Where it was not possible to match the level of disaggregation we used the next level of voter turnout, *e.g.* use turnout at the state level as a proxy for municipal elections and national elections as a proxy for state level turnout.

The median voter might very well be different at low levels of turnout than at higher levels. Arguably, the median voter at low levels of voter turnout will have a higher socio-economic background and is more likely to be industry friendly. In contrast, the median voter at higher levels of voter turnout might have a lower socio-economic background, with a stronger preference to increase public expenditure and potentially be less industry friendly. If this is the case, then all else equal, voter turnout will be positively correlated with expenditure competition: there will then be a positive correlation between voter turnout and the partial correlation between the expenditure choices of rival jurisdictions.

4.3 Fiscal decentralization

A third variable is *Fiscal decentralization.* Fiscal interactions are driven by decision makers with autonomy over benefits and/or taxes. Hence, we expect that fiscal interactions will be shaped by the degree of decentralization. However, it is unclear whether fiscal decentralization has a positive or negative effect on the partial correlation of expenditure choices between rival jurisdictions. Some authors such as Keen and Marchand (1997) predict that fiscal

interactions will result in excessive public spending in productive investments and insufficient spending on public consumption goods. Others, however, argue that there are factors operating that will lead to insufficient investment. The net effect on public spending on investment is thus unclear, as is the net effect on total investment. Tax decentralization is an important driver behind these spending biases.[19] In order to explore this effect we use the series on tax revenue decentralization constructed by Stegarescu (2005).[20] A positive (negative) coefficient in the MRA indicates that fiscal decentralization increases (decreases) fiscal interactions.

Descriptive statistics for these three variables are reported in Table 1, columns 2, 3, and 4. Capital controls, voter turnout and federal structure vary over time and between countries. We take advantage of this variation to explore the effects of regulation, political participation and federal structure on strategic interactions. As noted above, while various predictions are possible, our own expectations are that tax competition should increase as capital controls ease, while yardstick competition should increase as voter turnout rises. If the effects of capital controls on strategic interactions are greater (lower) than the effects of voter turnout, then we can conclude that tax competition (yardstick competition) is more prominent.

5. MRA Results

Various versions of the MRA model, Eq.(2), were estimated and the key results are presented in Table 3. We restricted the MRA to 27 variables that capture the main differences in the data, specification and estimation of Eq. (1).[21] Column 1 lists the moderator variables and

[19] Kappeler, Solé-Ollé, Stephan and Välilä (2013) point out that sub-national jurisdictions are responsible for most public infrastructure. Kappeler and Välilä (2008) and Kappeler, Solé-Ollé, Stephan and Välilä (2013) find that decentralization increases spending on infrastructure and public goods but not on redistributive outlays.

[20] Higher values indicate a greater degree of decentralization. Other series are available, such as IMF's Government Finance Statistics and the Fiscal Empowerment series by Boex and Simatupang (2008). However, these data series tend to overstate the degree of decentralization (Stegarescu, 2005).

[21] As part of robustness checks, we also expanded the MRA model to include other variables in the MRA, but these were not statistically significant in explaining observed heterogeneity; see Table 5 below.

their means and standard deviations. The first of these is *Standard error* which is included to test and correct for publication selection bias (Stanley, 2008). This offers a multiple regression version of the FAT-PET reported in Table 2. Next we include the three variables (discussed in section 4 above) constructed using data collected from sources other than the studies, *CapitalControl*, *VoterTurnout* and *FiscalDecentral* (capital market controls, voter turnout, and the degree of federalism, respectively). Seven variables are included to capture data differences. Differences in the measurement of the dependent variable are reflected in three binary variables, *Health*, *Security* and *Infrastructure*, which take the value of 1 if the measure of competition is based on spending on health, security, or infrastructure, respectively. The base for this model is total expenditure and other types of expenditure.

The variables *State* and *Nation* are binary variables that allow us to test how the level of government affects the magnitude of expenditure competition, with municipality as the base. *Panel* is a binary variable taking the value of 1 if panel data are used, with cross-sectional data as the base. *AverageYear* is the average year of the sample used. This variable is included to test whether the degree of expenditure competition varies over time. This variable is normalized at the mean of the sample, 1991. A negative (positive) sign on this variable would indicate that fiscal spending interactions are becoming weaker (stronger) over time. It is also possible that this variable might be picking up improvements in the quality of estimates over time or better quality data over time.

Five variables relate to estimation differences. The existence of strategic interactions means that expenditure policies are endogenous and determined jointly by competing policy makers. The variables *IV* and ML are binary variables that capture any difference in estimates that address this endogeneity by instrumenting spending competition and the use of maximum likelihood estimation, respectively. *OtherNonOLS* is a binary variable for studies that use other estimators. *Time effects* is a binary variable for those studies that use panel data and control for

fixed time period effects.[22] Most studies use contiguity or distance to assign weights to rival jurisdictions: The further away a jurisdiction is, the less weight it is assigned. *NoWeight* is a binary variable taking the value of 1 for studies that take a simple average of other regions.

The variables *Sweden*, *UK* and *AllOthers* capture any national differences, with the USA as the base. Since the MRA also includes *CapitalControl*, *VoterTurnout* and *FiscalDecentral*, the three country dummies are picking up any remaining unobservable differences between countries that might affect estimates of government expenditure strategic interactions. Model specification differences are reflected in the seven binary variables that capture the effect of including specific controls in the primary studies. *Grants*, *Income*, *Population*, *Unemployment*, *Politics*, *Neighborlag* and *Neighborchar* are all binary variables that control whether the primary study includes grants, income, population, unemployment, the politics of the ruling party as control variables, the use of a lagged measure of the neighbor's benefit instead of a contemporaneous value,[23]and control for the characteristics of neighboring jurisdictions, rather than just controlling of the characteristics of the own jurisdiction, respectively.

Column 2 presents estimates of the general MRA with all 27 variables when OLS is used, with standard errors adjusted for the clustering of observations within studies. These 27 variables quantify the main differences between studies in the measures, data, specification and estimation. Column 3 presents the same model estimated using WLS, using 'optimal weights', *i.e.*, each estimate is weighted by its inverse variance. This assigns greater weight to estimates that are reported with greater precision. Column 4 presents the results attained through a general-to-specific modeling strategy, sequentially removing any variable that was not statistically significant at least at the 10% level. The reason for estimating this model is that MRA variables are often highly collinear and the general-to-specific model reveals the underlying associations

[22] In unreported regressions we also considered fixed jurisdiction effects. This variable was never statistically significant.

[23] This is often done to get around the endogeneity between the own and neighbouring jurisdiction's expenditures.

with greater clarity (see Stanley and Doucouliagos, 2012).[24] Most of the observations included in our dataset relate to sub-national fiscal interactions, while 9% relate to national fiscal interactions. In column 5 we present the results of just sub-national fiscal interactions. Columns 2 to 5 use a WLS fixed effects MRA. In contrast, column 6 reports the results from a random effects MRA. These results are presented here for the sake of robustness. Stanley and Doucouliagos (2012) caution against the use of this estimator in the case of observational data as the random effects may not be independent of the underlying heterogeneity in the meta-data, resulting in biased estimates.

The MRA models reported in columns 2 to 5 explain over 40% of the variation in partial correlations. This is actually a fairly large proportion of the variation, given that it highly likely that there will be much random variation in estimates of strategic interactions. The preferred models are reported in columns 3 and 4. Both of these models various normal diagnostic tests.[25] The constant in these MRA models measures the degree of expenditure competition (as measured by partial correlations) for studies using US data on *total* expenditures at the municipality level, using cross-sectional data for 1991, estimated by OLS, without any of the controls listed in the table, using distance to weigh neighbors' spending *and* setting the three institutional data variables to zero. The MRA variables are then interpreted relative to this constant. A statistically significant negative (positive) coefficient in the MRA indicates that the variable reduces (increases) the size of the fiscal interaction.

Several robust results emerge from Table 3. First, *Standard error* is never statistically significant when WLS is used. This confirms the findings from Table 2 (column 4) that there is no significant publication selection in this literature. Second, we find that relaxing capital controls (higher values of *CapitalControl*) increases interdependence between jurisdictions. This can be explained by the spillover effects of tax competition on expenditure competition.

[24] A Wald test was conducted to confirm that the omitted variables were redundant.
[25]The MRA model reported in column 4 passes the RESET test (p-value = 0.60) and the linktest (p-value = 0.27).

Competing for mobile capital through the relaxation of capital controls effectively results in linking expenditure decisions between jurisdictions. Keeping the tax base and federal grants constant, a change in the tax rate alters revenues and hence expenditure. This flows on to the expenditure decisions of rival jurisdictions.

Decentralization (higher values of *FiscalDecentral*), on the other hand, has the opposite effect of relaxing capital controls; decentralization reduces welfare and spending competition. This means that when jurisdictions have greater tax revenue autonomy they are less likely to engage in strategic spending interactions with rival jurisdictions. In other words, the less autonomy they have in raising their own revenue, the more likely they are to use spending as a policy instrument. Hence, a negative coefficient in the MRA is consistent with the view that fiscal decentralization is more likely to result in increased tax competition than it is in expenditure yardstick competition. When taken together, the results from *CapitalControl* and *FiscalDecentral* suggest that the effects of relaxing capital controls are weaker when fiscal decentralization is greater.

Voter turnout appears to have no effect on expenditure competition.[26] We interpret this to mean that political participation does not moderate strategic spending interactions. This suggests that yardstick competition effects do not operate with regard to public spending, in the countries covered by our data. Hence, we conclude from the MRA results that expenditure interactions appear to be driven by tax competition rather than yardstick competition.

[26] One possible explanation for this is the ability of jurisdictions to manipulate who is actually eligible to vote. This can also arise when jurisdictions are very heterogenous with respect to the median voter.

Table 3: Meta-Regression Analysis of Inter-Jurisdictional Expenditure Competition

(Dependent variable is partial correlations)

Variable	Mean (S.D.) (1)	OLS (2)	WLS (3)	General to Specific (WLS) (4)	Without nation estimates (5)	REML (6)
Constant		-.23 (1.22)	-.29 (1.61)	**-.21 (1.94)**	**-.21 (1.92)**	-.23 (1.29)
Standard error	.05 (.03)	**1.41 (1.81)**	1.35 (1.41)	-	-	**1.41 (3.26)**
Regulation, political participation and decentralization						
CapitalControl	7.98 (1.15)	**.08 (4.28)**	**.06 (2.34)**	**.04 (5.00)**	**.04 (4.95)**	**.08 (7.10)**
VoterTurnout	62.30(14.50)	-.01 (0.78)	.01 (0.57)	-	-	-.01 (0.88)
FiscalDecentral	30.80(15.75)	**-.01 (2.07)**	-.01 (1.47)	**-.01 (3.68)**	**-.01 (3.70)**	**-.01 (3.72)**
Data differences						
Health	.09 (.28)	-.01 (0.35)	.02 (1.34)	-	-	-.01 (0.34)
Security	.06 (.25)	**-.20 (4.34)**	**-.16 (4.48)**	**-.16 (3.94)**	**-.16 (3.70)**	**-.20 (6.83)**
Infrastructure	.08 (.27)	-.01 (0.30)	.01 (0.42)	-	-	-.01 (0.34)
State	.40 (.49)	**-.14 (2.90)**	**-.15 (2.80)**	**-.10 (3.49)**	**-.10 (3.41)**	**-.14 (3.95)**
Nation	.09 (.29)	**-.25 (1.87)**	**-.40 (3.08)**	**-.19 (3.68)**	-	**-.25 (2.79)**
Panel	.75 (.43)	**.17 (1.90)**	.14 (1.54)	**.14 (2.05)**	**.14 (2.06)**	**.17 (5.75)**
AverageYear	2.67 (6.94)	-.01 (1.36)	**-.01 (2.01)**	**-.01 (2.78)**	**-.01 (2.71)**	**-.01 (1.73)**
Estimator differences						
Time effects	.56 (.50)	-.07 (1.56)	**-.06 (2.59)**	-.06 (1.65)	-.06 (1.66)	**-.07 (2.96)**
IV	.38 (.49)	0.01 (0.54)	**-.03 (1.85)**	-	-	.01 (0.70**)**
ML	.26 (.44)	.02 (0.48)	-.02 (0.55)	-	-	0.02 (0.76)
OtherNonOLS	.07 (.26)	-.03 (1.09)	**-.05 (1.79)**	-	-	-.03 (1.06)
NoWeight	.10 (.30)	-.04 (1.27)	-.04 (1.21)	-	-	-.04 (1.44)
Country differences						
Sweden	.18 (.38)	-.05 (0.41)	-.13 (0.90)	-	-	-.05 (0.50)
UK	.08 (.28)	**-.35 (2.07)**	-.21 (0.89)	-	-	**-.35 (3.37)**
AllOthers	.17 (.38)	-.21 (1.43)	-.18 (1.10)	-	-	**-.21 (2.27)**
Specification differences						
Grants	.59 (.49)	.13 (3.63)	.06 (1.69)	**.07 (3.09)**	**.07 (3.06)**	**.13 (4.89)**
Income	.68 (.47)	-.04 (0.91)	-.05 (1.18)	-	-	-.04 (1.53)
Neighborlag	.12 (.32)	-.01 (0.25)	**-.03 (2.17)**	**-.02 (1.79)**	**-.02 (1.82)**	-.01 (0.31)
Neighborchar	.15 (.36)	**-.05 (1.86)**	-.04 (1.65)	**-.05 (1.95)**	**-.05 (1.95)**	**-.05 (1.82)**
Politics	.49 (.50)	**.15 (5.15)**	**.13 (3.88)**	**.09 (5.80)**	**.10 (5.54)**	**.15 (7.60)**
Population	.79 (.41)	.05 (1.32)	**.07 (2.65)**	**0.06 (1.96)**	**.06 (1.97)**	**.05 (2.00)**
Unemployment	.54 (.50)	**-.10 (2.61)**	**-.11 (3.02)**	**-.09 (3.65)**	**-.09 (3.66)**	**-.10 (4.36)**
F-test		327.32 [0.00]	529.04 [0.00]	38.59 [0.00]	39.66 [0.00]	329.48 [0.00]
Adjusted R^2		.47	.42	.42	.43	-

Notes: The number of observations is 341 estimates from 32 studies for columns 2 to 4 and 6, and 309 estimates from 30 studies in column 5. Cell entries in bold denote statistical significance at least at the 10% level. Cell entries in brackets in columns 2 to 6 report absolute values of t-statistics derived using standard errors adjusted for data clustering. Column 2 uses OLS, while columns 3 to 5 use weighted least squares using precision as weights. Column 6 reports results of a random effects MRA estimated using Restricted Maximum Likelihood.

A third finding is that data makes a significant difference. The negative coefficient on *Security* indicates that inter-jurisdictional expenditure competition is smaller with respect to security. The level of the jurisdiction is also important. The *State* and *Nation* variables both have negative coefficients in the MRA. The use of state or nation level data results in smaller expenditure competition effects, compared to the base (municipality data). That is, strategic interactions appear to be weaker amongst rival states and nations than they are at lower level jurisdictions. *Panel* has a positive coefficient indicating that studies that use panel data report stronger strategic interactions than studies that use cross-sectional data. *AverageYear* has a negative coefficient indicating that welfare competition is time variant and has been declining over time. The country dummy variables are not statistically significant in the preferred WLS models. This means that there are no country differences in fiscal interactions conditionally on capital controls and fiscal decentralization differences.

Our fourth finding is that, surprisingly, the estimation variables are not important in explaining the variation in the reported results. The one possible exception is that the inclusion of time fixed effects results in smaller strategic interactions. The use of an IV or a maximum likelihood estimator does not appear to make a noticeable different to reported results once other differences in data and research designed are controlled for. Not using any weights at all (treating all jurisdictions equally) also makes no difference to the reported estimates of expenditure competition.

Fifth, econometric specification also matters. The inclusion of grants, the politics of the party in office, and population in an econometric model all result in larger welfare interactions. In contrast, unemployment, the neighbor's spending levels lagged and characteristics of neighboring jurisdictions, all result in smaller effects.

The MRA coefficients can be used to estimate the degree of expenditure interactions arising from inter-jurisdictional competition. We report such estimates in Table 4, for the US and

for all countries combined, for total spending and spending on security, and at the municipal and state jurisdiction levels. In forming such estimates we can use country specific data on capital controls and fiscal decentralization. We assume that the inter-jurisdiction competition occurs at either the municipality or the county level and that a well constructed model will include controls for grants, the politics of the party, population, and unemployment.[27] The average of all countries combined (column 2 of the first row of Table 4) shows a positive partial correlation between rival jurisdictions spending. This suggests the existence of a *negative* spending externality. A positive partial correlation means that the ith jurisdiction will reduce its spending when other jurisdictions decrease theirs. That is, the rival jurisdictions decisions have an adverse effect on the ith jurisdiction. However, it also means that when other jurisdictions increase their spending, it becomes easier for the ith jurisdiction to increase spending. The point estimates of interactions for the US (the second row of Table 4) are slightly lower than for all countries combined. However, the 95% confidence intervals overlap significantly so that there is no practical difference in the size of the interactions. Table 4 also confirms that interactions at the municipal/county level are significantly larger than those at the state/provincial level, with little overlap in the confidence intervals. In all cases, there is no evidence of fiscal interactions with regarding to spending on security: the point estimates vary from positive to negative but the confidence intervals include zero.

Cohen (1988) provides well-known guidelines for the practical significance of a correlation: 0.1 for a small effect, 0.30 is medium, and anything larger than 0.5 is a large effect. Doucouliagos (2011) provides similar guidelines for the practical significance of a partial correlation: 0.07 is a small effect, 0.17 is a moderate effect and 0.33 is a large effect. Hence, we can conclude that fiscal spending interactions at the municipality jurisdiction level are moderate in size and of some practical importance.

[27] We also assume that panel data are used and that model is estimated using either IV, or maximum likelihood or OLS with a lag value in the rival jurisdictions spending, with time effects included.

Table 4: Summary of MRA Estimates of Spatial Interactions, US and All Countries combined

	Municipality/County jurisdiction		State jurisdiction	
	Security spending (1)	Other spending (2)	Security spending (3)	Other spending (4)
All Countries	.04 (-.07 to .14)	.20 (.13 to .27)	-.06 (-.17 to .04)	.09 (.03 to .16)
USA	.02 (-.09 to .12)	.17 (.10 to .25)	-.09 (-.19 to .02)	.07 (.01 to .14)

Note: MRA predictions using regression coefficients reported in column 4 of Table 3. 95% confidence intervals reported in brackets.

Robustness

Table 5 reports the results of various robustness checks on the general-to-specific MRA model reported in column 4 of Table 3, which is reproduced in row 1 for comparison. Note, however, that we add back in *VoterTurnout* to this specific model. Table 5 reports the coefficients on the *CapitalControl*, *VoterTurnout,* and *FiscalDecentral* variables. First, instead of adjusting standard errors for data clustering, we re-estimated the MRA model using a multilevel mixed effects model estimated using REML. The key difference is that voter turnout now emerges with a statistically significant negative coefficient; greater political participation reduces strategic interactions between jurisdictions. Row 3 reports the results of re-estimating the MRA without adjusting standard errors for data clustering. Row 4 reports the results using robust regression, which is less sensitive to the effects of outliers. The MRA was also re-estimated with the addition of more control variables (see the notes to Table 5). These results are reported in row 5. Finally, row 6 reports the results of adding study fixed effects to the MRA. This model focuses

only on the within study differences in reported results and is not comparable to the other models. With the exception of row 6, the results are robust to these alternative approaches.

Table 5: Robustness of MRA

	Capital controls	Voter turnout	Decentralization
Main results (1)	**.04 (5.00)**	-.01 (-0.27)	**-.01 (-3.68)**
REML (2)	**.05 (5.94)**	**-.01 (-2.07)**	**-.01 (-2.72)**
Without clustering (3)	**.04 (6.08)**	-.01 (-0.39)	**-.01 (-5.73)**
Robust regression (4)	**.05 (5.42)**	**-.01 (-1.23)**	**-.01 (-3.12)**
With additional controls (5)	**.04 (3.17)**	-.01 (-0.55)	**-.01 (-1.75)**
Fixed effects (6)	.05 (1.08)	.01 (0.14)	**-.03 (-4.19)**

Notes: The first row reports the results of the model reported in table 3, column 4, with the addition of the *VoterTurnout* variable. The second row uses a multilevel mixed effects model estimated using restricted maximum likelihood. The third row uses WLS but does not adjust standard errors for data clustering. The fourth row uses robust regression. The fifth row adds additional controls variables: welfare spending, education spending, a dummy for jurisdiction fixed effects, GMM estimator, non-contiguity weights, Switzerland, and vertical expenditure competition. The sixth row adds study fixed effects.

6. Conclusion

This paper investigates the extent and magnitude of strategic expenditure interactions between jurisdictions, namely the extent to which expenditure in one jurisdiction is influenced by rival jurisdictions' actions. Meta-regression analysis was applied account for the number of potential biases each study could embrace as well as different study and institutional characteristics that could have influenced one particular study but that can be accounted when several estimates are pooled together. We draw several robust conclusions from our analysis.

The evidence points strongly to the existence of inter-jurisdictional expenditure interdependence among lower level jurisdictions (counties and municipalities). However, compared to the municipality level, horizontal expenditure competition is smaller when the jurisdiction is a State. That is, the strategic interactions are more pronounced at the municipal and county levels, and less so at the State level. In contrast, we find an absence of interactions with respect to spending on security. The MRA indicates that expenditure interactions are becoming weaker over time. This might be driven by rising political costs of inter-jurisdictional rivalry, as

per Basinger and Hallerberg (2004). Alternatively, this might perhaps reflect higher quality estimates using better datasets over time. However, our reading of the literature is that the quality of data used has not materially changed over time. We also find that much of the observed variation in strategic interactions can be explained by differences in the specification of the fiscal interactions econometrics model.

The MRA helps to reveal the causes of inter-jurisdictional interactions. Analysis of the effects of regulation, political participation and decentralization indicates that capital controls and fiscal decentralization play an instrumental role in shaping expenditure interactions. Relaxing capital controls increases strategic interactions whereas granting jurisdictions greater tax revenue autonomy decreases strategic interactions. Capital controls, however, appear to be more important. Evaluated at sample means, we find that the elasticity of strategic interactions with respect to capital controls is 3.97, while the elasticity of strategic interactions with respect to decentralization is -1.36. Hence, a one percentage reduction in capital controls has nearly three times the effect on strategic interactions as does an equivalent percentage change in decentralization. This is consistent with the view that expenditure interactions are caused by tax competition between rival jurisdictions. While some of the robustness results suggest otherwise (recall Table 5), our main results (Table 3) suggest that political participation is not an important factor. This suggests that yardstick competition does not occur at a sufficient degree to drive expenditure interactions, at least in the countries and time periods included in our study. This is an important finding in so far as would suggest that political decentralization does not engender automatically a race to the bottom as some studies have suggested in different settings.

Potential extensions of our study include performing sector specific analysis into different public and/or publicly financed private goods (e,g., education, health care) where other characteristics of the services such as the development of complementary insurance or education vouchers could influence the direction of the strategic expenditure interaction. Another possible

extension includes, examining the different form of spillover effects that could take place between different jurisdictions beyond strategic interactions.

References

Bailey, M.A., Rom. M.A. 2004. A wider race? Interstate competition across health and welfare programs. Journal of Politics 66(2), 326–347.

Basinger, S.J., Hallerberg, M. 2004. Remodelling the competition for capital: How domestic politics erases the race to the bottom. American Political Science Review 98(2), 261-276.

Becker, B.J., Wu, M-J. 2007. The synthesis of regression slopes in meta-analysis. Statistical Science 22(3), 414-429.

Berry, C. 2008. Piling on: Multilevel government and the fiscal common-pool. American Journal of Political Science 52(4), 802-820.

Berry, W.D., Baybeck, B. 2005. Using geographic information systems to study interstate competition. American Political Science Review 99(4), 505-519.

Besley, T. 2006. Principled agents? The Political Economy of Good Government. Oxford: Oxford University Press.

Besley, T., Case, A. 1995. Incumbent behavior: Vote-seeking, tax-setting, and yardstick competition. American Economic Review 85, 25-45.

Besley, T., Rosen, H.S. 1998. Vertical externalities in tax setting: Evidence from gasoline and cigarettes. Journal of Public Economics 70, 383-398.

Boex, J., Simatupang, R.R. 2008. Fiscal decentralisation and empowerment: Evolving concepts and alternative measures. Fiscal Studies 29(4), 435-465.

Brennan, G., Buchanan, J.M. 1980. The power to tax: Analytical foundations of a fiscal constitution. Cambridge: Cambridge University Press.

Breton, A. 1996. Competitive governments: An economic theory of politics and public finance. New York: Cambridge University Press.

Brueckner, J.K. 2000. Welfare reform and the race to the bottom: Theory and evidence. Southern Economic Journal 66(3), 505-525.

Brueckner, J.K. 2003. Strategic interaction among governments: An overview of empirical studies. International Regional Science Review 26(2), 175-188.

Bueno, A., Ashby, N.J., McMahon, F. 2012 Economic Freedom of North America, 2012, Fraser Institute.

Case, A. 1993. Interstate tax competition after TRA86. Journal of Policy Analysis and Management 12(1), 136-48.

Case, A., Rosen, H.R., Hines, J.R. 1993. Budget spillovers and fiscal policy interdependence: Evidence from the states. Journal of Public Economics 52, 285-307.

Cohen, J. 1988. *Statistical Power Analysis in the Behavioral Sciences*, 2nd edn, Hillsdale, NJ: Erlbaum.

Craw, M. 2010. Deciding to provide: Local decisions on providing social welfare. American Journal of Political Science 54(4), 906-920.

Djankov, S., Murrell, P. 2002. Enterprise restructuring in transition: A quantitative survey. Journal of Economic Literature 40, 736-792.

Doucouliagos, H., Stanley, T.D. (2008) Theory competition and selectivity: Are all economic facts greatly exaggerated? Deakin University, Economics Working Paper, No. 2008_14.

Doucouliagos, H., Paldam, M. 2008. Aid effectiveness on growth: A meta study, European Journal of Political Economy 24, 1–24.

Doucouliagos, H., Ulubaşoğlu, M. 2008. Democracy and economic growth: A meta-analysis. American Journal of Political Science 52(1), 61-83.

Edmark, K. 2007. Strategic Competition in Swedish Local Spending on Childcare, Schooling and Care for the Elderly. Uppsala Universitet, Department of Economics, Working Paper 21.

Efendic, A., Pugh, G., Adnett, N. 2011. Institutions and economic performance: A meta-regression analysis. European Journal of Political Economy 27, 586–599.

Egger, M., Smith, G.D., Schneider, M., Minder, C. 1997. Bias in meta-analysis detected by a simple, Graphical Test. British Medical Journal 315, 629-634.

Eggert, W. 2001. Capital tax competition with socially wasteful government consumption. European Journal of Political Economy 17(3), 517-529.

Feld, L.P., Heckemeyer, J.H. 2011. FDI and taxation: A meta-study, Journal of Economic Surveys 25, 233–272.

Figlio, D., Kolpin, V.W., Reid, W.E. 1999. Do states play welfare games? Journal of Urban Economics 46, 437-454.

Fiva, J., Rattso, J. 2006. Welfare competition in Norway: Norms and expenditure. European Journal of Political Economy 22, 202-222.

Gerber, A.S., Malhotra, N., Dowling, C.M., Doherty, D. 2010. Publication bias in two political behavior literatures. American Political Research 38(4), 591-613.

Hunter, J.E. and Schmidt, F.L. 2004. *Methods of Meta-Analysis: correcting error and bias in research findings*, New York: Sage.

Kappeler, A., Solé-Ollé, A., Stephan, A., Välilä, T. 2013. Does fiscal decentralization foster regional investment in productive infrastructure? European Journal of Political Economy 31, 15-25.

Kappeler, A., Välilä, T. 2008. Fiscal federalism and the composition of public investment in Europe. European Journal of Political Economy 24, 562–570.

Keen, M., Marchand, M., 1997. Fiscal competition and the pattern of public spending. Journal of Public Economics 66, 33-53.

Kelejian, H.H., Prucha, I.R. 1998. A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances. Journal of Real Estate Finance and Economics 17, 99-121.

Kelejian, H.H., Prucha, I.R. 1999. A generalized moments estimator for the autoregressive parameter in a spatial model. International Economic Review 40, 509-533.

Konisky, D. M. 2007. Regulatory competition and environmental enforcement: is there a race to the bottom. American Journal of Political Science 51(4), 853-872.

Lai, Y-B. 2010. The political economy of capital market integration and tax competition. European Journal of Political Economy 26, 475-487.

LeSage, J.P., Fischer, M.M. 2008. Spatial growth regressions: Model specification, estimation and interpretation. Spatial Economic Analysis 3(3), 275-304.

Lockwood, B., Makris, M. 2006. Tax incidence, majority voting and capital market integration. Journal of Public Economics 90, 1007-1025.

Murillo, M.V., Martíinez-Gallardo, C. 2007. Political competition and policy adoption: Market reforms in Latin American public utilities. American Journal of Political Science 51(1), 120-139.

Oates, W. 1972. Fiscal Federalism. New York: Harcourt Brace Jovanovich.

Oates, W. 1999. An Essay on Fiscal Federalism. Journal of Economic Literature 37, 1120-1149.

Peterson, P.E. 1981. City limits. Chicago: University of Chicago Press.

Roberts, C.J., Stanley, T.D. 2005. Meta-Regression Analysis. Oxford: Blackwell.

Rom, M.C. 2006. Policy races in the American States. In Racing to the Bottom? Provincial Interdependence in the Canadian Federation, Ed. Kathryn Harrison. 229-56.Vancouver: University of British Columbia Press.

Saavedra, L. 2000. A model of welfare competition with evidence from AFDC. University of South Florida, Manuscript.

Salmon, P. 1987. Decentralization as an incentive scheme. Oxford Review of Economic Policy 3(2), 24–43.

Schaltegger, C.A., Somogyi, F., Sturm, J-E. 2011. Tax competition and income sorting: Evidence from the Zurich metropolitan area. European Journal of Political Economy, 27(3), 455-470.

Simeon, R. 2006. Federalism and social justice. In Territory, Democracy, and Justice: Regionalism and federalism in western democracies, ed. Scott L. Greer. 18-43. New York: Palgrave Macmillan.

Stanley, T.D. 2005. Beyond publication bias. Journal of Economic Surveys 19, 309-345.

Stanley, T.D. 2008. Meta-regression methods for detecting and estimating empirical effects in the presence of publication selection. Oxford Bulletin of Economics and Statistics 70, 103-127.

Stanley, T.D., Doucouliagos, H. 2010. Picture this: A simple graph that reveals much ado about research. Journal of Economic Surveys 24(1), 170-191.

Stanley, T.D., Doucouliagos, H. 2012. Meta-Regression Analysis in Economics and Business, Routledge, Oxon.

Stanley, T.D., Doucouliagos, H., Giles, M., Heckemeyer, J., Johnston, R. J., Laroche, P., 2013. Meta-analysis of economics research reporting guidelines. Journal of Economic Surveys 27(2), 390-394.

Stanley, T.D., Jarrell, S.B. 1989. Meta-regression Analysis: A quantitative method of literature surveys. Journal of Economic Surveys 3, 161-170.

Stegarescu, D. 2005. Public sector decentralization: Measurement concepts and recent international trends. Centre for European Economic Research, Discussion Paper No. 04-74.

Tiebout, C.M. 1956. A pure theory of local expenditures. Journal of Political Economy 64, 416-424.

Volden, C. 2005. Intergovernmental political competition in American Federalism. American Journal of Political Science 49(2), 327-342.

Wilson, J.D. 1999. Theories of tax competition. National Tax Journal 52, 269-304.

Wilson, J.D., Gordon, R.H. 2003. Expenditure competition. Journal of Public Economic Theory 5(2), 399-417.

Appendix A: List of Studies Included in the MRA
(NOT FOR PUBLICATION)

1. Aronsson, T., Lundberg, J. and Wikström, M. 2000. The impact of regional expenditures on the local decision to spend. *Regional Science and Urban Economics* 30:185-202.
2. Baicker, K. 2005. The spillover effects of State spending. *Journal of Public Economics* 89(2-3):529-44.
3. Bailey, M. and Rom, M. 2004. A wider race? Interstate competition a cross health and welfare programs. *The Journal of Politics* 66(2):326-47.
4. Bailey, M., Rom, M and Taylor, M. 2004. State competition in higher education: A race to the top, or a race to the bottom? *Economics of Governance* 5:53-75.
5. Berry, W., Fording, R. and Hanson, R. 2003. Reassessing the "Race to the Bottom" in State Welfare Policy. *The Journal of Politics* 65(2):327-49.
6. Birkelof, L. 2008. Exploring the differences in expenditure for the functionally impaired - neighborhood interaction and the federal structure. *The Annals of Regional Science* 44: 185-204.
7. Birkelof, L. 2009. Intergovernmental Grants and Local Public Expenditure: Spending Decisions and Information Spillover Effects, Umeå University, Department of Economics, manuscript.
8. Bivand, R. and Szymanski, S. 1997. Spatial dependence through local yardstick competition: theory and testing. *Economics Letters* 55:257-265.
9. Bivand, R. and Szymanski, S. 2000. Modeling the spatial impact of the introduction of compulsive competitive tendering. *Regional Science and Urban Economics* 30:203-19.
10. Case, A., Rosen, H. and Hines, J. 1993. Budget Spillovers and Fiscal Policy Interdependence: Evidence from the states. *Journal of Public Economics* 52:285-307.
11. Dahlberg. M. and Edmark, K. 2008. Is there a "race-to-the-bottom" in the setting of welfare benefit levels? Evidence from a policy intervention. *Journal of Public Economics* 92:1193-209.
12. Edmark, K. 2007. Strategic Competition in Swedish Local Spending on Childcare, Schooling and Care for the Elderly. Uppsala Department of Economics Working Paper 21.
13. Figlio, D., Kolpin, V. and Reid, W. 1999. Do States Play Welfare Games? *Journal of Urban Economics* 46:437-54.
14. Fiva, J. and Rattso, J. 2006. Welfare Competition in Norway: Norms and expenditure. *European Journal of Political Economy* 22:202-22.
15. Hanes, N. 2002. Spatial spillover effects in the Swedish local rescue services, *Regional Studies* 36:531-39.
16. Hauptmeier, S., Mittermaier, F., Rincke, J. 2012. Fiscal competition over taxes and public inputs. *Regional Science and Urban Economics*, Volume 42, pp. 407-419.
17. Hübner, M. 2009. Welfare Competition in Germany: Decentralization, the Intensity of Competition and some evidence for the factor flow theory. Center for Doctoral Studies in Economics, Discussion Paper No. 70, University of Mannheim.
18. Kammas, P. 2009. Strategic Fiscal Interaction Among OECD Countries. *Public Choice* 147(3-4):459-80.
19. Kelejian, H. and Robinson, D. 1993. A Suggested Method of Estimation for Spatial Interdependent Models with Autocorrelated Errors, and an Application to a County Expenditure Model. *Papers in Regional Science* 72:297-312.
20. Lundberg, J. 2006. Spatial interaction model of spillovers from locally provided public services. *Regional Studies* 40(6):631-44.
21. Mattos, E. and Rocha, F. 2008. Inequality and Size of Government: Evidence from Brazilian states. *Journal of Economic Studies* 35(4):333-51.

22. Millimet, D. and Rangaprasad, V. 2007. Strategic Competition Amongst Public Schools. *Regional Science and Urban Economics* 37(2):199-219.
23. Murdoch, J., Rahmatian, M. and Thayer M. 1993. A spatially autoregressive median voter model of recreation expenditures. *Public Finance Quarterly* 21:334-50.
24. Redoano, M. 2003. Fiscal Interactions Among European Countries. Warwick Economic Research Papers, No. 680.
25. Revelli, F. 2002. Testing the tax mimicking versus expenditure spillover hypotheses using English data. *Applied Economics* 34:1723-31.
26. Revelli, F. 2003. Reaction or interaction? Spatial process identification in multi-tiered government structure. *Journal of Urban Economics* 53:29–53.
27. Revelli, F. 2006. Performance Rating and Yardstick Competition in Social Service Provision. *Journal of Public Economics* 90:459-75.
28. Rom, M., Peterson, P. and Scheve, K. 1998. Interstate Competition and Welfare Policy. *Publius* 28:17-38.
29. Saavedra, L. 2000. A Model of Welfare Competition with Evidence from AFDC, University of South Florida, Manuscript.
30. Schaltegger, C. and Küttel, D. 2002. Exit, Voice, and Mimicking Behavior: Evidence from Swiss Cantons, *Public Choice* 113:1–23.
31. Schaltegger, C. and Zemp, S. 2003. Spatial Spillovers in Metropolitan Areas: Evidence from Swiss Communes. Center for Research in Economics, Management and the Arts, Working Paper No. 2003-06.
32. Shroder, M. 1995. Games the States Don't Play: Welfare benefits and the theory of Fiscal Federalism, *The Review of Economics and Statistics* 77(1):183-91.
33. Tweedie, J. 1994. Resources Rather Than Needs: A State-Centered Model of Welfare Policymaking, *American Journal of Political Science* 38(3):651–72.