Subnational government tax revenue capacity and effort convergence: New evidence from sequential unit root tests[☆]

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ABSTRACT

Convergence in revenue capacity and effort around rising trends help more subnational governments assume their devolved functions. We examine the extent of such convergence by estimating the proportion of all pairwise convergent gaps in a panel of 48 combined state-local governments (SLGs) over the period 1981–2013 using a novel methodology. We found no evidence of convergence in *tax* revenue capacity or *tax* effort. However, about half of the revenue effort gaps were convergent when revenue was more broadly defined. At a given revenue capacity level, SLGs significantly varied with respect to the revenue effort and incidence of its convergence. Our results caution against inferring convergence as a sample wide phenomenon based on conventional tests, reveal a potential challenge to devolution in the absence of redistribution of federal grants, and are consistent with desire for fiscal diversity.

1. Introduction

Many U.S. state and local governments have been experiencing fiscal stress due to cyclical, structural, and intergovernmental factors that affected their revenue and expenditure levels and fiscal sustainability in the past several decades (Chapman, 2008). Baicker et al. (2012) identified changes in the nature intergovernmental interactions that took place in the context of devolution/decentralization in the postwar period as the main driver of a dramatic rise especially in the state government expenditures.[1] In the absence of a general-purpose fiscal equalization scheme, however, federal grants-which constituted about a third of the state and local government combined revenues-have not been primarily allocated to fully offset differences in the ability of subnational governments to raise revenues or provide services. In fact, governments that could spend more of their own-source revenues received more federal grants with matching, or "maintenance of effort" requirements (Yilmaz et al., 2006; Gordon et al., 2016).

Devolution critics contend that it generates fiscal disparity, because low-revenue capacity governments have to exploit their capacity more

intensely than others to provide a given level of public services. Attempts to boost the extent of capacity exploitation or "revenue effort," however, may be hampered by taxpayer antipathy, mobility of service firms, and/or interjurisdictional fiscal competition. Consequently, the most fiscally stressed governments may be drawn into a vicious cycle wherein cutting services to stay competitive in the short term will lead to further erosion of their competitive position and loss of revenues in the long term. Devolution advocates, on the other hand, argue that state and local governments are in the best position to choose the fiscal bundles that would most serve the interests of their citizen-voters. From this perspective, a low tax-low spending bundle merely reflects the electorate's genuine desire for fiscal diversity.[2]

Against this backdrop, the nature of evolution of the level and spatial distribution of subnational government revenue capacity and effort becomes important for several reasons. Largely rising and converging capacity and effort trends enable more governments to assume their devolved functions and provide services at levels closer to the national standards if they so choose. Furthermore, converging trends tend to weaken the incentive for a tax-based migration of people and the choice

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of business location. On the other hand, non-converging trends reflect persistent fiscal disparity which, while possibly compatible with realization of heterogeneous fiscal preferences, may be inconsistent with national interests. If narrowing of inter-state fiscal disparity is an important objective of a federalist form of government, then the case for redistributing federal grants to make them more closely linked to the fiscal needs of recipients will be stronger in this situation (Yilmaz et al., 2006).

Our review of the literature suggest that studies of subnational government revenue convergence are fairly scant. Almost all of them exclusively focused on actual tax revenue (and its subcategories) in panel data and interpreted their evidence as consistent with *general* convergence. The reported evidence was based on (1) falling coefficient of variation, or CV, ("σ-convergence"), (2) negative and statistically significant (partial) effect of initial tax revenue level on its growth rate in a regression equation ("β-convergence"), and/or (3) stationary tax variables ("stochastic convergence") over the sample period.

σ-convergence, however, merely indicates a narrowing of the dispersion around the sample mean between two points in time. Evidence of this kind (see Kenworthy, 1999; Mikesell, 2007; and Coughlin et al., 2007) is sensitive to the choice of comparison points and may not necessarily indicate a consistent diminution of CV over the entire sample period. Unconditional (conditional) β-convergence suggests convergence to the same (multiple) steady-state level(s). Unconditional β-convergence is unrealistic in view of significant differences in economic, political, institutional, and other "fundamentals" across states and conditional β-convergence is sensitive to the specification of control variables. Regardless, β-convergence is a necessary but not sufficient condition for σ-convergence (see, for example, Young et al., 2008). Accordingly, the evidence of conditional β-convergence in tax variables (see Scully, 1991; Annala, 2003; and Coughlin et al., 2007) may not necessarily be associated with a reduction in the overall dispersion within the sample; rather it may merely reflect a "catch up" of the laggards with the leaders. Finally, to the best of our knowledge, the only evidence of stochastic tax revenue convergence is reported by Annala and Chen (2011). The authors report results based on several conventional panel unit root tests including the less restrictive Im-Pesaran-Shin (IPS) test (Im et al., 2003). The IPS test rejects the null hypothesis of a nonstationary variable (tax level) in favor of the alternative of stationary (or mean-reverting) variable in at least some of the cross-sectional units. The alternative, however, is too broad to allow for any specific conclusions as it could be that all units are stationary or only a non-zero fraction is stationary.

Aside from the issues noted above, a common methodological drawback of past studies is that the convergence hypothesis is either accepted or rejected for the *entire* (or an unspecified fraction of) panel. This leads to unwarranted generalizations and conclusions when some units in the sample are converging while others are not.[3] Moreover, with one exception, these studies focus on convergence of actual tax revenue. Since actual revenue conflates the effects of tax revenue capacity and tax policy changes, its convergence does not necessarily imply convergence in the revenue effort (which is essentially a measure of average effective tax rate). The one exception is the study by Mikesell (2007) which separately examined tax capacity and effort and found evidence favoring σ-convergence for both variables.

The present study contributes to the empirical literature by adopting a novel methodology that accommodates convergence as a partial phenomenon and provides information about convergence among individual units within the sample. Specifically, we apply the "bootstrap sequential quantile test" (BSQT) of unit root proposed by Smeekes (2015) to all revenue capacity and effort *pairwise gaps* in order

to estimate the proportion of convergent (or stationary) gaps in a panel of 48 combined state-local governments (SLGs) over the period 1981–2013. The estimated proportion is based on identifying the number of pairwise convergent gaps for each of the 48 cross-sectional units. As convergence of *all* possible pairwise gaps is examined by the test, we are able to obtain more nuanced evidence of convergence than what was previously reported. In particular, the test results are helpful in determining whether the extent of convergence in revenue capacity and effort justifies the broad conclusions of past studies and also identifying the most (least) frequently convergent SLG units.

In Section 2, briefly reviews the theoretical arguments behind the forces that can potentially drive revenue convergence (or divergence). Section 3 contains an outline of the BSQT and its advantages. Section 4 describes the variables and data set. Section 5 presents the BSQT results, both at the sample and individual levels, against the backdrop of results from the three conventional approaches which are also presented for comparison purposes. Section 6 summarizes the paper's findings and briefly discusses their implications.

2. Theory

Spatial convergence (or divergence) of tax revenue reflects the net effect of a number of (interacting) factors. One factor is the spatial evolution of income/output. The "neoclassical growth model" (Solow, 1956) suggests that, under a set of assumptions, income will spatially converge to the same steady state level as low-income economic units grow faster than the high-income economic units. This drives tax revenue convergence across the units *if* tax is assumed to be a fixed proportion of income. However, income may diverge if, as proposed by "New Growth Theories" (see, for example, Romer, 1986), spillovers associated with abundant capital and/or skilled labor in some economic units put them on a limitless growth path.[4] Accordingly, tax revenue will not converge *even if* it is a constant share of income. Note that within this framework, convergence (or divergence) in revenues reflects evolution in the spatial distribution of revenue capacity (as proxied by income) rather than revenue effort (the proportion of income actually taxed).

Also, the extent of fiscal interdependence among state and local governments can spur convergence in fiscal variables such as tax revenue. Models of interjurisdictional competition provide several channels through which fiscal interdependence may emerge. In Oates and Schwab's (1988) model, for example, jurisdictions compete to attract and retain mobile skilled labor and capital through taxes (and public spending). The threat of resource migration to other jurisdictions, or the "exit mechanism," constrains the fiscal behavior of subnational governments. In the 'yardstick competition' model of Besley and Case (1995) it is the "voice mechanism" that imposes discipline on the fiscal behavior as voters in a jurisdiction judge the fiscal decisions of their elected officials using those of officials in their neighboring states as a yardstick. As noted by Shannon (1989), both interstate competition and comparison set upper and lower bounds on state fiscal decisions and act as a stabilizing factor. One may reasonably expect that fiscal competition and comparison affect revenue convergence through both revenue capacity and effort.[5]

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[3] The following conclusion by Annala (2003, p.156) based on analysis of actual tax variables is illustrative: "The decrease in the coefficient of variation, coupled with the evidence of beta convergence, indicates that state and local tax policies are becoming increasingly similar between the United States."

[4] In this context, Webber et al. (2005, p.566) note that "Divergence may reflect the effects of powerful but temporary national economic shocks that affect regions differently. Endogenous growth could result in divergence due to the presence of "superstar" economies linked to growth poles or geographically reliant sector and skill-biased technical change. The importance of transportation costs and associated iceberg effects can also constrain competition and create an uneven spatial distribution of output and welfare." For a review of empirical evidence on output convergence across U.S. states see Webber et al. (2005) and Islam (2008).

[5] For example, Arizona may decide to follow California and expand its revenue capacity by making the Internet based transactions of its residents with large retailers that do not have physical presence in Arizona subject to sales tax. The rate at which such transactions are taxed would affect Arizona's tax effort.