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Revenue Decentralization and Vertical Fiscal Imbalance: A Survey

By Manuel E. Lago[*], *Santiago Lago-Peñas*[†], *Jorge Martinez-Vazquez*[‡] *and Cristian Sepulveda*[§]

Abstract

This paper offers a comprehensive and updated survey of subnational revenue autonomy and vertical fiscal imbalance in fiscally decentralized systems. We argue that progress in understanding the effects of revenue decentralization has been fundamentally shaped by how it is measured, and that the widespread reliance on transfer-dependence proxies has generated persistent inconsistencies in the empirical literature. Moreover, distinguishing between optimal, actual, and excess Vertical Fiscal Imbalance is essential for policy design. We focus on the effects of revenue autonomy in enhancing spending efficiency, strengthening accountability, and promoting fiscal discipline, while also shaping outcomes in macroeconomic stability, economic growth, and regional redistribution. While the intricate nature of the subject does not allow for an all-inclusive survey, we aim to provide a thorough examination of the most salient effects of subnational revenue autonomy and the pervasiveness of vertical fiscal imbalances. We conclude by highlighting priorities for future research.

JEL Codes: H71, H72, H73, H77

Keywords: Revenue Assignments; Vertical Fiscal Imbalances; Tax Autonomy; Fiscal Decentralization; Subnational Governments.

Statements and Declarations

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I. Introduction

The assignment of revenue responsibilities and the corresponding level of autonomy for subnational governments (SNG) to collect their own revenue are fundamental pillars of sound fiscally decentralized frameworks. Revenue autonomy not only allows for effective discretion in the expenditure side of the budget but also leads to three types of virtuous outcomes: enhancing spending efficiency, strengthening the accountability of subnational officials, and promoting greater fiscal discipline in budgeting and subnational borrowing (Weingast, 1995; Oates, 1999; Rodden, 2006). Over the past two decades, empirical research has consistently demonstrated that subnational revenue autonomy plays a critical role in determining the effectiveness of fiscal decentralization (Martinez-Vazquez, 2008; Martinez-Vazquez et al., 2017).

Yet most decentralized systems worldwide remain characterized by limited subnational revenue authority and often show a wide imbalance between expenditure needs and own revenues. This imbalance, generally known as Vertical Fiscal Imbalance (VFI), arises because the decentralization of revenue responsibilities is very often much less than the decentralization of expenditure responsibilities. This common occurrence raises fundamental questions about the optimal structure of revenue assignments and, therefore, the desirable size of the VFI: How should revenue decentralization be conceptualized and measured? What is the optimal level of vertical imbalance between expenditures and own revenues? How do these arrangements affect fiscal discipline, local responsiveness, and the overall performance of decentralized systems? And finally, why are large VFI so common in practice, and should they be brought down, and if yes, how and how much?

This survey helps answer the questions above within a framework that addresses several fundamental prior issues. First, it reviews the conceptual framework for characterizing the degree and structure of revenue decentralization. Second, it provides a systematic review of existing empirical measures of revenue decentralization, showing how the reliance on oversimplified proxies has generated confusion in both theoretical and empirical research. This framework allows us to further examine which findings regarding the impact of revenue decentralization are most theoretically consistent and robust for policy guidance. By combining conceptual arguments with empirical approaches, the paper offers researchers and

policymakers a coherent package for anticipating intended effects and potentially mitigating unintended effects of revenue decentralization reforms. The intricate nature of the subject does not allow for an all-inclusive survey. However, we aim to provide a detailed examination and update of the most salient effects, while highlighting areas for further research.

We find that the extended use of intergovernmental transfers as a proxy for VFI has created persistent inconsistencies in the empirical literature, thus confounding the true effects of revenue decentralization. We further find that distinguishing between optimal VFI, actual VFI, and excess VFI is essential for both theoretical conceptualization and revenue decentralization design. When more robust measures are employed, the empirical evidence finds that revenue autonomy enhances spending efficiency, strengthens accountability, and promotes fiscal discipline. On the distributional side, the evidence is more mixed, with revenue decentralization tending to weaken intra-regional redistribution unless accompanied by adequate equalization mechanisms. Finally, excess VFIs persist primarily because of misaligned political economy incentives that favor transfer dependence over own-revenue mobilization.

The remainder of this paper is structured as follows. Section II reviews the theoretical framework for understanding the optimal distribution of revenue powers and the precise meaning of revenue autonomy. Section III reviews the measures of revenue decentralization documented in the literature, critically evaluating their respective strengths and analytical limitations. Section IV investigates both the intended consequences and potential unintended effects of revenue decentralization, as well as the consequences of insufficient revenue autonomy, tracing the causal pathways from individual behavioral responses at the micro level to aggregate outcomes at the macro level. Section V synthesizes the paper's key findings and identifies priorities for future research in subnational government revenue autonomy.

II. Conceptualization

II.1. Core Proposition of Fiscal Decentralization: Revenue Autonomy is Key for Attaining Efficiency and Accountability

Tiebout (1956) and Oates (1972) established the foundational argument that fiscal decentralization enhances economic efficiency. Their central insight is straightforward:

subnational governments, being closer to their constituents, possess superior local knowledge and can tailor tax and expenditure decisions to match community preferences and needs. This proximity creates two critical benefits. First, it strengthens government accountability by forging direct links between taxpayers and subnational officials. Second, that greater accountability improves the efficiency of public service delivery and overall fiscal discipline (Musgrave, 1959; Oates, 1972; Weingast, 2009).

This efficiency gains hold under minimal spatial externalities and economies of scale, and genuine fiscal autonomy for subnational governments; that is, real self-rule over both revenue generation and spending decisions (Oates, 1972).[1] Thus, it is fiscal autonomy on the revenue and expenditure sides of the budget that allows for the political accountability of government officials to resident voters, fostering transparency, efficiency, and fiscal responsibility (Bird, 2000; De Mello, 2000; Bahl & Martinez-Vazquez, 2006; Faguet, 2014; Foremny, 2014; Martinez-Vazquez, 2015; Dougherty et al., 2019; Lago et al., 2024).[2]

However, fiscal decentralization often follows an asymmetric design pattern in practice. Substantial spending responsibilities are devolved to lower levels, but tax authority tends to remain much more concentrated at the center. The balancing of revenue and expenditure is achieved through intergovernmental grants, which, paradoxically, can often undermine the efficiency and accountability benefits that fiscal decentralization is intended to deliver. This is because subnational officials under transfer dependence face diminished political pressure to spend efficiently or to respond to voter preferences, a phenomenon known as the presence of a "soft budget constraint" in the design of fiscal decentralization (Kornai, 1986; Kornai et al., 2003; Rodden et al., 2003). As a result, the key benefits of decentralization, such as enhanced accountability, fiscal responsibility, and efficiency, are weakened and may be eroded.

The reasons for the existence of a VFI are multiple and very often anchored in political economy considerations. For instance, subnational governments (SNGs) are likely

[1] The original formulation of Oates' Decentralization Theorem emphasizes the absence of significant spatial externalities and economies of scale. However, more recent research shows that its efficiency implications may also apply in the presence of externalities settings, particularly when political institutions, such as integrated political parties, facilitate coordination across different government levels (Ponce-Rodríguez et al., 2018).
[2] For recent comprehensive discussions on the arguments for and against fiscal federalism, see Agrawal et al. (2024) and Martinez-Vazquez (2026).

to prefer financing sources that do not require them to incur the political costs of taxing their own constituencies, while, at the same time, central authorities are likely to prefer retaining control over most or all taxation powers.

II.2. Understanding Vertical Fiscal Imbalance

The concept of VFI has been used inconsistently in the literature. The common understanding is that the VFI describes the difference between the costs of expenditure responsibilities devolved to subnational governments and the revenue potential associated with their assigned revenue sources. However, there are different ways to estimate the costs of expenditure responsibilities, also called *expenditure needs*, and the revenue potential or *fiscal capacity*, which has opened the door to competing approaches to define and measure the VFI.

A very simple yet flawed approach is to assume that actual expenditures are equal to expenditure needs, and that actual revenues are equal to fiscal capacity. The VFI is measured in this case as the difference between actual subnational expenditures and actual subnational revenues. Moreover, since that difference is normally made up by the transfers that the central government provides to subnational governments (plus subnational borrowings), the VFI is often measured under this approach by the level of intergovernmental transfers. There are at least two problems with this practice. One is that many transfers from the central to the subnational governments have objectives other than closing existing vertical imbalances (e.g., capital investment grants, funding delegated responsibilities). The other (even more important) problem is that, if actual expenditures and revenues are "not right" in the first place, this approach does not address the problem the concept of VFI is intended to identify and solve. That is, determining the amount of transfers the central government *should* make to subnational governments to close the imbalance between their expenditure needs and their fiscal capacity. As we discuss below, the use of this approach has generated significant inconsistencies in both theoretical and empirical literatures on fiscal decentralization.

Expenditure needs are the costs of providing the goods and services assigned to each level of government at *standard* levels of quality. Similarly, fiscal capacity is equal to the amount of revenue that governments can collect from their assigned revenue sources at *standard* levels of fiscal effort (Boadway & Flatters, 1982). Building on these concepts,

Martinez-Vazquez & Sepulveda (2025) distinguish between the actual VFI, which arises from the prevailing expenditure and revenue assignments, and the optimal VFI, based on the assignment of expenditure and revenue responsibilities that maximizes welfare. They argue that the optimal VFI is greater than zero when social welfare maximization requires decentralizing more expenditure responsibilities than revenue capacity. In that case, a positive VFI becomes desirable and a part of the optimal design of the decentralization system. On the one hand, the devolution of many expenditure decisions can be justified on efficiency grounds by a better fit of local preferences, and the devolution of revenue sources is necessary to implement efficiency-enhancing accountability mechanisms. On the other hand, revenue decentralization is also subject to costs associated with the loss of economies of scale in tax collection, stronger at the central level, and potential inefficiencies boosted by subnational tax competition.

Following Martinez-Vazquez & Sepulveda (2025), we define the difference between the actual VFI and the optimal VFI as the "excess VFI". Hence, the key concern is not the presence of a VFI *per se*, but rather the magnitude of the excess VFI. Addressing the excess VFI presents structural obstacles rooted in misaligned political economy incentives. As outlined above, for subnational officials, intergovernmental grants constitute an expedient means of financing local services while avoiding the political costs associated with raising taxes on residents. Central authorities, for their part, often view transfers as a practical instrument for sustaining political influence and maintaining distributive or patronage networks over lower tiers of government. Taken together, these incentives give rise to a self-reinforcing suboptimal equilibrium that sustains a positive, and possibly large, excess VFI, which can yield enduring distortions and allocative inefficiencies that weaken overall fiscal performance and social welfare, and more specifically reduce the gains associated with fiscal decentralization.

As highlighted by Bird and Smart (2010) and Lago and Lago-Peñas (2010), when an excessive VFI leads to an over-reliance on intergovernmental grants as the prevailing adjustment financing mechanism, it risks perpetuating the very distortions that were intended to remedy. While intergovernmental grants are a standard and generally necessary instrument for addressing the optimal VFI, significantly large “excess VFI” can generate persistently high transfer dependence. This separation between expenditure responsibility and own

revenue generation capacity will inevitably erode subnational accountability, diminish expenditure efficiency, and weaken incentives for prudent fiscal management. And again, it will dilute the potential efficiency gains typically associated with fiscal decentralization, leading to an equilibrium where both central and local governments underperform relative to their institutional capacities.

An important consequence is that the design of intergovernmental fiscal frameworks must go beyond incremental adjustments to transfer formulas. Achieving an optimal degree of vertical balance requires a deliberate alignment between fiscal autonomy, redistributive objectives, and political accountability. Well-designed revenue assignment systems and carefully structured transfer mechanisms should enable subnational governments to finance a meaningful share of their expenditure through own-source revenues while preserving central government capacity to take advantage of tax collection efficiencies, address vertical disparities, equalization needs, externalities, and so on. Striking this balance is essential to ensure that decentralization yields enduring efficiency and accountability gains, rather than reproducing a cycle of transfer dependency and inefficiency across levels of government.

II.3. Designing revenue autonomy

How should revenue decentralization be structured? There are several important challenges in its design. Ideally, calculations of the VFI should include functions over which subnational governments exercise meaningful control, ensuring that the measure reflects actual, rather than merely formal autonomy (Martinez-Vazquez & Sepulveda, 2025). Crucially, meaningful VFI measurement must account only for expenditure and revenue responsibilities over which subnational governments exercise genuine discretionary control. It is essential to define revenue autonomy broadly, by including both tax autonomy and the ability to set non-tax revenues, such as fees, charges, and tariffs (Blöchliger, 2013; Dougherty et al., 2019).

Another dimension to consider is tax administration and enforcement. While subcentral tax administration may lead to greater accountability, many aspects of tax administration are closely linked to tax policy itself (McLure, 2000; Martínez-Vázquez & Timofeev, 2005). Some taxes, such as those on property, may be better administered locally due to informational advantages and proximity to tax bases (Mikesell, 2007; Martinez-

Vazquez, 2008). However, central governments often benefit from economies of scale, scope, and greater administrative capacity, enabling more effective revenue collection for many other taxes (Mikesell, 2007; Bird, 2011). Hence, if certain subnational assigned taxes are better administered by the central tax administration, how does that sort of arrangement affect subnational revenue autonomy? The literature on optimal tax assignments generally agrees that subnational tax autonomy can be maintained even when some taxes are centrally administered, provided subnational governments retain authority over key aspects of the tax structure. But even in this dimension, not all tax structure levers are a desirable part of subnational tax autonomy. For example, the literature on optimal tax assignments generally emphasizes the key role played by tax rate setting authority, and that full decentralization of tax bases is generally undesirable, as it increases administrative complexity and compliance costs (Bird, 2011).

Thus, it is generally agreed in this literature that subnational governments can exercise substantial (and the right type of) revenue autonomy by setting tax rates and perhaps granting tax benefits. Moreover, giving subnational governments the power to set tax rates with a centrally legislated minimum threshold becomes quite crucial to avoid the undesirable effects of harmful tax competition (McLure, 2000; Bird, 2011; Martínez-Vázquez et al., 2024).[3]

II.4 Optimal Transfer Design

A crucial stage in decentralization design is determining the appropriate level and types of intergovernmental transfers, including those needed to support the optimal level of VFI. This poses several important challenges. As remarked above, from a political-economy perspective, subnational authorities will tend to advocate for increased grants because of their perceived greater gains. But again, dependence on grants can generally become a major factor of distortionary incentives, threatening to undo the efficiency gains conventionally associated with fiscal decentralization (Rodden et al., 2003; Bouton et al., 2008; Eyraud & Lusinyan, 2013). Another aspect to be taken into account is that any increase in the amount of transfers

[3] An important dimension that goes beyond the scope of this survey concerns the type of taxes which are better suited to grant tax autonomy. The literature generally recommends property taxes and personal income tax piggybacks as particularly well-suited given their immobile bases and limited spillover effects, while corporate income taxes and value-added taxes require more careful design and assignment given tax competition and administrative complexity (Bahl & Bird, 2008; Martinez-Vazquez, 2008).

required to close an excess VFI will contribute to the costs associated with lower accountability, efficiency, and fiscal responsibility among subnational authorities.[4] Thus, the need to strike the right balance by combining a limited, carefully designed amount of grants from the national government, with additional incentives for subnational own-revenue mobilization.

The optimal design of grants involves first addressing the necessary presence of the optimal VFI. In the second place, the design of grants needs to focus on minimizing the additional costs (losses in accountability and efficiency) associated with closing any excess VFI, recognizing that the availability of own revenue sources means there are better and worse ways to close the excess VFI. And third, grant design also involves the design of other transfers primarily pursuing other worthwhile objectives in fiscal decentralization, such as addressing externalities, or incentivizing subnational governments to spend in certain areas.[5]

III. On the Measurements of Revenue Decentralization and Vertical Fiscal Imbalances

A wide range of indicators has been developed to assess the degree of revenue decentralization, highlighting different facets of the relationship between revenue generation, expenditure needs, and intergovernmental transfers. While such measures focus primarily on the revenue side, expenditure responsibilities often serve as a reference point in related indicators, particularly when assessing the actual degree of autonomy granted to subnational governments (Ebel & Yilmaz, 2003; Stegarescu, 2005; Martínez-Vázquez et al., 2017).[6] We structure the review of this literature by focusing on three fundamental dimensions: own tax

[4] The impact of intergovernmental transfers on subnational governments goes beyond accountability, efficiency, and fiscal responsibility effects. For a comprehensive review of both the intended and unintended effects of intergovernmental grants on tax policy choices, expenditure decisions, fiscal stability, and political economy, see Lago et al. (2024).

[5] An exhaustive discussion of optimal transfer design falls beyond the scope of this survey (see Boadway & Shah, 2007; Martinez-Vazquez & Searle, 2007 for extensive reviews).

[6] Stegarescu (2005) and Blume and Voigt (2011) employ an expenditure-based decentralization index, often interpreted as a proxy for VFI, while De Mello (2000) develops a fiscal dependency index, defined as the ratio of intergovernmental transfers to subnational total revenues. These approaches highlight the interdependence between revenue and expenditure dimensions of decentralization. However, given the scope of this paper, we do not provide a detailed discussion of expenditure decentralization measures, which lies beyond our main focus.

autonomy and effort, more general revenue autonomy, and the challenging measurement of vertical fiscal imbalances.

III.1. Tax Autonomy

Tax autonomy indicators seek to capture the degree of discretionary control that subnational governments exercise effectively over their tax sources, independent of external influence (McLure, 2000; Dougherty et al., 2019). In essence, tax autonomy reflects the extent to which subnational entities can define tax bases, set tax rates, and manage their own tax collections. Higher levels of tax autonomy allow subnational governments to dispose of a higher envelope of own revenue potential. This enhances their ability to better align fiscal policy with local economic conditions, increase expenditure discretion, and strengthen accountability.

The OECD has played a central role in the efforts to measure the tax autonomy of subnational governments (Dougherty et al., 2019). Its first effort relied on data from 1995, drawn from a survey of 19 member countries, and introduced a taxonomy of subnational taxing powers divided into several categories. Category A denotes full subnational discretion over tax rates, bases, and reliefs; Categories B and C represent partial autonomy under central oversight; Category D refers to shared taxes; and Category E covers centrally controlled taxes that, while may be recorded as subnational revenues in official fiscal accounts, imply no subnational tax autonomy. This classification was subsequently refined when the effort was expanded to include more detailed data and has since been incorporated into successive editions of the OECD Fiscal Decentralisation Database (Blöchliger & King, 2006).

The OECD methodology for estimating tax autonomy has been widely adopted in the literature (Blöchliger & Petzold, 2009; Bodman & Hodge, 2010; Baskaran, 2012; Foremny, 2014; Asatryan et al., 2015; Van Rompuy, 2016; Dougherty et al., 2019). The OECD index generally indicates that subnational governments often exhibit lower levels of tax autonomy than is typically suggested by general revenue- or expenditure-based indicators. Moreover, it reveals substantial cross-country variation, particularly between federal and unitary systems. Although subnational tax autonomy has generally risen over time, these differences remain significant (Dougherty et al., 2019).

Alternative similar measures have been developed, trying to better capture the degree of tax autonomy. For example, Stegarescu (2005) provides a detailed cross-country assessment of tax autonomy and revenue decentralization for 23 OECD countries between 1965 and 2001. He defines tax autonomy as the share of subnational tax revenue derived from taxes over which subnational authorities have total or significant control of tax rates and bases. From his findings, he also concludes that many earlier studies had substantially overestimated the degree of revenue decentralization.

More recently, broader institutional indices offering complementary perspectives have also been developed. An important example is the Regional Authority Index (RAI), developed by Marks et al. (2008) and Hooghe et al. (2016), which includes tax rate-setting powers as one dimension of policy autonomy within a wider framework of political decentralization.[7] Unlike the OECD taxonomy, which focuses on fiscal discretion over tax instruments, the RAI incorporates taxing powers alongside a set of other dimensions such as institutional depth, political representation, and shared rule over national law-making offering a more comprehensive perspective on subnational autonomy across both federal and unitary countries.

Despite these advances, measuring tax autonomy remains a challenging issue. A large part of this difficulty lies in the fact that cross-country comparability is limited by institutional heterogeneity and variations in subnational responsibilities. As in other cases, single quantitative indices risk oversimplifying complex underlying fiscal relationships and potentially underestimating informal or negotiated forms of local fiscal power (Dougherty et al., 2019). Table 2 summarizes the main contributions to the construction of indicators of subnational tax autonomy in the literature.

In concluding, it is also important to distinguish tax autonomy from tax effort. Tax effort refers to the extent to which subnational governments actually use the revenue potential associated with their tax autonomy. A subnational government might enjoy full formal discretion over certain taxes yet limited revenue because of low collection effort, meaning that high formal autonomy does not guarantee higher autonomous revenues. Conversely,

[7] As previously discussed, from a normative viewpoint within the theory of revenue assignments, tax rate setting powers is the most desirable form of tax autonomy, if not the only one, to be assigned to subnational governments (McLure, 2000).

subnational governments with limited formal autonomy generally cannot compensate for that constraint solely through tax effort, since tax effort operates strictly within the space allowed by existing autonomy. In this sense, tax effort reflects the effective use of the existing tax autonomy (fiscal capacity) and indicates the actual own tax revenue output derived from a given level of discretion.

[Insert Table 1 here]

III.2. Revenue Autonomy

Revenue autonomy is of course closely related to tax autonomy, but it differs from it because it captures the possibility that subnational governments may have sources of own revenues other than their own taxes. And the morphology of these indicators (tax versus revenue autonomy) has evolved somewhat differently in the previous literature. Revenue autonomy indicators have been widely used in the literature as a measure of subnational government decentralization (Akai & Sakata, 2002; Meloche et al., 2004; Martinez-Vazquez & Timofeev, 2010; Buser, 2011). Revenue autonomy is commonly measured as the share of locally generated subnational revenues relative to total revenues (Martinez-Vazquez et al., 2017). More revenue autonomy involves greater fiscal independence and reduced reliance on intergovernmental grants, thereby increasing budgetary flexibility and strengthening incentives for greater accountability and subnational fiscal responsibility (Faguet, 2014; Asatryan et al., 2015; Martinez-Vazquez & Sepulveda, 2020).

Several studies apply this approach by distinguishing own-source revenues from external revenues, primarily intergovernmental transfers. For example, using detailed municipal data for Greece, Psycharis et al. (2016) construct revenue autonomy indicators based on the share of own-source revenues in total municipal revenues, expressed in real terms to account for price variation over time.[8] Related approaches measure revenue autonomy from a different perspective, which is closer to tax autonomy indicators, by

[8] As a complementary measure, they normalize own internal revenues by non-internal revenues, capturing municipalities' reliance on own resources relative to external funding. While conceptually close to standard revenue decentralization measures, this approach illustrates how disaggregated data can be used to assess local fiscal autonomy in a highly centralized fiscal system.

focusing on the extent of legal taxing powers rather than actual revenue shares (Rodden, 2002; Eyraud & Lusinyan, 2013).[9]

Overall, while existing indicators capture important dimensions of revenue autonomy, they often conflate formal discretion with effective fiscal capacity and remain sensitive to the composition of own-source revenues, which vary in terms of stability and predictability (Blöchliger, 2013). Moreover, empirical analyses often confront issues of endogeneity when using available cross-country measures of local revenue autonomy, as well as difficulties in using comparable cross-country data due to institutional, legal, and administrative differences (Ebel & Yilmaz, 2003; Asatryan et al., 2015; Martínez-Vázquez et al., 2017). Therefore, despite their widespread use, revenue autonomy measures still face important analytical limitations and measurement challenges. Further research is still needed to address these limitations, develop more nuanced measures of revenue autonomy, and also importantly bring more integration with the indicators of tax autonomy.

Table 2 summarizes the array of revenue autonomy indicators that have been proposed in the empirical literature.

[Table 2 near here]

III.3. Vertical Fiscal Imbalance

In contrast to tax and revenue autonomy, so far there has been much less consensus on how to measure VFI. The most commonly used proxy measure has been the ratio of intergovernmental transfers to local expenditures (or total local revenues) (Rodden, 2002; Guo, 2008; Asatryan et al., 2015; Meloni, 2016). This means that in many cases, the actual transfer amounts are employed as a proxy for the actual VFI. As explained, however, this approach assumes that transfer amounts are based on an appropriate estimation of the actual VFI, which might not be the case, and for those reasons, it can be expected to generally lead to an overestimation of the actual VFI. This is because that ratio does not exclude transfers that serve entirely different purposes from closing any existing vertical imbalance, such as

[9] For example, Eyraud & Lusinyan (2013) employ the indicator developed by Marks et al. (2008), which captures the extent to which regional governments hold legal authority to levy taxes independently.

financing delegated expenditure responsibilities or addressing externalities, and so on. Since transfer structures differ significantly across countries in the objectives they pursue, total transfer amounts are very unlikely to capture the relative degree of vertical imbalance in place. All in all, even when the excess VFI is very large, total transfers over total subnational revenue (or expenditure) can be a very poor proxy for the actual VFI (Martinez-Vazquez & Sepulveda, 2025).

A more precise approach argues that the correct measurement of VFI needs to account for the difference between *expenditure needs*, deriving from the expenditure assignments to SNGs, and their *fiscal capacity*, implied by their revenue assignments (Boex & Martinez-Vazquez, 2007; Sepulveda & Martinez-Vazquez, 2011, 2020; Jia et al., 2021). Given the inherent difficulties in measuring both expenditure needs and fiscal capacity, however and as pointed out above, most previous studies have found it convenient to use accounting-based budgetary measures, such as total transfers, as proxies for VFI. Evidently, this has brought up a tradeoff between practicality and convenience versus reliability and comparability of results.

Based on this budget accounting framework, the most comprehensive and frequently used approach was developed by Eyraud & Lusinyan (2013). They propose an index that incorporates not only intergovernmental transfers but in addition, in the presence of borrowing (and potential soft-budget constraints), any mismatches between local revenues and expenditures, and the presence of fiscal deficits. Several recent studies have adopted or extended this method in the Chinese context (Li & Du, 2021; Liu & Zhang, 2022; Wang & Liew, 2024). Additionally, Canikalp and Martinez-Vazquez (2025) estimate VFI for 81 provinces in Türkiye from 2007 to 2022 using stochastic frontier analysis to approximate expenditure needs and fiscal capacity, but for robustness, they also employ Eyraud & Lusinyan (2013) approach, allowing for other factors such as subnational debt and deficits.

Recent studies focusing on the impact of VFI on the performance of China's decentralization system treat VFI and transfer revenues (TR) as distinct but interrelated variables, sometimes including both in empirical models (Li & Du, 2021; Chu & Fei, 2021). Specifically, Li & Du (2021) examine how transfer payments affect local fiscal sustainability, measured by the "fiscal space" definition of Heller (2005), which captures the capacity of

governments to expand spending or absorb shocks without jeopardizing fiscal solvency. They find the effects vary depending on the degree of VFI, this latter measured following Eyraud & Lusinyan (2013). Similarly, Chu & Fei (2021) argue that VFI affects local governance both directly and indirectly through its impact on transfers. However, they do not provide separate quantitative estimates of VFI and TR effects. Overall, these studies highlight that high VFI levels can influence the design and impact of transfers, thereby affecting tax effort and other subnational fiscal outcomes.

A recurring feature across the empirical literature is that most of the VFI measures used, share an "equivalent" structure despite contextual differences. That is they are based on actual measures of intergovernmental transfers with additional adjustments. Guo (2008), adapting Rodden's (2002) ratio of grants to revenues, measures VFI as the ratio of intergovernmental transfers to total revenues for Chinese counties. Similarly, Jia et al. (2021) and Wang & Liew (2024) measure VFI by focusing on the gap between expenditure responsibilities and own revenues, with the latter adopting the Eyraud & Lusinyan (2013) formulation for Chinese provinces. In most of these studies, intergovernmental transfers serve as the proxy for VFI. A partial exception is Koley & Mandal (2019), who measure VFI as the share of subnational expenditures not financed by own revenues across 24 Indian states. However, in practice, this formulation simply captures reliance on both transfers and borrowing. This convergence around a transfer-based structure highlights how the literature has largely followed an underlying logic of associating transfers with VFI, even if the specific operationalization differs across institutional contexts.

Overall, despite recent insightful contributions, empirical estimates of VFI remain diverse and difficult to evaluate because there is still no broadly accepted definition of this concept. As already discussed above, the frequent use of intergovernmental transfers as proxies for VFI introduces measurement errors, most often leading to the overestimation of the true VFI. Furthermore, the persistent presence of methodological differences in estimating fiscal capacity and expenditure needs, along with data limitations, continues to pose significant challenges for the consistent and more precise measurement of VFI (Güzel & Yilmaz, 2018).

In conclusion, the measurement of the VFI remains one of the most debated and methodologically complex issues in the literature on fiscal decentralization (Jia et al., 2021; Martinez-Vazquez & Sepulveda, 2025). Recognizing these conceptual and empirical limitations is a necessary starting point for understanding the results observed in empirical studies of revenue decentralization, along with their intended and unintended effects, which are discussed in the following section. Table 3 summarizes some of the recent contributions to the measurement of Vertical Fiscal Imbalance.

[Insert Table 3 here]

IV. Intended and Unintended Effects of the Degree of Revenue Decentralization

Revenue decentralization, complete or only partial, can carry both local (micro) and national (macro) implications beyond the fundamental desired micro level intended effects of full decentralization on accountability, efficiency, subnational fiscal responsibility and discipline. Other micro type effects include the adequacy of local revenue collections, the level of tax effort, or the effects on tax morale. On the other hand, there may be unintended effects, especially in the case of partial revenue decentralization, ranging from the overuse of intergovernmental grants to stimulating fiscal indiscipline and even corruption. At the macro level, those other effects can translate into broader fiscal outcomes, including public deficits and debt, spurring inflation, limiting the capacity to conduct macroeconomic stabilization policies or income redistribution, and other effects on regional economic convergence and general economic growth. On the other hand, high subnational revenue autonomy without adequate transfers can exacerbate regional disparities in service provision and limit regional convergence.

Because empirical studies have often relied on the level of intergovernmental transfers to proxy for VFI, a wide range of empirical findings tend to reflect the effects of grants rather than those of VFI in a stricter sense. This constitutes a significant limitation, as it makes it more difficult to obtain direct empirical evidence on the benefits and the costs of the different degrees of revenue decentralization, as reflected in the VFI.

IV.1. Fundamental Issues of Revenue Decentralization

Accountability and Efficiency

Tax autonomy is theoretically expected to encourage local accountability and responsiveness (Sacchi & Salotti, 2014; Martinez-Vazquez and Sepulveda, 2020). Municipalities that are responsible for their own tax policies are more directly answerable to their residents for fiscal decisions, promoting transparency and ensuring that revenue collection and expenditure align with community priorities. However, the fundamental proposition that it is the accountability mechanism what makes revenue autonomy to enhance efficiency has not been solidly backed by empirical evidence, and the evidence to date remains mixed (Boadway & Shah, 2009; Dougherty et al., 2019; Bahl & Martínez-Vázquez, 2022). Moreover, the promise that greater accountability translates into cost efficiency may fail when local preferences favor electorally attractive spending, whether voluntarily or through political manipulation, making the relationship between tax autonomy, accountability, and efficiency ultimately an empirical question.

On the empirical side, Boetti et al. (2012) examined whether the ratio of municipal own taxes to total current revenues affects the spending efficiency of local governments in Italian municipalities. They find that those municipalities with low VFI, measured as the ratio of municipal own taxes to total current revenues, exhibit less inefficient spending behavior. In the same vein, Gadenne (2017) found that Brazilian municipalities invested on the quantity and quality of education infrastructure when they increased local tax revenue, but not when they received discretional transfers. Similar results are reported in cross-country and OECD-based studies, which find that greater revenue decentralization is associated with improved fiscal discipline and spending efficiency, particularly when accompanied by sound institutional frameworks (Neyapti, 2006; Goerl & Seiferling, 2014; Filippetti & Sacchi, 2016).

Moreover, Ke & Martinez-Vazquez (2026) show that the relationship between tax autonomy and government cost efficiency is neither linear nor monotonic. Using a panel of U.S. school districts from 2008/09 to 2018/19, they find that districts with full tax autonomy, those empowered to set their own marginal tax rates without binding state constraints, are

more efficient than those with low autonomy. Additionally, the efficiency gains accelerate at higher levels of the autonomy distribution, rather than occurring uniformly across it.

Crucially, the dominant mechanism is not the degree of tax autonomy per se, but the clarity of accountability signals it generates. Their findings underscore that the benefits of tax autonomy are not automatic and depend critically on the institutional environment in which it operates.

Overall, the main findings of the previous literature must be interpreted as providing strong support for the presence of accountability effects; with higher tax autonomy, the political cost of poor fiscal decisions is raised. Unfortunately, accountability is inherently difficult to measure directly, as it requires data on citizen responsiveness, oversight mechanisms, and political feedback, information that is rarely available (Porras-Mendoza et al, 2021). Consequently, the consistent finding that higher tax autonomy is associated with more efficient spending suggests accountability may operate in the background, but this remains a presumption rather than demonstrated evidence. Addressing the non-linear relationship between tax autonomy and efficiency and the broader measurement mismatch between revenue discretion and accountability represent the most pressing challenges for future research in this area.

Fiscal Responsibility

The presence of an excess VFI may lead to fiscal indiscipline at the subnational level, mostly due to overspending and overborrowing behavior and a reduced effort to raise own tax revenues. These effects operate primarily through dependence on intergovernmental transfers, which are both the main financing instrument of VFI and also the most used empirical proxy. When transfers finance local public services, the perceived local cost of those services falls below their actual cost, creating pressure to overspend and reducing incentives to mobilize own-source revenues (Sepulveda, 2017; Jia et al., 2021). High transfer dependence also softens the budget constraint of subnational governments, further weakening fiscal discipline (Jia et al., 2021). However, as noted several times above, directly measuring VFI is challenging, and most studies have relied on transfer-based proxies. This results in empirical findings that are more precisely understood as a mix of evidence of the effects of transfers and VFI per se.

A broad cross-country and cross-regional empirical literature finds that transfer dependence is associated with overspending, overborrowing, and weaker fiscal discipline more generally (Stein, 1999; Velasco, 2000; Borge & Rattsø, 2002; Rodden et al., 2003; Eyraud & Lusinyan, 2013; Ben-Bassat et al., 2016; Köppl-Turyna & Pitlik, 2018; Mitra and Chymis, 2022).[10]

Overall, the empirical evidence provides strong evidence that grants dependence weakens local fiscal discipline. These findings need to be interpreted in light of the VFI measurement employed. From a methodological perspective, approaches that distinguish structural expenditure–revenue gaps from mere transfer dependence and institutional constraints appear more informative than simple revenue-share or transfer-based measures. At the same time, these findings underscore the need to distinguish more clearly between structural and policy-induced imbalances, as well as between *optimal* and *excess* VFI. Despite recent progress, a key challenge remains developing more robust measures of VFI that credibly separate these dimensions and allow more precise identification of the causal effects of VFI on subnational fiscal behavior. Nevertheless, because both optimal and excess VFI generally need to be closed with transfers, empirically it can be very demanding to devise estimation strategies to disentangle the effects of VFI from those of transfers dependence.

IV.2. Other Micro-Level Effects

Tax Effort

Beyond fiscal discipline, excess VFI also affects the revenue side by reducing the incentive of subnational governments to mobilize own-source revenues. This scenario is typically studied through the concept of tax effort, a measure of how intensively subnational governments exploit their revenue capacity.

Early work by Guo (2008), extending Rodden's (2002) approach, measures VFI as the ratio of grants and subsidies to total revenues in Chinese counties. They find that grants and subsidies do not crowd out local tax efforts. However, more recent and econometrically robust studies point in the opposite direction. Defining VFI as the proportion of subnational

[10] In addition, Wang & Guo (2025) find that VFI intensifies resource misallocation in Chinese cities, with the repercussions being notably more pronounced at the provincial level than at the municipal level.

expenditures not covered by own-source revenues, Koley & Mandal (2019) find significant crowding-out effects on revenue effort across 24 Indian states. In the same vein, Jia et al. (2021), using panel data from Chinese cities between 1999 and 2009, find that higher VFI reduces subnational tax collection efforts. They employ the commonly used approach in the previous literature of measuring VFI as the proportion of subnational expenditures that their own revenue-raising capacity cannot cover. Using this VFI methodology, Di Liddo et al. (2019) and Canikalp & Martinez-Vazquez (2025) find that VFI has a negative direct effect on the fiscal efforts of Italian municipalities and Türkiye's provinces, respectively.[11] Finally, Wang & Liew (2024), using a panel threshold model for 30 Chinese provinces, also find that high VFI levels diminish local tax effort.

Tax Morale and Incentives

Revenue decentralization can also affect tax morale, which is generally defined as the intrinsic willingness to pay taxes voluntarily. If local tax institutions and the level of taxing rights granted to lower-tier governments are designed to align with residents' preferences and demands, it can be expected that such a framework would strengthen the fiscal exchange between local authorities and their constituencies. As a result, this alignment could lead to improved voluntary tax compliance. Empirical evidence supports this expectation. For example, Torgler et al. (2010) find a positive relationship between local autonomy and tax morale in Switzerland, where local autonomy is measured through a self-assessment conducted by local authorities. Similarly, Torgler & Werner (2005) show that greater subnational tax autonomy, measured as the ratio of subnational own taxes to federal tax revenues, is associated with higher tax morale in Germany.

Since tax morale is a key determinant of tax compliance (Torgler, 2011), the greater the discretionary power granted to subnational governments in tax matters, the more likely residents are to comply with their local tax obligations. Recent evidence on Italy's municipal waste tax further illustrates these dynamics. Using a large panel of municipalities, Minzyuk et al. (2025) show that civic engagement, along with local fiscal autonomy, significantly

[11] Specifically, Canikalp & Martinez-Vazquez (2025) examine local tax effort applying a panel stochastic frontier model over 2007-2022 to better address the endogeneity problem.

improves tax compliance. Their findings emphasize how institutional design interacts with social behavior to influence tax morale.

An important open question is whether these effects of local autonomy and tax morale extend to national-level tax compliance. In other words, can enhanced local tax morale, and maybe also accountability, lead to an increase in overall tax compliance beyond subnational taxes? There is limited empirical research on this broader impact, making it a promising area for future investigation.

Table 4 summarizes the main findings from selected papers on effects of tax autonomy/VFI on local fiscal behavior.[12] These papers are arranged in tables in chronological order. The information displayed includes the definition of the main outcome variables and the measurement of VFI, the data sample, the empirical strategy, and a brief review of the results.

[Insert Table 4 here]

IV.3. Macro-Level Effects

Fiscal Instability, Budget Deficits, and Debt Accumulation

If tax autonomy brings more accountability and fiscal responsibility from subnational government officials, it should translate into lower budget deficits and more disciplined borrowing. More generally, well-designed fiscally decentralized systems that incorporate features such as low transfer dependence, effective borrowing rules, and strong budgetary institutions can contribute to macroeconomic and fiscal stability (Baskaran & Feld, 2009; Neyapti, 2010, 2013; Lago-Peñas et al., 2020).

Cross-country studies consistently show that high reliance in transfers is generally associated with weaker overall fiscal performance, including larger deficits and rising public debt (Rodden, 2002; Aldasoro & Seiferling, 2014; Lago-Peñas et al., 2020). Complementarily, many empirical studies have found that higher tax autonomy leads to higher fiscal prudence and a reduction in deficits (Rodden 2002; Neyapti 2010; Foremny, 2014; Presbitero et al. 2014; Asatryan et al. 2015; Van Rompuy 2016; Bartolini et al. 2018;

[12] Papers are selected according to their relevance, as determined by both our subjective criteria and their impact, as measured by Google Scholar.

Arespa & González-Alegre, 2023). Other theoretical arguments suggest that in developing economies without adequate coordination or central oversight, greater revenue autonomy may create a deficit bias and weaken fiscal discipline (De Mello, 2000). However, empirical evidence directly linking revenue autonomy to weaker fiscal discipline is limited. A few other studies have reported no systematic relationship between decentralization and fiscal aggregates such as deficits or debt (Thornton, 2009; Baskaran, 2010).

Country-specific evidence further supports the finding that greater subnational tax autonomy generally improves local fiscal balances and promotes prudent fiscal behavior. In Spain, expanded regional tax discretion appears to have improved fiscal responsibility (Argimón & Cos, 2012; Arespa & González-Alegre, 2023), while higher municipal revenue autonomy in Germany also appears to lead to greater fiscal discipline (Geys et al., 2010). In Poland, Switzerland, and Sweden, higher subnational tax autonomy is associated with better budget management and higher fiscal prudence (Von Hagen & Dahlberg, 2004; Freitag & Vatter, 2008; Schaltegger & Feld, 2009; Bukowska & Siwińska-Gorzelak, 2019). Moreover, Van Rompuy (2016), using data from 27 OECD countries, further confirms that greater subnational tax autonomy improves local fiscal balances, measured as deficits relative to total expenditure, averaged over three sub-periods between 1995 and 2008. Finally, similar findings are obtained in politically centralized states like China, with asymmetric decentralization and institutional fragmentation posing distinct challenges (Guo, 2008; Jia et al., 2014; Jia et al., 2021; Li & Du, 2021). These results are consistent with the importance of reducing, and hopefully eliminating, excess VFI, given again the likely high correlation of this latter with high debt dependence.

However, the positive relationship between tax autonomy and fiscal discipline may not be uniform. One explanation is the possibility of a non-linear relationship between tax autonomy and deficits. Baskaran (2012) identifies a U-shaped relationship, whereby moderate tax autonomy fosters fiscal responsibility, but higher levels (“excessive”) autonomy can trigger higher deficits. Another argument advanced by Foremny (2014) is that in unitary states, greater tax autonomy often correlates with higher deficits unless accompanied by stringent fiscal rules. Asatryan et al. (2015) further support the importance of complementary institutions in enhancing the role of revenue decentralization on fiscal

balance. Using data for 23 OECD countries from 1975 to 2000, they find support for that conclusion but only in the presence of other strong institutional constraints.

The empirical evidence in developing countries is more limited. In Ghana, a transfer-based measure of VFI is linked to weaker fiscal discipline across local governments (Obeng & Aazam, 2025). This gap between expenditures and central government transfers relative to total expenditures is particularly relevant in the case of Ghana, where local governments are not permitted to borrow, making these transfers essential to filling the fiscal gap. Similarly, Ogweno and Semedo (2025) find a U-shaped relationship across 33 developing economies, in which both very low and very high tax autonomy are associated with higher primary deficits. This finding highlights the importance of intermediate levels of tax autonomy, which aligns with our theoretical discussion of the "optimal versus excess VFI".

Taken together, these findings suggest that, like in the case of full transfer dependence, an unlimited level of tax autonomy may also carry fiscal risks. Excess VFI, sustained through high transfer dependence, weakens accountability and erodes tax effort. In contrast, excessive tax autonomy, particularly in the absence of strong institutions and fiscal rules, can also breed other types of fiscal indiscipline. The intuition is that very high autonomy, under these circumstances, may encourage competitive tax cutting while incentivizing local pressures for higher spending, both undermining fiscal sustainability. The relevant policy question is therefore not simply how to reduce VFI, but how to balance between own-source revenues and transfers to preserve accountability incentives while ensuring adequate delivery of services.

These results also highlight several methodological challenges the literature needs to address in the future, including the accurate measurement of VFI and revenue autonomy, since commonly used proxies, like transfers, generally fail to capture actual revenue autonomy while overlooking institutional variations and time-dependent effects (Martinez-Vazquez et al., 2017). In addition, the presence of endogeneity and reverse causality also poses potential problems, because fiscally disciplined governments may be more inclined to adopt greater autonomy in the first place. More emphasis is also needed on the conditions and institutional contexts that moderate the effect of tax autonomy on fiscal outcomes, such as fiscal rules, political accountability, and other governance mechanisms. Moreover, the

existing evidence of a U-shaped relationship indicates that both very low and very high levels of autonomy can undermine fiscal discipline, but understanding why and how this occurs will require further research. Finally, the empirical coverage of developing countries remains limited, diminishing the generalizability of findings and also underexploiting cross-country experiences.

Effect on economic growth, public investment and human capital

As initially argued by Oates (1972), fiscal decentralization can enhance efficiency in public service delivery by better matching local preferences, potentially improving social outcomes and fostering economic growth. To date, most empirical research has examined the effects of fiscal decentralization in general (combining revenue and expenditure decentralization).

Regarding this general impact of fiscal decentralization on economic growth, the empirical evidence is generally mixed (Martinez-Vazquez et al., 2017; Canavire-Bacarreza et al., 2020; Shrestha & Hankla, 2025). Some studies find no significant link between fiscal decentralization and growth (Thornton, 2007; Baskaran & Feld, 2013), others report negative effects (Zhang & Zou, 1998; 2001; Xie et al., 1999; Ezcurra & Rodríguez-Pose, 2011), while several more identify positive, sometimes nonlinear, relationships (Akai & Sakata, 2002; Iimi, 2005; Stansel, 2005; Gemmell et al., 2013; Jalil et al., 2014). Recent work by Canavire-Bacarreza et al. (2020) aimed to address the endogeneity concerns by employing an instrumental variable (IV) approach. Specifically, the authors use a Geographic Fragmentation Index (GFI) and country size as instruments to address reverse causality. These authors find modest but significant positive effects of fiscal decentralization on growth. Attempting to address the same issues, Jin & Rider (2020) and Hung & Thanh (2022) employ advanced GMM methods and find a negative relationship between fiscal decentralization and economic growth. These inconsistent results in part seems to arise from differences in how decentralization is measured and from dealing or not with potentially significant endogeneity concerns (Ebel & Yilmaz, 2003; Martinez-Vazquez et al., 2017).

While the aggregate evidence on the role of fiscal decentralization remains inconclusive, relatively few studies have focused specifically on revenue decentralization or revenue autonomy. This distinction matters, as revenue and expenditure decentralization may

operate through distinct mechanisms and produce divergent effects including those on growth.

By focusing exclusively on the potential impact of revenue decentralization on economic growth, the nature of that relationship still appears complex. Baskaran & Feld (2013), using data from 23 OECD countries between 1975 and 2008, showed that fiscal decentralization, measured by subnational tax autonomy, is negatively associated with economic growth, suggesting that excessive tax autonomy may lead to inefficiencies or misaligned tax policies. Nevertheless, after accounting for endogeneity, these authors conclude that the negative relationship is unlikely to be robust. On a similar vein, Rodriguez-Pose & Kroijer (2009) found positive, medium-term effects of revenue decentralization but negative effects of expenditure decentralization in Central and Eastern Europe.

These mixed or negative findings weaken once endogeneity is properly addressed. Recent empirical studies employing more robust estimation methodologies generally point to positive effects of subnational revenue autonomy on economic growth. For instance, Filippetti & Sacchi (2016) find that for OECD countries, tax autonomy can positively influence economic growth, particularly when coupled with high levels of administrative and political decentralization. Similarly, Hanif et al. (2020) show that tax revenue decentralization has a positive impact on economic growth. More recently, Sima et al. (2023) analyzed African and OECD countries, using a variety of estimation methods to address endogeneity concerns. The authors find that both revenue and expenditure decentralization have significant positive effects on GDP per capita. Furthermore, Ferraresi et al. (2026) find a positive effect of financial fiscal autonomy on per capita income using a spatial fuzzy regression discontinuity and controlling for endogeneity. Canavire-Bacarreza et al. (2020) also identify positive effects when using the Geographic Fragmentation Index as an instrumental variable, particularly in developed countries. Finally, Mitra & Chymis (2022) report a negative relationship between VFI and economic growth in Belgium. However, as noted earlier, the difficulty of separating VFI from transfer effects complicates the causal interpretation of those findings.

Finally, revenue autonomy also has been found to affect public investment and human capital accumulation outcomes. Evidence from European countries indicates that greater

subnational revenue autonomy tends to increase investment in public infrastructure, such as schools, hospitals, and other public services, though it does not significantly affect redistribution-related spending (Kappeler & Välilä, 2008; Kappeler et al., 2013). In Latin America, Faguet (2008) finds that fiscal autonomy in Bolivia and Colombia led to greater investment in socially oriented sectors, including human capital, social services, and urban development. In addition, Busemeyer (2008) and Dougherty et al. (2019) report a positive association between subnational tax autonomy and education spending. However, these findings are not uniform. For example, Siwińska-Gorzelak et al. (2020), using panel data of roughly 2,400 Polish municipalities over the years 2002-2014, identify a negative relationship between tax autonomy and education spending. Similarly, Grisorio & Prota (2015), examining 20 Italian regions for the period 1996-2008, also observe a negative relationship between tax autonomy and the share of education expenditure. These divergent results likely reflect differences the level of government studied and the interaction between tax autonomy and expenditure responsibilities within specific institutional settings.

Effects on regional interregional equity and regional convergence

Regarding the effects of revenue decentralization on interregional equity and convergence, Bartolini et al. (2016) and Blöchliger et al. (2016) find that devolving tax autonomy tends to reduce regional inequalities. Similarly, Van Rompuy (2021) explores how subnational tax autonomy and intergovernmental transfers affect regional GDP per capita disparities across 30 OECD countries from 1995 to 2011. The findings indicate that both tax autonomy and vertical transfers can contribute to regional convergence.

The intuition behind these results is twofold. First, own-source revenues, particularly from property taxation, can create stronger incentives to invest in locally growth-enhancing policies, with proportionally larger returns in lagging regions that have greater untapped fiscal capacity (Bartolini et al., 2016). Second, high transfer dependence itself tends to entrench regional disparities by weakening incentives for revenue mobilization and local accountability, so reducing it reduces the gap between regions (Goerl & Seiferling, 2014). However, these convergence effects are conditional. Where well-designed equalization transfers do not accompany tax autonomy, it risks disproportionately benefiting already-richer regions, since these jurisdictions with greater administrative and fiscal capacity are

better positioned to exploit autonomy. In addition, and most directly, greater revenue autonomy also potentially gives richer regions the means to pull ahead of lagging regions, which potentially can have negative effects on income distribution.[13]

For example, evidence from Burkina Faso shows that only communes with a strong capacity to generate own-source revenue benefited from decentralization, potentially with adverse consequences for less well-off communities (Bargain et al., 2025). The relevant policy conclusion is therefore not that revenue autonomy alone promotes convergence, but that autonomy paired with well-designed equalization transfers is the effective combination identified by the literature (Ezcurra & Pascual, 2008; Canavire-Bacarreza et al., 2026).

Effects on poverty and income distribution

Ramirez et al. (2017) find that higher per capita property tax revenues reduce dimensional poverty headcount rates across Colombian municipalities. By contrast, Pietrovito et al. (2023), using regional data for 183 OECD regions, find that revenue decentralization reduces intra-regional income redistribution, measured as the reduction in the Gini coefficient from market to disposable income.. Tselios and Rodriguez-Pose (2024) show that at the regional level, greater revenue autonomy is associated with lower poverty and social exclusion regardless of governance quality, Furthermore, Song et al. (2022), using a Spatial Dobbin model, find that fiscal revenue decentralization inhibits poverty reduction. Moreover, increased local discretion over revenues and policy scope, when capacity is adequate, facilitates human capital investment and contributes to poverty reduction (Habibi et al., 2003; Cavalieri & Ferrante, 2016; Siburian, 2022). Finally, Kang et al. (2026), using a panel of 69 countries from 1996 to 2017, show that subnational autonomy, measured by the aggregate RAI index, capturing both self-rule and shared-rule dimensions, has a positive impact on inclusive growth.[14]

[13] The empirical evidence on the impact of fiscal decentralization in poverty and income distribution is mixed (von Braun & Grote, 2002; Bardhan & Mookherjee, 2003; Lindaman & Thurmaier, 2002; Galasso & Ravallion, 2005; Neyapti, 2006; Tselios et al., 2012; Sacchi & Salotti, 2014; Martinez-Vazquez et al., 2017; Tang et al., 2024). For instance, Sepulveda & Martinez-Vazquez (2011) find that fiscal decentralization can increase poverty rates while simultaneously reducing income inequality.

[14] Inclusive growth is measured as a composite index that incorporates both income dimensions (poverty, inequality, and employment) and non-income dimensions (health and education).

Several other studies that have used transfer-based measures of VFI highlight the potential adverse distribution effects of the implied lack of revenue autonomy. Thus, for example, Mao (2025), employing GMM and threshold analysis, finds that higher VFI, measured as the share of provincial expenditures not covered by own revenues, significantly widens the Chinese urban-rural income gap. Similarly, using panel data from 30 Chinese provinces spanning 2008-2022, Wang & Liew (2024) show that higher levels of VFI negatively affect the quality of regional economic development. These findings highlight that relying on revenue autonomy alone may tend to benefit richer subnational governments. As such, even though they are not highlighted in these studies, equalization transfers are a crucial complementary policy instrument for compensating for the disparities created and promoting more balanced outcomes.

Effects on macroeconomic stabilization and fiscal policy implementation

For many years, it was widely believed that greater subnational revenue autonomy could compromise the central government's ability to implement macroeconomic stabilization policies (Lago-Peñas et al., 2020). These concerns have long influenced policy recommendations from institutions such as the International Monetary Fund (IMF) and the World Bank, as reflected in the work of Prud'homme (1995) and Tanzi (2006). However, those early fears about the dangers of fiscal decentralization lacked robust empirical evidence (Baskaran, 2010; Neyapti, 2010, 2013; Bartolini et al., 2018). Indeed, the more recent empirical literature points to a general consensus that overall fiscal management may be enhanced through revenue autonomy especially when that is complemented by the presence fiscal rules on deficits and borrowing, as well as other recent budgetary innovations such as the presence of independent fiscal councils.

Regarding the effect of revenue decentralization in isolation on macroeconomic stability, the empirical evidence remains mixed (Martinez-Vazquez et al., 2017). A substantial body of research suggests that revenue decentralization can reduce inflation, particularly in countries with strong institutional frameworks and independent central banks (Neyapti, 2006; Jalil et al., 2014). Consistent with this view, several studies find that greater sub-national tax autonomy is associated with lower inflation and more sustainable fiscal positions (Martinez-Vazquez & McNab, 2006; Baskaran, 2012; Von Hagen & Foremny, 2013; Okonkwo &

Godslov, 2015; Bartolini et al., 2018). Similarly, Lago-Peñas et al. (2020) show that lower (transfer-based defined) VFI paired with expenditure decentralization resulted into enhanced macroeconomic stability in OECD countries during the recent Great Recession.

Overall, the evidence suggests that revenue decentralization is more likely to support macroeconomic fiscal stability when paired with strong, well-developed institutional frameworks and independent fiscal council authorities (Martinez-Vazquez & McNab, 2006; Canavire-Bacarreza et al., 2025). More generally, the potential benefits of revenue (and expenditure) decentralization can be undermined by weak institutional arrangements (Shrestha & Hankla, 2025). Soft budget constraints and excessive sub-national borrowing are generally accepted it may generate macroeconomic instability and increase fiscal deficits (Rodden, 2002).

Table 5 summarizes the main findings from selected papers on the macro-level effects of tax autonomy and VFI.[15]

[Insert Table 5 here]

V. Conclusion

Why should designers of fiscal decentralization systems bother to create enough revenue autonomy at the subnational level? Wouldn't it be simpler just to use generalized transfers from the central government to finance subnational governments letting them concentrate on their expenditure functions? The answer we have seen is that indeed tax, and more general revenue, autonomy plays a critical role in aligning the very desirable objectives of expenditure efficiency, accountability and fiscal responsibility in fiscally decentralized systems. Therefore, it is very important to get the design of revenue autonomy right.

But beyond those important primary effects, designing fiscal decentralized systems with high levels of revenue autonomy may also have other significant benefits or impose some costs in other areas of the decentralization system and more generally in the overall performance of the economic system. A significant part of this review paper has been devoted

[15] As before, the papers are selected based on their relevance, as determined by both our subjective criterion and their impact as measured by Google Scholar. They are arranged in tables in chronological order.

to clarify those other benefits and costs of revenue autonomy, as well as the impacts of having low levels of revenue autonomy, that is, in the presence of significant levels VFI.

What we find is that progress in understanding the effects of revenue decentralization has been fundamentally shaped by how it is empirically measured. The widespread use of transfer-dependence proxies as a measure of VFI has led to misleading conclusions about both the true extent of revenue autonomy and its actual effects. As such, a central contribution of this survey is to show that distinguishing between actual VFI, optimal VFI, and excess VFI is essential for both the theoretical conceptualization and the design and implementation of the fiscal decentralization system. The key concern is not the presence of a VFI per se, but the magnitude of the excess VFI, and most existing studies cannot make this distinction because they rely on transfer-based proxies.

Once this measurement issue is properly accounted for, the evidence is broadly supportive of revenue autonomy. The primary benefits of efficiency gains, stronger accountability, and greater fiscal discipline are well documented, but they materialize only when subnational governments have real discretion over tax rates and bases. On the design side, stronger efforts are needed to distinguish between closing the optimal VFI, addressing excess VFI, and pursuing other objectives such as equalization and externality correction. Beyond the primary effects, revenue autonomy supports economic growth and regional convergence, but these benefits require well-designed equalization transfers to prevent richer regions from capturing disproportionate gains. Finally, the persistence of large excess VFIs worldwide is not a technical failure but a political economy equilibrium, as both subnational and central government officials have strong incentives to sustain transfer dependence, and breaking this equilibrium requires deliberate institutional reforms that go well beyond incremental adjustments to transfer formulas.

Future research should focus on developing more robust measures of VFI that go beyond transfer-based proxies. Specifically, we need to separate optimal from excess VFI to better interpret and compare empirical findings across institutional contexts. Moreover, understanding the political-economy incentives that explain why large VFI persist despite their documented costs, and the institutional conditions that allow countries to reduce them, is crucial. Finally, the endogeneity between revenue autonomy and fiscal outcomes remains

inadequately addressed in most existing studies, and future work should focus on implementing more robust methodologies to address these measurement issues.

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Table 1. Indicators of Tax Autonomy

Authors	Data and econometric technique	Tax Autonomy (TA) Formula
Stegarescu (2005)	**Sample**: 23 OECD countries. **Period**: 1965-2001. **Dataset**: OECD Revenue Statistics	$TA_1 = \frac{SCG\ own\ tax\ reveenue\ (a)\ to\ (c)}{SCG\ total\ tax\ revenue}$ $TA_2 = \frac{SNG\ own\ tax\ revenue\ (a)\ to\ (c) + Shared\ tax\ revenue\ (d.1)\ and\ (d.2)}{SCG\ total\ tax\ revenue}$
Hooghe et al. (2016)	**Sample**: 81 countries, including all EU and OECD members, and 231 regional tiers. **Period**: 1950–2010. **Dataset**: RAI Dataset.	$RAI = \sum_{d=1}^{10} Dimension\ Scores_d$ where the 10 dimensions are: - Self-Rule: *Institutional Depth, Policy Scope, Fiscal Autonomy, Borrowing Autonomy, Representation.* - Shared-Rule: *Law Making, Executive Control, Fiscal Control, Borrowing Control, Constitutional Reform.*
Foremny (2014)	**Sample**: EU15 members **Period**: 1995-2008 **Dataset**: OECD Regional Database, Eurostat, National Ministries of Finance and IMF GBS database.	$TA = \frac{SNG\ tax\ revenue\ with\ regional\ rate{-}setting\ power}{Total\ SNG\ tax\ revenue}$
Dougherty et al., 2019	**Sample**: 50 U.S. states **Period**: 1995–2016. **Dataset**: U.S. Census of Governments, NBER State Tax Files and State-specific statutory tax rules for classification	$TA = \sum_{OECD\ tax\ autonomy\ code\ (a1,a2,b1,b2,b3)} (\frac{Revenue}{Total\ SNG\ Tax\ Revenue})$ where b3 is an U.S. specific levy-limited property taxes.

Source: Authors' elaboration

Table 2. Indicators of Revenue Autonomy

Authors	Sample and data sources	Revenue Autonomy (RA) formula
Martinez-Vazquez & Timofeev (2010)	**Sample**: 58 countries, including 21 OECD countries. **Period**: 2002–2004. **Dataset**: IMF Government Financial Statistics (GFS) database.	$RA = \frac{Local\ Own\ Revenue}{Local\ Own\ Revenue + Grants\ to\ subnational\ governments}$
Buser (2011)	**Sample**: Annual observations from 20 high-income OECD countries. **Period**: 1972–2005. **Dataset**: IMF GFS database.	RA after excluding those revenues that come from intergovernmental grants $RA = \frac{Own - Source\ Revenues}{Total\ Sub - National\ Revenues}$
Asatryan et al., (2015)	**Sample**: Annual Panel of 23 OECD countries and a triennial hierarchical dataset of 34 OECD countries. **Period**: 1975–2000 and 2000, 2005 and 2008, respectively. **Dataset**: OECD's Fiscal Decentralization database.	$RA = \frac{SNG\ tax\ revenue,\ non-tax\ and\ capital\ revenue}{General\ Government\ tax\ revenue,\ non-tax\ and\ captial\ revenue}$ $RA\ (Shared) = \frac{SNG\ tax\ revenue, non-tax,\ capital\ revenue\ and\ revenues\ from\ shared\ taxes}{General\ Government\ tax\ revenue,\ non-tax\ and\ captial\ revenue}$
Psycharis et al. (2016)	**Sample**: 1031 Greek municipalities. **Period**: 1999–2009. **Dataset**: Hellenic Statistical Authority.	$RA = \frac{\sum(Deflated\ Internal\ Revenue\ Components)}{Total\ Revenues}$ $Alternative\ Index = \frac{\sum(Deflated\ Internal\ Revenue\ Components)}{Total\ Revenues - \sum(Deflated\ Internal\ Revenue\ Components)}$

Source: Authors' elaboration

Table 3. Indicators of Vertical Fiscal Imbalance

Authors	Data and econometric technique	VFI Formula
Eyraud & Lusinyan (2013)	**Sample**: 28 OECD countries. **Period**: 1969-2007. **Dataset**: OECD General Governments Accounts Database	$VFI = 1 - \frac{SNG\ own\ revenue}{Total\ SNG\ spending}$
Meloni, (2016)	**Sample**: 22 Argentine districts. **Period**: 1985-2007. **Dataset**: Dirección Nacional de Coordinación Fiscal con las Provincias, Secretaría de Hacienda, Ministerio de Economía de la Nación.	$VFI = \frac{Total\ Federal\ Government\ transfers\ (automatic+non-automaric+oil\ and\ gas\ grants)}{Total\ district\ revenues} \times 100$
Chu and Fei (2021)	**Sample**: 29 Chinese provinces members **Period**: 2009-2017 **Dataset**: China Statistical Yearbook, Finance Yearbook of China, Collection of Local Financial Statistics, Collection of National Budget and Final Accounts Documents.	$VFI = 1 - \frac{SNG\ own\ revenues}{Total\ SNG\ expenditure\ responsabilities}$
Jia et al (2021)	**Sample**: 325 prefecture-level Chinese cities. **Period**: 1999–2009 **Dataset**: Prefecture, City, and County Public Finance Statistics and NBRS.	$VFI = \frac{Total\ SNG\ own\ expenditures - SNG\ total\ own\ revenues}{Total\ SNG\ own\ expenditures}$
Canikalp & Martínez-Vázquez (2025)	**Sample**: 81 Türkiye provinces. **Period**: 2007-2022 **Dataset**: The Republic of Türkiye Ministry of Treasury and Finance and Turkish Statistical Institute.	$VFI = \frac{(Expenditure\ needs - Fiscal\ capacity)}{Expenditure\ needs}$

Source: Authors' elaboration

Table 4. Selected papers on Micro-Level Effects: Local Fiscal Behavior

Authors	Torgler et al. (2010)
Data and econometric technique	**Sample**: 1,143 Swiss survey respondents. **Period**: 1999 **Dataset**: International Social Survey Programme (ISSP). **Method**: Weighted Ordered Probit models.
Main dependent variable	**Tax morale**: Measured as a 1 to 4 categorical survey question, where one means you feel it is not wrong if a taxpayer does not report all of their income to pay less income taxes, and four means you feel it is seriously wrong.
VFI Measurement	Not measured explicitly.
Main Results	Local tax autonomy, categorized at the cantonal level based on survey responses of chief local administrators in 1865, positively affect respondent's tax morale
Authors	Boetti et al (2012)
Data and econometric technique	**Sample**: 262 Italian Municipalities in the province of Turin. **Period**: 2005 **Dataset**: Ministry of Domestic Affairs **Methods**: Parametric and nonparametric frontier estimation techniques (SFA and DEA)
Main dependent variable	**Spending Efficiency**: Measured as local government's spending performance in four essential public services categories: general administration, waste management, education and elderly care, and road maintenance and local mobility.
VFI Measurement	$VFI = \frac{SNG\ own\ taxes}{Total\ SNG\ current\ revenues}$
Main Results	Those municipalities with a low VFI exhibit less inefficient spending behavior, thus supporting the local accountability channel.
Authors	Eyraud & Lusinyan (2013)
Data and econometric technique	**Sample**: 28 OECD countries. **Period**: 1969-2007. **Dataset**: OECD General Governments Accounts Database **Methods**: a) Least square dummy variable (LSDV) estimator with robust standard errors clustered at the country level. b) IV estimation of the VFI using different instruments, such as share of school-age population, fiscal autonomy indicator of Marks et al. (2008) and the lag value of the baseline VFI.
Main dependent variable	**General government primary balance**: Defined as the difference between total revenue and primary expenditure (expenditure excluding interest payments), expressed as a percentage of GDP.
VFI Measurement	$VFI = 1 - \frac{SNG\ own\ revenue}{Total\ SNG\ spending}$
Main Results	On average, a 10 percentage point reduction in VFI, the fiscal balance of the general government improves by 1 percent of GDP.
Authors	Köppl–Turyna, & Pitlik (2018)
Data and econometric technique	**Sample**: 1,685 Austrian municipalities. **Period**: 2001–2014. **Dataset**: Austrian Statistical Office. **Methods**: Local ATE based on a Regression Discontinuity Design. The assignment value is a cut-off point at the level of 10,000 inhabitants.
Main dependent variable	**Borrowing per capita**: Defined in net terms as the subtraction of repayments of debts from new municipal borrowing during a fiscal year.
VFI Measurement	Not measured explicitly.
Main Results	Municipalities with higher revenue dependency observe higher net borrowing per capita.

Authors	Di Liddo et al (2019)
Data and econometric technique	**Sample**: Panel data of 4,744 Italian municipalities **Period**: 2002–2010. **Dataset**: Italian Ministry of Interior, Italian National Institute of Statistics and Agency of Territory at the Ministry of Economy and Finance. **Methods**: Arellano-Bond Dynamic Panel GMM with robust standard errors, and a Fixed Effects model by FGLS estimator as a robustness check.
Main dependent variable	**Fiscal Effort**: measured as local tax burden.
VFI Measurement	Measured following Sharma (2012): $VFI_1 = \frac{Total\ grants\ received}{Total\ expenditure};\ VFI_2 = \frac{Total\ grants\ received}{Total\ revenue}$ $VFI_3 = \frac{Total\ grants\ received + Tax\ Sharing}{Total\ expenditure};\ VFI_4 = \frac{Total\ grants\ received + Tax\ Sharing}{Total\ revenue}$
Main Results	VFI negatively impacts the fiscal efforts of municipalities. This negative impact of the VFI is greater in municipalities characterized by a greater horizontal fiscal imbalance.
Authors	Jia et al. (2021)
Data and econometric technique	**Sample**: Panel Data of 325 prefecture-level cities in China. **Period**: 1999–2009. **Dataset**: Prefecture, City, and County Public Finance Statistics and NBRS. **Methods**: Fixed effects and IV estimation strategies.
Main dependent variable	**Local fiscal discipline measured** as different indicators: a) Ratio of total own revenues to GDP of a city b) Actual revenues collected in logarithm terms (as robustness)
VFI Measurement	First, $VFI = \frac{Total\ SNG\ own\ expenditures - SNG\ total\ own\ revenues}{Total\ SNG\ own\ expenditures}$ Next, to address the endogeneity issues of this estimation, they employ and IV approach: the change in the predicted school-age population.
Main Results	Higher VFI induces a reduction of tax collection effort by local governments
Authors	Wang & Liew (2024).
Data and econometric technique	**Sample**: Panel of 30 Chinese provinces **Period**: 2008–2022. **Dataset**: China Statistical Yearbook, China Financial Yearbook, China Urban Statistical Yearbook, National Government Debt Audit Results, China Land and Resources Yearbook, Wind Database, China Economy Net Statistical Database, financial budget reports from provinces and cities, and statistical annual reports. **Methods**: Panel threshold model and three-stage least squares methodologies.
Main dependent variable	**Local tax effort**: Measured as the ratio of actual to potential tax revenues
VFI Measurement	$VFI = 1 - \frac{Decentralization\ of\ Fiscal\ Revenue}{Decentralization\ of\ Fiscal\ Spending} \times (1 - Local\ Fiscal\ SelfSufficiency\ Rate)$
Main Results	Higher VFI negatively impacts local tax effort.

Source: Authors' elaboration

Table 5. Selected papers on Macro-Level Effects

Authors	Bouton et al. (2008)
Data and econometric technique	**Sample**: 22 OECD countries. **Period**: Average 4 years per country. **Dataset**: Luxembourg Income Study project database and World Bank. **Method**: Two-way fixed effects model.
Main dependent variable	**Redistributive Fiscal Policies**: Two inequality indices: the Gini index and Theil entropy index
VFI Measurement	Measured as the dependence of sub-national governments on central government revenues to finance their expenditure responsibilities.
Main Results	Higher levels of VFI lead to a substantial reduction in redistributive fiscal policies.
Authors	Baskaran (2012)
Data and econometric technique	**Sample**: 23 OECD countries **Period**: 1975-2000 **Dataset**: OECD Economic Outlook No.83, Stegarescu (2005) and OECD Key Economic Indicators. **Method**: Linear and non-linear panel data models.
Main dependent variable	**Government deficit**: Measured as the general government primary deficit in percent of GDP.
VFI Measurement	Not measured explicitly.
Main Results	Low levels of tax autonomy incentivize fiscal responsibility, but higher levels can lead to increased deficits.
Authors	Von Hagen, & Foremny (2013)
Data and econometric technique	**Sample**: EU15 countries **Period**: 1995-2010 **Dataset**: OECD Revenue Statistics, European Comission, Eurostat and information from Stegarescu (2005) **Method**: Fixed Effect models.
Main dependent variable	**Annual budget balance**: Share of subnational revenues
VFI Measurement	Not measured explicitly.
Main Results	An increase in tax autonomy by ten points increases the budget balance of subnational governments by roughly two percent of subnational government revenues.
Authors	Meloni, (2016)
Data and econometric technique	**Sample**: 22 Argentine districts. **Period**: 1985-2007. **Dataset**: Dirección Nacional de Coordinación Fiscal con las Provincias, Secretaría de Hacienda, Ministerio de Economía de la Nación. **Methods**: Province-level dynamic panel data.
Main dependent variable	**Fiscal Variables**: Four policy instruments subject to potential manipulation by incumbents given the timing of elections: total expenditures per capita, local revenues per capita, budget result per capita, and the ratio of current expenditures to direct investment.
VFI Measurement	$VFI = \frac{Total\ Federal\ Government\ transfers\ (automatic + non - automaric + oil\ and\ gas\ grants}{Total\ district\ revenues} x\ 100$
Main Results	Higher levels of VFI incentivize electoral motivated spending shifts in election years.

Authors	Van Rompuy (2021)
Data and econometric technique	**Sample**: 30 OECD countries. **Period**: 1995-2011. **Dataset**: OECD Regional database, OECD Fiscal decentralization database and World Bank. **Methods**: Fixed-effects model and IV approach: Several macroeconomic time-varying variables to account for endogeneity of fiscal variables, but all are statistically insignificant.
Main dependent variable	**Regional Disparity**: a) Coefficient of variation b) Population-weighted coefficient of variation c) GINI index
VFI Measurement	Not measured explicitly
Main Results	Tax autonomy and vertical transfers have a positive impact on regional convergence.
Authors	Eyraud & Lusinyan (2013)
Data and econometric technique	**Sample**: 28 OECD countries. **Period**: 1969-2007. **Dataset**: OECD General Governments Accounts Database **Methods**: a) Least square dummy variable (LSDV) estimator with robust standard errors clustered at the country level. b) IV estimation of the VFI using different instruments, such as share of school-age population, fiscal autonomy indicator of Marks et al. (2008) and the lag value of the baseline VFI.
Main dependent variable	**General government primary balance**: Defined as the difference between total revenue and primary expenditure (expenditure excluding interest payments), expressed as a percentage of GDP.
VFI Measurement	$VFI = 1 - \frac{SNG\ own\ revenue}{Total\ SNG\ spending}$
Main Results	On average, a 10 percentage point reduction in VFI, the fiscal balance of the general government improves by 1 percent of GDP.
Authors	Lago-Peñas et al. (2020)
Data and econometric technique	**Sample**: OECD countries **Period**: 1995–2014. **Dataset**: OECD Economic Outlook database, World Bank, IMF, European Commission (Fiscal Rules Database) and Hooghe et al. (2016). **Methods**: Time-Series Cross-Section (TSCS) analysis and Average Linkage Clustering methods.
Main dependent variable	**Fiscal Stability**: Measured as general government primary balance (as a percentage of GDP).
VFI Measurement	Not measured explicitly.
Main Results	Expenditure decentralization coupled with lower vertical fiscal imbalance improved macroeconomic stability of decentralized countries during the Great Recession
Authors	Mao (2025)
Data and econometric technique	**Sample**: 28 Chinese provinces **Period**: 1995–2019. **Dataset**: China Statistical Yearbook, Local Statistical Yearbook, Local Survey Yearbook, and the China Macro Network. **Methods**: OLS, GMM And Threshold Analyses
Main dependent variable	**Income inequality**: Gini coefficient encompassing three separate categories: a) Gini index for urban resident income b) Gini index for rural resident income

	c) Gini index for national resident income
VFI Measurement	$VFI = 1 - \frac{Decalization\ of\ fiscal\ revenue}{Decalization\ of\ fiscal\ expenditure} \times (1 - Fiscal\ self sufficiency\ rate)$
Main Results	VFI significantly widens the urban-rural income gap.

Source: Authors' elaboration