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### ABSTRACT

This paper offers a comprehensive and updated review of the effects of intergovernmental grants. We focus on the main findings in the existing literature on the effects of intergovernmental grants on tax policy and choices, expenditure decisions, fiscal stability and behavioral choices, and political economy. The intricate nature of the subject, intrinsically, does not allow for an all-inclusive survey, but we aim to provide a thorough examination and update of the most salient effects of intergovernmental grants, while indicating areas for further research.

**KEYWORDS:** Intergovernmental transfers, effects, fiscal decentralization

**JEL CODES:** H71, H72, H77

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# 1. Introduction

Intergovernmental grants are a key financial instrument for funding subnational governments, at both the local and intermediate or regional levels, serving different objectives.<sup>1</sup> Oates (1990) identifies a threefold rationality for intergovernmental transfers to subnational jurisdictions. First, for financing subnational public services and investments: Upper tiers of government may provide intergovernmental grants lower tiers to increase their capacity to provide services, filling the vertical fiscal gap left between diverging tax and expenditure decentralization levels. Second, subsidization: When the provision of services involves spillovers or externalities, central government may subsidize those services which are in risk of not being optimally provided, boosting subnational government spending in priority areas for the whole country and addressing inter-jurisdictional externalities. Third, equalization: Central governments may try to enable subnational governments with different fiscal capacity and expenditure needs to provide the same or equivalent public services with roughly a similar level of subnational tax effort, following redistributive and solidarity motivations.

Over the past several decades, a large body of literature has contributed to our understanding of whether and to what extent the several targets of intergovernmental transfers are met, and how complex the responses of subnational governments can be, largely depending on how grants are designed and implemented. Literature surveys on this topic include Gramlich (1977), Hines and Thaler (1995), Bailey and Connolly (1998), Oates (1998), Gamkhar and Shah (2007) and Inman (2008).

Our paper provides an update of this literature by offering a comprehensive review of what is known to date on the main effects, both pursued and unintended, of intergovernmental grants. We go beyond the intended effects of grants in vertical and horizontal imbalances or specific policy objectives, to also focus on how intergovernmental grants can alter subnational budget constraints, incentive systems and the institutional settings framing intergovernmental relations. The policy implications of our review are significant because subnational government responses and the consequences on the efficiency and equity of fiscally decentralized systems are often far

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<sup>1</sup> The terms ‘transfers’ and ‘grants’ are used interchangeably in the paper. Generally, we use the terms intergovernmental transfers or grants for funds payable to any level of government by other levels of government.

reaching. With this information, policy makers can become much more aware of what the potential indirect effects of grant design may be and therefore try to avoid shortcomings and unplanned troubles.

The rest of the paper is organized as follows. In section 2, we introduce a nomenclature for the different main types of grants we may observe, providing a common vocabulary to the often-diverse terminology employed in the empirical works surveyed in the rest of the paper. In Section 3, we critically review findings on the main different impacts of intergovernmental grants on tax policy choices, including the impacts on tax effort and tax competition, or the presence of possible asymmetric effects. The focus of section 4 is on the impact of grants on expenditure decisions by subnational governments, with especial emphasis on the phenomenon of the “fly-paper effect”. In Section 5, we analyze the effects on fiscal stability and fiscal policy. In Section 6, we analyze the impact of intergovernmental grants on political institutions, including accountability and subnational autonomy. Section 7 concludes. At the end of every section, a table which summarizes the main findings of the specific literature is referenced. Papers are selected according to its perceived relevance from both a subjective criterion and its impact measured by Google Scholar. They are ordered in tables following a chronological structure. The information displayed includes the definition of the main outcome variables and type of grants analyzed, the data sample and the empirical strategy and a brief review of the results.

## **2. The taxonomy of grants in theory and practice**

### **2.1 Classification**

Intergovernmental grants can be classified according to their purpose and to how funds are allocated. Regarding the first dimension, the literature has mainly divided intergovernmental grants into conditional (also called earmarked, categorical, or specific-purpose grants) and unconditional grants (also called general-purpose grants).<sup>2</sup>

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<sup>2</sup> Those grants which are conditional are open use or only dedicated to recurrent or capital expenditures? If otherwise unconditional transfers may only be used for investment purposes, there may be issues about whether the recipient governments later cover the operation and maintenance costs of the infrastructure financed by the development transfers.

Conditional grants restrict the receiving government to specific forms of spending. In contrast, unconditional grants have no restriction on what the funds can be spent on.

Both conditional and (much less frequently) unconditional grants may be themselves categorized in matching and non-matching grants, depending on the requirement that subnational governments contribute or not a share of the funds. Conditional grants may also be differentiated by the timing of the conditionality: *ex ante*, the most common practice, or *ex post*, as in the case of performance-based transfers.<sup>3</sup> The difference is that the latter links the performance of subnational governments to the access and/or the amount of funding, thus improving the chances of more effective service delivery (Martínez-Vázquez, 2020). Furthermore, grants can be differentiated according to whether their allocation is formula-based (based on pre-defined criteria) or discretionary (allocated on an ad-hoc manner).<sup>4</sup>

## **2.2. The Practice of Granting: Is there a best type of grant and optimal design?**

Two fundamental questions in the theory and practice of transfer design are first, whether some types of transfers are superior instruments to others, and second, what may be the optimal design of those instruments.

Regarding the first question, there have been discussions in the literature, for example, comparing unconditional to conditional grants, and among the latter whether block grants may be superior instruments to specific grants. However, there is no such a thing as a “best type of grant.” Practically all types of grants can be the most preferred depending on the situation and context. There is a large array of worthwhile objectives that different grants help support, and the art of transfer design is to reach a balance between them. Unconditional grants, such as revenue sharing or equalization transfers, may be

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<sup>3</sup> Among the *ex-ante* conditional grants, a further distinction is made between specific or categorical grants and block grants. In the case of the former, the conditionality is detailed and obligates subnational governments to spend funds into narrow areas with little choice. In contrast, block grants just target specific areas of spending but provide considerably more discretion on how the funds are spent by subnational governments. The clear greater autonomy provided by block grants has been often used to proclaim their superiority over specific grants, but in fact these latter may be more effective instruments in achieving certain types of national objectives; they are also less prone to intergovernmental controversy. For further information on taxonomies of grants, see Bahl, Boex and Martínez-Vázquez (2001), Bergvall et al. (2006), Boadway and Shah (2007), Searle and Martínez-Vázquez (2007), and Spahn (2012).

<sup>4</sup> On an additional dimension, matching grants can be open-ended, if there is no limit to the amount of funding that can be received, or close-ended, if the amount of funds available is capped at some level.

superior to reduce of vertical and horizontal imbalances because they also allow complete spending autonomy to subnational governments. However, conditional grants, such as block and specific grants, can be superior instruments when some specific objective of the transfer needs to be achieved and subnational governments are wanted to perform some work or service to that end. And while block grants impose a softer type of conditionality than specific grants, thus allowing more autonomy to subnational governments, specific grants may sometimes be preferred because of the need to ensure certain outcomes, e.g., child vaccination programs, or to avoid “blaming game dynamics” between the central and subnational governments (Borge and Lilleschulstad, 2009; Searle and Martinez-Vazquez 2007).

Thus, a clear definition of an objective and the demonstrated ability of a particular transfer instrument to achieve that objective is what determines the superiority of that instrument. A common mistake in the practice of grant design across countries is to design intergovernmental grants in the simultaneous pursuit of multiple objectives within a single instrument. Lack of transparency, confusion on the outcomes being achieved, and even inefficiencies may easily arise in that context. In practice, each country has its own history regarding the evolving structure of the intergovernmental grant system. More mature and evolved decentralized systems tend to rely more on unconditional than on conditional grants; and when the latter are used, they are more likely to be block grants than specific earmarked grants in reaction to the historical overuse of a multiplicity of specific grants.<sup>5</sup>

Regarding the optimality of design question, there is general agreement on the general principles, such as simplicity, efficiency, equity, or revenue adequacy, that transfer design should meet (Martinez-Vazquez and Searle, 2006; Boadway and Shah 2007). But beyond those general principles, even though it has been extensively analyzed, it has been hard to reach a consensus on what the optimal design of the different transfer instruments should be. And the causes are multiple. Taking the salient example of equalization grants, redistributive objectives necessarily entail subjective perceptions and judgments, over which even fully rational agents can disagree (Boadway 2006).<sup>6</sup> For many other transfer

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<sup>5</sup> See for example Blöchliger and Rabesona (2009) and Lotz (2009) for additional discussion on the composition of intergovernmental grants in the OECD member countries.

<sup>6</sup> Using one of the most salient examples, in the case of equalization grants, no general agreement has been reached in both the theoretical and empirical fiscal equalization literatures on the optimal design features of a universal fiscal equalization scheme (e.g., Johansson, 2003; Kalb, 2010; Albouy, 2012, or Simon- Cosano

instruments, as Boadway (2006) also argues, it is difficult to understand or fully predict the behavior of the subnational governments themselves. Drawing many robust conclusions is also difficult by the fact that the empirical literature on the impact of transfer design is characterized by a large heterogeneity in countries or groups of countries covered, time frame periods, estimation techniques and variables, and specific goals analyzed, making many of the results not directly comparable. Consequently, the desirable transfer instrument design tends to be highly dependent on the priority objectives and specific contextual factors of a particular country.

### **3. Effects on Tax Policy and Choices**

The theory of fiscal federalism has always emphasized the key importance of subnational revenue autonomy. This latter yields a large variety of benefits ranging from greater accountability to greater spending efficiency and fiscal responsibility. Transfers are seen as the main financing alternative to own revenues, and even though they can be perfectly justified, their effects on how subnational revenue autonomy is utilized can be widespread and pervasive. In this section we focus on the effects that transfers directly or indirectly may have on the behavior and decision making of subnational governments regarding their tax policy decisions. In particular, we focus on three types of responses, based on both their relevance and the attention that have attracted in the literature: the effects of transfers on subnational tax effort, with the generation of both crowding-out and crowding-in effects; the effect on tax competition among subnational governments; and the asymmetric responses of subnational governments depending on the sign of changes in the level of intergovernmental transfers.

#### **3.1 Tax Effort and Crowding-out effects**

The impact of grants on the tax effort exerted by subnational governments within the confines of their revenue assignments has been a main focus of the literature.<sup>7</sup> Many

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et al., 2013) This lack of consensus emerges also in numerous comparative studies (e.g., Dabla- Norris, 2006 for transition countries; Peteri, 2006 for Southeast European countries; Shah, 2007 for industrialized countries; or Blöchliger, et al., 2007 for OECD countries).

<sup>7</sup> While the operational definition of tax effort has evolved over time, the concepts of fiscal capacity and tax effort have experienced less variation and controversy over time from a theoretical perspective. See Bird and

scholars have argued that grants induce a crowding-out effect because of the negative incentives generated for subnational governments to raise their own revenues. The basic mechanism for this crowding-out effect is based on political economy arguments. Subnational government officials find it so much easier to depend on transfers than on asking their voters to pay more taxes, while their central governments may oblige them because that transfer dependence gives them a sense of power and control. But results vary depending on how grants are designed. For example, as we discussed further below equalization grants may be defined to provide lower amounts to those jurisdictions that collect more by exerting a higher tax effort. The choice of transfer instrument can also contribute to the level of crowding out. For example, block general grants are more subject to negotiation and bargaining between government tiers than is the case with specific grants. As we will see in later sections that design choices are also important on a variety of other effects considered, from the flypaper to externalities or fiscal discipline.

The overall empirical evidence on transfers disincentivizing subnational tax effort is, not surprisingly, somewhat mixed. Most of the empirical work focused on high-income countries which support the negative impact of transfers on tax effort includes Shah (1994); Rajaraman and Vasishtha (2000); Zhuravskaya (2000); Barette et al. (2002); Knight (2002); Liu and Zhao (2011); Dash and Raja (2013); or Mohanty et al. (2019). However, other empirical studies on high-income countries suggest a positive effect (see Dahlby and Warren, 2003; Buettner, 2006; and Miyazaki, 2020).

Empirical studies for developing countries generally suggest a negative impact of central government grants on subnational revenue generation (see Bird, 1994, Ahmad, 1997; Bird and Vaillancourt, 1999; Correa and Steiner, 1999; Jha et al., 1999; Bird and Smart, 2002; Schroeder and Smoke, 2003; Bird et al., 2006; Canavire-Bacarreza and Zúñiga, 2010; Bravo, 2011; Clist and Morrisey, 2011; Canavire-Bacarreza et al., 2012; Mogues and Benin, 2012; Bird and Slack, 2014; Bhatt and Scaramozzino, 2015; Garg et al., 2017; Lewis and Smoke, 2017 and Miri, 2019).<sup>8</sup>

As pointed out above, the crowding-out effect of grants is often boosted by the perverse incentives set in the grant design formula, like when subnational governments

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Slack (1990), Dahlby and Wilson (1994), or Cyan, Martínez-Vázquez and Vulovic (2014) among others.

<sup>8</sup> See also Bahl and Bird (2018) for an extensive discussion on subnational government revenue generation issues in developing countries.



receive lower transfer amounts when they increase their own revenue generation effort. To avoid this, the formulas for computing the allocation amounts can be designed on the basis of revenue potential or fiscal capacity instead of actually collected revenues. In this regard, there is empirical evidence that subnational tax effort may actually increase when tax capacity or potential tax revenues of subnational governments are used instead of actual revenues. This crowding-in effect has been empirically documented in many countries: Skidmore (1999) for the US; Litschig and Morrison (2013) for Brazil; Zhang (2013) for China; Caldeira and Rota-Graziosi (2014) for Benin; Brun and El Khdari (2016) for Morocco; Lewis and Smoke (2017) for Indonesia; Masaki (2018) for Tanzania; and Miyazaki (2020) for Japan.

An additional reason for the divergent results in this literature might be the different estimation approaches that have been followed. If, for example we focus on the important issue of the identification strategy, as shown in Table 1, the issue of endogeneity is quite prominent from the viewpoint of the recipient governments' tax policy decisions; nevertheless, a good number of papers summarized there have ignored the endogeneity issue or employed non-robust external instruments.

Going forward, further research should be welcome focused on addressing the proper identification strategies and also on providing more complete explanations and disentangling the divergent results between high-income and developing countries and the roles played by specific institutional and political contexts.

[Insert Table 1 near here]

### **3.2 Tax Competition**

One potential downside of subnational government revenue autonomy is the potential presence of predatory tax competition. Tax competition involves strategic interactive relationships between subnational governments to attract or retain mobile tax bases by bringing their taxes to inefficiently low levels.<sup>9</sup> The empirical evidence on

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<sup>9</sup> However, other scholars have argued that tax competition may be welfare improving. For complete surveys of the literature on tax competition see Zodrow (2001), Guimarães Ferreira et al. (2005), Zodrow (2010) and Baskaran and Lopes da Fonseca (2013).

subnational tax competition is mostly centered on OECD countries, including Canada, Germany, Switzerland, and the US. Tax competition is expected to vary across countries and over time, depending on fiscal and institutional frameworks (Blöchliger and Pinero-Campos, 2011).

Although alternative solutions, such as tax harmonization and cooperation are possible, the theoretical literature on this issue has argued that central governments may use transfers to partially or fully offset the inefficiencies that ensue at the subnational level (Wilson 1999). More specifically, several theoretical studies have examined the potential effects of equalization transfers on mitigating subnational tax competition and for regaining equilibrium efficiency (e.g., Koethenbuerger 2002; Bucovetsky and Smart 2006; Hindriks et al., 2008). Other scholars have also empirically explored to what extent tax-base equalization grants may lessen tax competition among subnational governments. Many of those studies have focused on the on the impact of Canada's equalization system for provincial governments, which is built exclusively on disparities in fiscal capacity, and the common finding is that indeed tax competition across Canadian provinces is decreased (Boadway and Hayashi 2001; Esteller-Moré and Solé-Ollé 2002; Smart 2007 and Ferede 2017).

The case studies for other countries with equalization systems that consider not only disparities in fiscal capacity but also disparities in expenditure needs generally tend to find less strong results. In particular, Dahlby and Warren (2003) found only weak support the hypothesis that tax-base equalization leads to a reduction on tax competition rates at the state level in Australia. Similar weak results were found for Germany by a number of papers (Buettner 2006; Egger et al. 2009; Baskaran 2014; Rauch and Hummel 2015; Buettner and Krause 2020 and Holm-Hadulla 2020) and for Switzerland (Widmer and Zweifel 2012).

Although some of the differences in empirical findings could be due to differences in datasets and estimation methodologies, those differences appear to be quite systematic and related to specific institutional contexts. However, additional comparative research is still needed to ascertain that possibility.

[Insert Table 2 near here]

### 3.3 Asymmetries in the effects of changes in the level of transfers

A priori one may expect that rational subnational decisionmakers may react symmetrically regarding their choices of tax effort to similar increases and decreases in transfers. However, the possibility of an asymmetric response was first introduced by Gramlich (1987) who argued that cuts in transfers may be partly compensated by subnational governments willing to preserve current expenditure levels by raising additional taxes. Thus, Gramlich (1987) concluded that program spending cuts following decreases in the level of transfers could be much smaller than program expansions following increases in grants; he called this the "fiscal replacement" effect, which would lead to tax effort increases following transfer cuts. The presence of this type of response has been explained by Stine (1994) as due to fiscal illusion.

In contrast, a commonly observed behavior by subnational governments is for them to expand expenditures instead of cutting taxes in response to increases in intergovernmental transfers. This latter type of behavior, known as the "fly paper effect", is discussed immediately below in the paper. A significant body of research has found that the marginal propensity to spend when grants are rising is higher than the propensity to cut expenditures when grants are falling (Stine 1994; Volden 1999; Heyndels 2001; Levaggi and Zanola 2003; Deller and Maher 2006; Lago-Peñas 2008; Cárdenas and Sharma 2011; Mehriiz and Marceau 2014; Samal 2020 and Rios et al. 2021).<sup>10</sup>

These asymmetrical effects appear to differ by the type of transfer, being lower in the case of conditional block grants than for the case of unconditional grants (Goodspeed 1998; Volden 1999; Gamkhar 2000; Heyndels 2001; Deller and Maher 2006 and Lago-Peñas 2008).

The asymmetrical effects also appear to be mediated by institutional and political factors. Regarding the latter, for example, Lago-Peñas (2008) found that municipalities with lower levels of debt and leftist-leaning administrations are more likely to experience the "fiscal replacement" effect, maintaining expenditure levels and raising taxes in the face of grant cuts. In a similar vein, Bækgaard and Kjaergaard (2015) found that left-wing

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<sup>10</sup> However, some authors have found that not to be the case. In particular, Gamkhar and Oates (1996), using US aggregate time-series data on state and local expenditures, found no asymmetries in response to cuts and increases in transfers, and Gennaro and Messina (2014) obtained similar results for the case of Italian municipalities.

political administrations are more likely to raise spending when grants are increased and raise taxes when grants are cut. Regarding institutional factors, Rios et al. (2021) found that municipalities where incumbent authorities either make weaker enforcement efforts in tax collection or have lower margins of maneuver for budget allocations are likely to be more responsive to increases in grants.

Last, as for other grant effects already discussed, there are several econometric issues that need to be considered in identifying the asymmetry of subnational governments responses. First, the earlier literature on this issue had problems in separately identifying the effects of program structure and financing institutions from the effects of variations in the levels of grant funding. Second, divergent results have been found in this literature depending on the inclusion or not of time fixed effects, the use or not of first differences, and the choice of lag lengths for the explanatory variables (Goodspeed, 1998; Gamkhar, 2000). Last, Levaggi and Zanola (2003) found problems of heteroskedasticity and serial autocorrelation, while Gamkhar and Oates (1996) and Knight (2002) insisted on the need of addressing the potential problem of endogeneity of grants. Assessing the importance of these issues will require further empirical work.

[Insert Table 3 near here]

#### **4. Effects on expenditure**

Intergovernmental transfers not only affect how subnational governments raise their own revenues but also can affect their spending behavior. In this section we will focus first, on research studying the impact of transfers on the overall size of the public sector, that is, total public spending, and second, on a perceived significant anomaly on subnational spending behavior, where transfers appear to have a significantly larger effect

on subnational spending than equivalent size increases in the private income of the jurisdiction' residents, which has been termed the "fly-paper effect."

#### **4.1 Effects on government size**

Research on the question of government size has a long tradition in the public finance literature starting with Wagner's law, which associated the rise in government size with an income elastic demand for public services, to Peacock and Wiseman (1961) similar prediction on faster growth of public spending than income but in a step like manner due to periodic shocks and social disturbances. Other hypotheses on the growth of government size have included the impact of rent-seeking and clientelism policies (Alesina et al., 2000) or using government as a social insurance device (Rodrik, 1997).

The level of fiscal decentralization has been traditionally seen as affecting the public sector size, but, in this case, containing its growth. In this sense, Musgrave (1959) argued that decentralization would shrink redistribution policies and therefore government spending. But the best-known contribution in this regard is Brennan and Buchanan's (1980) Leviathan hypothesis; in their view, decentralization heightens competition among government units, at the same and different levels, as they seek attract and preserve tax bases, which works to constraint "the size of the Leviathan." The financing of subnational governments with their own tax revenues is of critical importance to the Leviathan hypothesis. When that financing is based on intergovernmental transfers, the story could change radically, and further government growth should be expected (Rodden, 2003).

A good number of papers have researched how grants can affect the size of government. The consistent finding is that the size of subnational governments increases when they are predominantly funded with intergovernmental grants, while their size decreases when subnational governments are funded with own tax revenues (Grossman, 1989; Grossman and West, 1994; Shadbegian, 1999; Stein, 1999; Jin and Zou, 2002; Rodden, 2003; Prohl and Schneider, 2009; Cassette and Paty, 2010; Ashworth et al., 2013; Liberati and Sachi, 2013 or Makreshanska and Petrevski, 2019).<sup>11</sup> This positive impact on

government size also tends to hold when fiscally decentralized units are funded through revenues sharing or centrally regulated sub-national taxation, instruments that are more akin to grants (Makreshanska and Petrevski, 2019).

[Insert Table 4 near here]

## 4.2 Fly-paper effect

Quite related to the growth on government size, the phenomenon of the “fly-paper effect” first introduced by the end of the 1960s (Henderson, 1968; Gramlich, 1969) was termed that way because it does appear that "money sticks where it hits". Funds from intergovernmental transfers tend to be used predominantly by subnational governments for public spending rather than for tax relief to their residents. The existence of this effect is largely documented in the literature across countries (see Bradford and Oates 1971b; Hines and Thaler 1995; Bailey and Connolly 1998; Oates 1998; Gamkhar and Shah 2007).

However, challenging that early academic consensus, several researchers argued that this empirical result could be mostly explained by the presence of endogeneity, a problem that had not been adequately addressed in the prior estimations (Bailey and Connolly, 1998; Knight, 2002). Using proper exogenous instruments to correct for the endogenous determination of grant allocation makes the fly-paper effect fade (Dollery and Worthington, 1999 for Australia; Knight, 2002<sup>12</sup> or Gordon, 2004<sup>13</sup> for the US).<sup>14</sup>

Nevertheless, more recent studies have again supported the hypothesis of the fly-paper effect even after correcting for the presence of endogeneity, although with possibly

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<sup>12</sup> Knight (2002), after controlling for endogeneity of grant amounts federal highway funding to states, suggested that some observed flypaper effects may just be statistical artifacts.

<sup>13</sup> Specifically, Gordon (2004) studied the effects of the Title I program in the U.S, a program that transfer nonmatching resources to school districts targeting their number of poor children. She employed a discrete change in the census-based index of poverty to estimate state-level effects to correct for endogeneity.

<sup>14</sup> To be noted most of these papers only studied specific grant programs within the Australia and the US contexts. For those reasons their external validity and robustness have been questioned; and there has been also some questioning about the exogeneity of the instruments they utilized.

smaller size (Card and Payne 2002<sup>15</sup>; Lutz 2010<sup>16</sup>; Cascio et al. 2013<sup>17</sup>; Litschig and Morrison 2013<sup>18</sup>). But also other studies such as Dahlberg et al. (2008), Liu and Ma (2015) and Lundqvist (2015) have found an increase on subnational spending in response to grant increases in Sweden, China, and Finland, respectively, near to 1 to 1.<sup>19</sup> More recent studies have kept finding consistent empirical evidence in favor of the presence a sizeable strong fly-paper effect (Bracco et al. 2014; Gennari and Messina 2014; Allers and Vermeulen 2016; Leduc and Wilson 2017; Langer and Korzhenevych 2019; and Alekseev et al. 2021).

Considerable research efforts have also gone into establishing the causes of the fly-paper effect. For example, early on Hines and Thaler (1995) argued that the fly-paper effect is simply an empirical anomaly. Many other studies have suggested that this phenomenon stems from the presence of fiscal illusion within subnational government operations, due to the fact that citizens misjudge and erroneously estimate the costs and benefits of their subnational governments. Essentially, the fiscal illusion explanation assumes that the median voter is only capable of observing the average cost of public expenditures, leading to an underestimation of the real marginal costs and thus to a choice to overspend. The possibility of fiscal illusion has been explored in theoretical papers (Courant et al. 1979; Mueller 1989; Baekgaard et al., 2016; Dell'Anno and Martinez-Vazquez 2019), and also in empirical work, (Heyndels and Smolders 1994; Becker 1996; Gemmell et al. 2002; Cárdenas and Sharma 2011; or Ferreira et al. 2019).<sup>20</sup>

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<sup>15</sup> These authors studied the effects of school finance reforms between 1977 and 1992 on U.S. states spending. They employed state Supreme Court decisions as instrumental variables for state educational grants-in-aid. They reported that a one-dollar-increase in state aid raised district education spending by 50 to 65 cents.

<sup>16</sup> He studied the effect of statewide school finance reform in New Hampshire, using reform grants per pupil as an instrument of the allocation of transfers. He found that that one dollar of additional transfers on education spending results in an increase of less than 0.2 dollars.

<sup>17</sup> Cascio et al. (2013) showed an expansion in school spending of 50 cents per dollar in the average Southern school district in the U.S. They also studied the implications of the Title 1 program, focusing on the Southern states in the US, but employing the per-pupil current expenditure using 1960 child poverty rate as an instrument of the federal revenue.

<sup>18</sup> They estimated the impact of intergovernmental transfers, under the unconditional program "Fundo de Participação dos Municípios (FPM)" in Brazil, using RDD models based on multiple population cutoffs to address endogeneity. They showed that transfers increased local government spending per capita by about 20 percent over a 4- year period.

<sup>19</sup> Dahlberg et al (2008) used the formula for the distribution of funds in Sweden to address endogeneity, while Liu and Ma (2015) exploit a discontinuity from the central Chinese government's designation of National Poor Counties; and Lundqvist (2015) employed a quasi-experimental research design for finish municipalities.

<sup>20</sup> To be noted, many of these latter studies may have suffered from the presence of endogeneity, this time in the measurement of fiscal illusion. Intergovernmental grants are likely to be endogenously determined by political and socioeconomic factors that may distort subnational behavioral responses and grants allocation

Besides fiscal illusion, other authors have offered alternative causal interpretations involving the impact of politics, such as citizens' inability to establish "political contracts" with their elected officials (Inman, 2008), or the dynamic interactions between politicians and interest groups that can influence the allocation of public funds (Mueller, 2003; Singhal, 2008 or Leduc and Wilson, 2017).

An additional interesting twist in some recent literature on the subject has been to see the fly-paper effect not as an anomaly or distortion but rather as a rational response in situations where subnational governments use distortionary taxes to finance at least part of their expenditures. This strand of the literature, which builds upon Hamilton (1986), focuses on the idea that transfers are more stimulative of public spending than increases in private income because grants generally can lead to a greater reduction in the marginal cost of public funds (MCPF). Henceforth, the fly paper effect would arise as the result of maximizing welfare behavior by public governments in the presence of costly tax collection, costs which are expected to increase with the level of tax rates (Dahlby, 2011; Aragon, 2013; Vegh and Vuletin, 2015; Mattos et al., 2018; and Ferreira et al., 2020).<sup>21</sup> Here the important obstacle has been how to measure the MCPF accurately, given that its estimation varies greatly across countries and time.<sup>22</sup>

One last strand of the empirical literature suggests that the fly-paper effect may be due to the presence of strategic interactions and spatial local interdependence on subnational governments' spending behavior, which are captured using spatial analysis on cross-sectional data, controlling for both spatial and time fixed effects (Acosta, 2010; Bastida et al., 2013; Kakamua et al., 2014 and Yu et al., 2016).<sup>23</sup>

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itself, and also by fiscal competition and asymmetric information issues (Khemani, 2007 or Boex and Martínez-Vázquez, 2005). See Knight (2002) and Ichimura and Todd (2007) for the use of a variety of techniques, including Instrumental Variable (IV) estimators to address the potential endogeneity of fiscal illusion.

<sup>21</sup> Note that Sepúlveda (2017) has argued that the fly-paper effect does not require the MCPF to be increasing in the tax rate, but only to be greater than one and non-decreasing in the tax rate.

<sup>22</sup> Some of those differences may also be due to the different methodologies employed (e.g., Dahlby, 2008; Auriol and Warlters, 2012). Another layer of complexity and source of variation has been the different instrumental variable used to address the issue of endogeneity. For example, Buettner and Fabritz (2014) used differences in subnational employment as an instrument; Dahlby and Ferde (2015) employed the weighted average personal income tax of other provinces; and Ferde and Islam (2015) and Langer and Korzhenevych (2019) employed, respectively, the allocation formula for the equalization grant and the exogenous shocks from adjustments of the weighting function used to regulate expenditure needs.

<sup>23</sup> An extension of this strand of literature is performed by Rios et al. (2021) who employed a spatial panel data framework to account for unobserved spatial and temporal variability.



To the extent that the government budget constraint relates grants with taxes, deficit and expenditure, changes in the former may also generate crowding-in and crowding-out effects on the spending side. This idea was originally introduced by Scott (1952) and Bradford and Oates, (1971a, 1971b). While intergovernmental grants may involve a lower increase in expenditure because of reductions in taxes and fees, they may also generate a crowding-in effect, increasing total expenditure above the amount of the grant (Gramlich, 1977 and Hines and Thaler, 1995). In this respect, for example, Lago-Peñas (2006) found an increase in investment of around 90 percent of the capital grants received by Spanish regions, with the remaining 10 percent going to reduce the deficit, thus involving a partial and small crowding out.

A fair conclusion, therefore, is that our knowledge about the effects of grants on the spending behavior of subnational governments is rich and extensive, but far from complete. The contradictory nature of the findings is likely to motivate even more future empirical research on the existence and causes of the fly-paper effect. Going forward it will be useful to have a wider diversity of country studies; until now most of the empirical work on the flypaper effect has been focused on high- income countries, where government institutions and officials likely often follow different patterns of behavior than those in low and middle-income countries because of differences in democratization culture or administrative structure.

Future work in this area should also address several econometric issues more consistently. As shown in Table 5, the treatment of the endogenous allocation of grants has been mostly based on non-robust IV instruments, without considering the spatial correlation of the allocation with the recipient municipalities and without controlling for the political and institutional structures possibly subnational government decisions. The main challenge remains how to exogenously capture the allocation of grants with more valid instruments. Identification may be helped by using natural experiments and differential timing treatments. Future research should also differentiate between short and long-term effects of grants, considering that subnational government could need some time to fully react to changes in the allocation of transfers.

[Insert Table 5 near here]

## **5. Other induced subnational behaviors via transfers**

Over the last several decades, there has been a burgeoning of the literature examining the impact of intergovernmental grants on several other consequential behaviors of subnational governments. In this section we focus on four types of those additional behaviors, three of which can not only harm and undermine the system of intergovernmental relations but also jeopardize the macroeconomic stability and sustainability of the national economy (Ter-Minassian, 2007). First, the timing of central transfers can contribute to the procyclical spending behavior of subnational governments; second, poorly designed transfers can induce subnational perverse fiscal behaviors; and third, significant subnational transfer dependence can easily lead to several forms of subnational fiscal indiscipline. The fourth type of behavior considers how effectively transfers can be used to lead subnational governments to internalize spillover or externality effects across subnational units.

### **5.1 The cyclicity effects of grants on subnational fiscal choices**

Depending on their timing and design, intergovernmental grants can either dampen or amplify the typical pro-cyclicality of subnational government spending. If transfers are designed as an insurance mechanism over the business cycle, they will have a dampening impact (Xing and Fuest, 2018). However, if transfers expand when the economy is growing or decrease when the economy is contracting, they will exacerbate the business cycle. As we see next below, the overwhelming evidence is that most central governments time transfers poorly which helps exacerbate the national business cycle.

Earlier empirical studies found some mixed evidence. For example, Sorensen et al. (2001) found a pro-cyclical behavior in the U.S. for federal grants to the states over the nationwide business cycles, while federal grants were counter-cyclical with respect to the narrower state-specific business cycles. Similarly, Arena and Revilla (2009) found that intergovernmental grants in Brazil were also counter-cyclical with respect to state-specific shocks. However, many other studies for the U.S. and OECD countries strongly suggest that intergovernmental grants are often pro-cyclical with respect to subnational output shocks, contributing to aggravate the typical pro-cyclicality of subnational government spending (Seitz, 2000; Boadway and Hayashi, 2004; Abbott and Jones, 2012, 2013;

Blöchliger and Égert, 2013; Caldera-Sanchez, 2013). Two other multi-country studies suggest the predominance of pro-cyclical behavior; Rodden and Wibbels (2010)<sup>24</sup>, find that discretionary transfers are either at best a-cyclical or pro-cyclical in seven of the largest OECD federations, while Blöchliger and Petzold (2009) found that at least half of the transfers systems of all OECD countries tend to be pro-cyclical.

[Insert Table 6 near here]

## 5.2 Fiscal discipline

A particular type of perverse effect of the high dependence on intergovernmental grants, and which has received a great deal of attention in the previous theoretical and empirical literatures, is the weakening of fiscal discipline of subnational governments. This gets manifested into excessive spending, lower tax effort, large budget deficits and the accumulation of subnational debt, which may end in bankruptcy and bail outs by the central government. This process has been framed within the context of the soft budget constraint hypothesis developed by Kornai (1979 and 1986), a soft budget constraint that is generated by the presence of transfer dependence and large vertical fiscal imbalances which weakens overall budget discipline leading to excessive borrowing and subnational indebtedness.<sup>25</sup> Complementarily, this effect has also been framed as part of the "common pool or tragedy of the commons" problem, where fiscal indiscipline arises because financing for subnational governments is perceived to come from taxes raised outside the jurisdiction (von Hagen and Harden, 1995; Alesina et al., 1999; Velasco 1999, 2000; Persson and Tabellini, 2000; Sanguinetti and Tommasi, 2004; Cullis and Jones, 2009; Krogstrup and Wyplosz, 2010; Baskaran, 2012; Esteller-Moré et al., 2015; Molina-Parra and Martinez-Lopez, 2016).

An extensive empirical literature testing these perverse effects on subnational fiscal discipline from different angles has developed over the past several decades. Several

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<sup>24</sup> The list of OECD countries analyzed by Rodden and Wibbels (2010) included Argentina, Brazil, Canada, Germany, India, Spain, and the United States. Interestingly, they found a clearly not pro-cyclical behavior in the case of Australia, although it was the country with the fewest data points.

<sup>25</sup> We should note that some authors have argued that certain level of vertical fiscal imbalance may be instrumental for the central government to pursue certain political and economic objectives (Boadway and Keen, 1996; Dahlby, 1996).

studies have found strong evidence of the common pool problem explaining the generation of a deficit bias among OECD and non-OECD countries (Roubini and Sachs 1989; de Mello 1999 and 2000; Rodden 2002; Fabrizio and Mody 2006; Debrun et al. 2008; Neyapti, 2010; Eyraud and Lusinyan, 2013; Aldasoro and Seiferling 2014; Foremny 2014; Lago-Peñas et al., 2019; and Shi and Hendrick 2020). Other studies have found strong evidence that transfer dependence and vertical fiscal imbalances lead to the expansion of subnational expenditures ( Ehdaie, 1994; Stein, 1999; Jin and Zou, 2002; Rodden, 2003; Jia et al., 2014) and lower subnational tax effort (Jia et al., 2021).

Another group of studies have found strong evidence that dependence on grants generates e increased subnational indebtedness and expectations of a central government bail out in times of crisis (Djankov and Murrell, 2002; Pettersson-Lidbom, 2010; Baskaran 2011; Sorribas-Navarro, 2011; Braun and Trein, 2014; Dietrichson and Ellegård, 2015; Baskaran et al., 2016; Akai and Sato 2019; and Calvo and Cadaval 2021). In connection to this latter literature, several other papers have found that potential rescuers (central governments) are not likely to credibly commit themselves to a no-bailout policy ex-ante because there exists a lot of public pressure to avoid cuts in public services such as health care or education provided by subnational governments. (Wildasin, 1999; Goodspeed, 2002; Oates, 2005; Crivelli and Staal, 2013; Martinez-Lopez, 2022). And complementarily several other studies have found that indeed central governments do increase grants to those subnational governments with higher deficits and debt stocks to avoid financial stress and eventual bankruptcy (Garcia-Milà et al. 2002; Levaggi and Zanola 2003; Buettner and Wildasin 2006; Pettersson-Lidbom 2010; Baskaran 2012; Sola and Palomba 2016; and Goodspeed 2017).

In summary, there is robust evidence on how overuse of transfers to finance subnational governments leads to important problems with subnational government fiscal discipline. Of course, this is a powerful argument in defense of subnational governments' revenue autonomy in fiscal decentralization design. Nevertheless, the empirical literature covered in this section, as shown in Table 7, is not free of some significant econometric issues, as has been the case in other sections, including how potential endogeneity is addressed or the identification of future expectations.

[Insert Table 7 near here]

### **5.3. Addressing externalities across subnational government units with central grants.**

The presence of spillover effects or externalities potentially represents one of the weakest points of decentralized governance, as flagged out in Oates' (1972) "decentralization theorem".<sup>26</sup> Subnational spillover effects have been defined as those discrepancies between the tax prices paid by citizens and the gains obtained from those services financed by those taxes (Bergvall et al. 2006). Many subnational government policies and programs can have significant positive and negative spillovers beyond their jurisdictions. This can be for very visible reasons, such as upper stream jurisdictions inflicting negative externalities on downstream ones, to more subtle reasons due to the presence of spatial interactions.<sup>27</sup> The complication for decentralized governance is that generally, subnational governments have little incentives to internalize those spillover effects by spending more or less on specific sectors or programs, which could benefit other subnational governments. The question that concerns us is to what extent intergovernmental grants can be successful in helping subnational governments internalize those externalities.

One important difficulty is that estimating the size of those spillovers effects across jurisdictions is a hard task due to many different complications, as highlighted by Bird and Smart (2002). This means that calibrating the size of the grant that may be needed becomes more of an uncertain task. And this helps explain why the empirical literature has found mixed results on the effectiveness of using grants for addressing these inter-jurisdictional externalities. It is often argued that the best type of grant that can be used to address inter-jurisdictional externalities is a matching grant (Bezdeck and Jonathan, 1988; Bird and Slack, 1993; Oates, 1998; Figuières and Hindriks, 2002; Bergvall et al. 2006; Ogawa,

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<sup>26</sup> Institutions of political decentralization, such as the level of national political party integration, can have important mitigation effects on subnational government externalities (Ponce-Rodriguez et al. 2020)

<sup>27</sup> The seminal paper on spatial interactions by Case, Hines and Rosen (1993) reported a positive effect of the neighbors' expenditure levels on local per capita expenditure. Similarly, Dahlberg and Edmark (2008) found a positive effect of the welfare level in neighboring municipalities on local welfare. Other studies on the presence of spatial spillovers include Hanes (2002), Lundberg (2006), Birkelöf (2009) and Stastna (2009).

2006; Blöchliger and Kim, 2016).<sup>28</sup> This is because while both matching and non-matching grants stimulate spending by effectively increasing subnational governments' ability to spend (the income effect), but only matching grants provides an additional stimulus through the lower tax price (the price effect).<sup>29</sup>

Empirical studies on the real effectiveness of matching grants or other types of grants in reducing externalities have found mixed results, and there is some general skepticism that upper-level governments have been successful in this matter. For example, in the U.S. context, Inman (1988) and Grossman (1994) argue that the distribution of central grants reflects decisions taken by a universalistic central legislature, rather than being focused on correcting inefficiencies, and that federal transfers quite likely have been ineffective in making subnational governments internalize spillovers.

Overall, this is an area of the empirical literature on the impact of intergovernmental transfers that is under researched. Clarifying the mixed findings thus far will require to undertake case studies where externalities are well quantified and government grant interventions are clearly identified.

[Insert Table 8 near here]

#### **5.4 Other perverse incentives to subnational fiscal choices**

Finally, other kind of perverse incentives may arise from a design of grants. A salient quite common example is the design of equalization grant formulas incorporating the actual tax revenue collections as a measure of their fiscal capacity, thus strongly incentivizing lower subnational tax collections (Baretti et al., 2002; Bravo, 2011; Pöschl and Weingast, 2013; Weingast, 2014). Moreover, the generally right solution of using tax capacity instead of actual revenues in the equalization grant formula may actually backfire, with subnational governments raising taxes beyond what is desirable from a national

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<sup>28</sup> Bergvall et al. (2006) suggest that earmarked matching grants are indeed efficient instruments to internalize national spillovers, but they may fail to internalize regional spillovers. The reason for this is that these types of transfers may incentivize the national taxpayer to pay for those services that exclusively benefit sub-national residents.

<sup>29</sup> In addition, Wildasin (1999) argues that the internalization of externalities is likely affected by the size of the locality receiving the grant allocation, which may matter little for larger size subnational budgets.

viewpoint, when equalization grants overcompensate jurisdictions for the adverse effect of reduced tax bases due to increased subnational tax rates (Persson and Tabellini, 1996; Smart, 1998, 2007; Esteller-Moré et al., 2002; Snoddon, 2003; Ferede, 2017).<sup>30</sup>

Matching clauses in the design of some conditional grants may be also troublesome insofar as matching clauses reduce the marginal cost of spending and then may incentivize inefficient spending (De Borger and Kerstens 1996; Zhuravskaya 2000; Dahlby and Warren 2003; Wiesner 2003; Loikkanen and Susiluoto 2005; Balaguer-Coll et al. 2007; Kalb 2010; Doumpos and Cohen 2014; and Toolsema and Allers 2014; Hailemariam and Dzhumashev 2019). However, there is some other empirical evidence indicating this may not be a generalized problem; for example, Geys and Moesen (2009) find a positive impact of grants on cost efficiency for a sample of Flemish municipalities, while Worthington (2000) finds no significant relationship between transfers and technical efficiency in the case of Australian local governments.

A more general type of perverse effect may be present when transfer funds work as “political resource curse.” Subnational governments often receive additional transfers to improve the performance of their government institutions. However, the condition of poor functioning institutions may be exacerbated by those additional resources. In this sense, for example, Brollo et al. (2013) find that additional federal transfers to municipalities in Brazil induce political corruption and lower the quality of politicians running for office, while Litschig and Morrison (2009) find, also for Brazil, that those additional transfer funds disproportionately increase the probability of the incumbent party being reelected. In the particular case of equalization transfers, Kotsogiannis and Schwager (2006) argue that they reduce the intensity of political competition and lead to rent extraction behavior by incumbent officials.

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<sup>30</sup> A similar problem may arise when equalization grant formulas are based on a representative tax system, such that when a subnational government raises its tax rate, it may obtain higher equalization transfers by the effect its policy has on an increased national standard tax rate used in the formula (Smart, 1998; Ferede, 2017).

## 6. Political economy: Effects on autonomy and accountability

The great promise of fiscal decentralization is to be able to achieve a more efficient allocation of public resources by bringing government closer to the people and allow through diverse government units a better match of resources with people's preferences and needs. For this to happen, subnational governments need to enjoy autonomy in their spending and taxing decisions and for public officials to be held accountable to their resident voters.

The fiscal autonomy of sub-national governments has multiple dimensions, but the two most conspicuous ones are revenue and expenditure autonomy. The level of revenue autonomy can be measured by the share of own revenues to total revenues in the budgets of subnational governments. The measurement of expenditure autonomy is more complex, but essentially it reflects the ability of subnational officials to make their own decisions on what public services to deliver and how to do that in making their own choices on inputs of production, etc.

It is relatively intuitive that grant financing can generally affect the level of revenue autonomy of subnational governments, and that depending on the modality of the grant, especially in the case of conditional grants, expenditure autonomy can also be reduced (Stein, 1999; Rodden 2003, Furceri and Ribeiro, 2009; Sacchi and Salotti, 2017). From this perspective, non-earmarked or unconditional intergovernmental grants are generally interpreted to be more beneficial to autonomy, and among earmarked grants, block grants are preferred to specific grants (Blöchliger and King, 2006; Martinez-Vazquez and Searle, 2006; and Ladner et al., 2019).<sup>31</sup> Numerous papers have documented the relationship between increases in grant financing and losses in autonomy by subnational government, for example, Zhuravskaya (2000); Buettner and Wildasin (2006); Bodman and Hodge (2010) and Psycharis et al. (2016) for OECD countries, and for the case of developing countries, for example, Azis et al. (2001) and Silver (2003) for Indonesia, Mogues and Benin (2012) for Ghana, and Bongo (2019) for Sudan.

When subnational government officials lack autonomy, it becomes much harder to

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<sup>31</sup> Of course, block grants with general earmarking to some areas of expenditure are still more restrictive for autonomy than general- purpose or unconditional grants. See Bergvall et al. (2006) for a detailed discussion of block and general- purpose grants.



hold their accountable to their residents, since, after all, those officials may have little control of how budgets are implemented. Accountability has been defined as the decision by the subnational government to implement, efficiently and without corruption or patronage, the policies and budget most preferred by their citizens (Fearon, 1999).<sup>32</sup> The potential effect of intergovernmental grants on weakening the accountability link between subnational government elected officials and citizens has become a topic of increasing interest. The empirical research has focused on two pillars: First, individuals must know whom to assign blame or reward for policy outcomes (requiring clarity in expenditure assignments), and second, the link between tax and expenditure decisions must be clear for citizens (requiring revenue and spending authority) (Bird and Smart, 2010; Lago and Lago-Peñas, 2010; Kleider, 2018; Dynes and Martin, 2019). The fundamental issue is that practically all types of grant financing, but in different degrees, tend to weaken, if not sever, the accountability link by reducing the political costs of inefficient spending for subnational officials since they do not have to tax their residents, who will not hold officials accountable either. Grant financing also biases the balance made by voters between both sides of the budget, undermining the relation between government performance and re-election incentives (Smart, 1998; Oates, 1999; Rodden, 2003; Martinez, 2005; Egger et al., 2009; Litschig and Morrison, 2009; Gervasoni, 2010; Kalb, 2010; Narbón-Perpiñá and De Witte, 2018).

[Insert Table 9 near here]

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<sup>32</sup> In situations of weak subnational government autonomy, and in the absence of the preferred horizontal accountability, vertical accountability to the central authorities is often seen as an imperfect substitute to generate some sort of indirect subnational government accountability to their residents. In this situation, conditional grants, and in particular specific earmarked grants are more likely to generate that vertical accountability.

## 7. Concluding Remarks

Intergovernmental grants are ubiquitous across countries, as significant public policy tools for financing subnational governments in more and less decentralized system. This makes it important to systematically review and update what is known and what it is not known about both the intended and unintended effects of grants. This survey on the different effects of intergovernmental grants on subnational governments had to be, by necessity, selective. Although some relevant empirical and theoretical research on this topic may have not been included, we have strived to provide a balanced view taking stock of what is known and pointing out some areas that still will require further research.

We have seen that some different results in empirical studies are related to the different methodological estimation approaches utilized, which as is logical have been evolving over time with advances in estimation techniques dealing with such problems as endogeneity. These problems can be overcome by using more sophisticated econometric tools, such as more suitable instrumental variables and novel identification methods.

Another handicap lurking in the background is the need to improve the overall quality and quantity of subnational governments data. This is certainly a more general case that our understanding on the impact of transfers could be enriched by striking a better balance between cross-country analysis and single case country studies of what may be behind the heterogeneous and disparate results observed across countries.

There may also be a need to strike a better balance among the topics being researched. In comparative terms, empirical research of the fly-paper effect and the effects on the tax effort has been considerably more abundant. But that may not be the only or most policy relevant issue regarding the impact of grants. For example, we need a better understanding about the incentives or causal mechanism and the magnitudes involved for the net effect of transfers on subnational revenues generation, perverse incentives, addressing externalities, spending efficiency and accountability, and how specific institutional contexts may affect the results.

But even after future research contributes to clarify the questions raised, we will likely need to accept that definite conclusions regarding some of the effects of intergovernmental grants will not become settled. The fly-paper effect is a good example of that. We have seen that despite considerable research, its existence, size, and persistence

over time are still in question.

In closing, considering the literature reviewed in this paper much work remains to be done on how to design, implement and measure the effects of intergovernmental grants. And there are many other areas where those potential impacts could be researched, such as constitutional design and separation of power, the disciplining of badly behaving political actors, or the role of judicial authorities.

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**Table 1: Selected papers on Tax Effort and Crowding-out effects.**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Knight (2002)	State spending and grant receipts.	Sample: 47 US states. Period: 1983-1997. Method: Ordinary Least Square Model (OLS), Two Stages Least Square Models (2SLS) and LIML estimations. Endogeneity: Treated by two IV: preferences for public goods.	Federal Highway Trust Fund: closed end matching grants.	Intergovernmental grants generate a crowd-out that is statistically and economically significant.
Buettner and Wildasin (2006)	Expenditures, intergovernmental transfers, debt service, and revenues.	Sample: 1270 U.S. municipalities subnational government authorities in Tasmania (Australia). Period: 1973-1997. Method: Panel; Vector error-correction model with an intertemporal budget constraint. Endogeneity: Not treated.	General grants.	An increase in external grants results in reduced subsequent subnational revenue generation.
Mogues and Benin (2012)	Districts' own generated revenues.	Sample: 110's district governments' public finances in Ghana. Period: 1994-2004. Method: Panel; OLS and Random Effects (RE) model. Endogeneity: Not treated.	Conditional transfers.	External transfers crowd-out subnational governments' own revenues.
Litschig and Morrison (2013)	Spending areas such as education, transportation, and housing and urban infrastructure.	Sample: 391 subnational municipalities in Brazil municipalities. Period: 1982-1988. Method: A regression discontinuity approach (RDD). Endogeneity: Not Treated.	Unconditional program: Fundo de Participação dos Municípios (FPM).	They found no evidence of crowding out, but rather a crowding in effect.

		Endogeneity: Treated by IV: redistributed strictly based on population, via a formula based on cutoffs.		
Masaki (2018)	Subnational own revenues removing agricultural taxes.	Sample: 1,572 subnational governments in Tanzania. Period: Quarterly data from 2010 to 2013. Method: OLS and Generalized Method of Moments (GMM) estimations. Endogeneity: Treated as IV. lagged differences of the variables and lagged levels of the equations.	General transfers, both unconditional and conditional, and earmarked development grants.	Grants facilitate subnational revenue generation, especially on rural areas, thus evidence of crowding-in effect.

**Table 2: Selected papers on Tax Competition**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Boadway and Hayashi (2001)	Provincial tax rates, s including lagged tax rates of other jurisdictions as well as their own lagged tax rate	Sample: i) The federal government; ii) the provinces of Ontario and Quebec, and iii) the aggregate of the other eight Canadian provinces. Method: Seemingly unrelated regression (SUR) system by the method of iterated feasible generalized least squares (IFGLS). Endogeneity: Not treated.	Discretionary tax policies.	Negative effect on provincial tax rates, while some provinces increase their tax rates in response to increases in the tax rates of other provinces.
Smart (2007)	Ratio of tax revenue to tax base.	Sample: 10 Canadian provincial tax bases and revenues. Period: 1972-2002. Method: OLS and 2SLS estimations.	Tax-base equalization transfers.	Tax-base equalization transfers have a distorting effect on subnational tax bases.

		Endogeneity: Treated as IV: Increases in the national average tax rate as instrument of the target tax rate.		
Dahlby and Warren (2003)	State Land Taxes.	Sample: 96 Australian subnationalities. Period: 2000-2001. Method: Pooled Data (OLS). Endogeneity: Not treated.	Tax-base equalization transfers.	Tax-base equalization transfers weakly leads to a reduction on tax competition rates at the state level.
Egger et al. (2009)	Business tax policy.	Sample: 1022 municipalities Lower Saxony. Period: 1994-2004. Method: Difference-in-difference estimation (ATT and ATE). Logit and Probit estimations. Endogeneity: Not treated.	Tax-base equalization transfers.	Positive incentive effects of tax-base equalizing grants on subnational tax rates.

**Table 3: Selected papers on Asymmetries in effects**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Stine (1994)	Own-source revenue response variables.	Sample: 66 Pennsylvania county government municipalities. Period: 1978-1988. Method: 2SLS estimation. Endogeneity: Predetermined variables were used as instrumental variables: i) a percentage of the population receiving cash public assistance; ii) the annual dollar changes in three separate expenditure functions	Unconditional nonmatching grant.	The local government revenue response to federal aid was found to be asymmetric.

		(highway, parks and recreation, and library); and iii) two tax base composition variables.		
Heyndels (2001)	Municipality's per capita expenditures	Sample: 308 Flemish municipalities. Period: 1989-1996. Method: Fixed Effects and Random Effects models. Endogeneity: Not treated.	Unconditional grants from the regional government.	Evidence of a fiscal replacement asymmetry.
Lago-Peñas (2008)	Total municipal expenditures	Sample: Broad sample of 264 Spanish municipalities (all of them in the same region, Galicia). Period: 1985-1995. Method: OLS and GMM models. Endogeneity: A lagged endogenous variable is included to deal with potential sluggishness in adjustments.	Wisconsin's unconditional shared revenue program.	Evidence of asymmetries in the effects of grants on total spending. This fiscal replacement form of asymmetry is explained by the incumbent's ideology and the financial capacity of getting into debt.
Gamkhar and Oates (1996)	State and subnational expenditure per capita.	Sample: 39 U.S. subnationalities. Period: 1953-1991. Method: Time-series data; OLS and 2SLS. Endogeneity: Treated as IV: several variables such as the fraction of Democrats or the square of the unemployment rate and of the population residing in metropolitan areas.	Both matching and non-matching grants.	No asymmetry in the response to federal grants.
Gamkhar (2000)	Per capita real state and subnational government high-way spending.	Sample: 45 U.S. states. Period: 1976-1990. Method: Panel data with state and time-fixed effects; GLS and OLS. Endogeneity: Not treated.	Federal highway transfers: closed-end matching grants.	A symmetric response by state and subnational government to federal highway spending.

**Table 4: Selected papers on the effects on government size.**

Authors	Main dependent variables	Data and econometric technique	Type of Grant	Main results
Stein (1999)	The size of the consolidated public sector as a share of GDP.	Sample: 44 OECD countries. Period: 1978-1997. Method: Aggregate panel data. OLS and error-correction models (ECM). GMM estimation. Endogeneity: Treated by GMM estimator: the lagged explanatory variables and lagged dependent variable (in differences).	Discretionary grants.	The larger the share of grants, the larger the government.
Rodden (2003)	A measure of total public-sector expenditure as a percent of GDP.	Sample: 43 Latin America and OECD countries. Period: 1990-1995. Method: Cross Section OLS. Endogeneity: Not treated.	From specific-purpose matching grants to open-ended block grants.	When funded by grants, fiscal decentralization is associated with larger government.
Cassette and Paty (2010)	Government size measured as total public-sector expenditures (as a percentage of GDP).	Sample: EU-15 countries. Period: 1972–2004. Method: Spatial dynamic panel data model (GMM) and using a generalized one-step ECM estimated using a LSDVC estimator. Endogeneity: Treated by GMM estimator: use of the weighted averages of neighbours' exogenous or control variables, (WX), as instruments.	Intergovernmental transfers.	Grants have a positive effect on the size of subnational, national, and aggregate governments.



**Table 5: Selected papers on the Fly-paper Effect.**

Authors	Main dependent variables	Data and econometric technique	Type of Grant	Main results
Card and Payne (2002)	State's Educational Spending per student.	Sample: 48 mainland states in U.S. Period: 1977-1992. Method: OLS and 2SLS models. Endogeneity: Treated by IV: Supreme Court decisions as instrumental variables for state educational grants-in-aid.	Combination of MFP and flat grants.	Evidence of a strong fly paper effect on U.S. states spending: One-dollar-increase in state aid raised district education spending by 50 to 65 cents.
Gordon (2004)	Instructional spending and revenues.	Sample: 7047 schools at the district level in the US. Period: 1991-1995. Method: OLS and 2SLS models. Endogeneity: Treated as IV: Discrete change in the census-based index of poverty to estimate state-level effects.	Title I program non-matching block grants.	Grants raise spending initially, but the effects become very minimal over time.
Dahlberg et al. (2008)	Total and disaggregated by the different sectors.	Sample: 284 Swedish municipalities. Period: 1996-2004. Method: Discontinuity approach that exists every tenth year; 2SLS model. Endogeneity: Treated as IV: new formula for the distribution of funds.	Unconditional block (lump sum) grants.	The fly-paper effect persists when one uses appropriate instruments for grants.

Lutz (2010)	Variation in municipal per pupil local revenue for education.	<p>Sample: 125 New Hampshire municipalities.</p> <p>Period: 1998-2000.</p> <p>Method: OLS and 2SLS models.</p> <p>Endogeneity: Treated as IV: reform grants per pupil as an instrument of the allocation of transfers.</p>	Unconditional grants and matching grants.	One dollar of additional transfers on education spending results in an increase of less than 0.2 dollars.
Cascio, Gordon and Reber (2013)	Per-pupil school expenditure and revenue.	<p>Sample: 910 school districts in 9 southern states of US.</p> <p>Period: 1961-1964-1969.</p> <p>Method: Panel FE; 2SLS.</p> <p>Endogeneity: Treated by IV: per-pupil current expenditure.</p>	Title I: restricted block grant program.	An expansion in school spending of 50 cents per dollar in the average Southern school district in the U.S.
Leduc and Wilson (2017)	Change in state highway spending per capita.	<p>Sample: 48 U.S. states.</p> <p>Period: 2009-2012.</p> <p>Method: OLS and Instrumental variables (IV) difference-in-differences methodology.</p> <p>Endogeneity: Treated by IV: pre-existing road-related factors as instruments for the amount of ARRA highway funds received by states.</p>	Federal highway grants under 2009 American Recovery and Reinvestment Act (ARRA).	States increased highway spending more than dollar-for-dollar with the ARRA grants they received, especially those states with more political contributions from the public-works sector.

**Table 6: Selected papers on the cyclical effects of grants on subnational fiscal choices and on the perverse incentives to subnational fiscal choices.**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Baskaran et al. (2016)	Annual per capita deficit.	Sample: Panel of 114 Israeli municipalities. Period: 1999-2009. Method: Fixed effects model with a lagged dependent variable; System-GMM estimator. Endogeneity: Treated as IV: the lagged dependent variable is instrumented with further lags of itself.	Earmarked transfers.	The higher the dependence of central government grants, the more exacerbate political budget cycles are.
Baretti et al. (2002)	Combined state income and corporate tax revenues as percentage of state GDP.	Sample: 10 western states of Federal Republic of Germany. Period: 1970-1998. Method: Pooled time series and OLS; Hausman and Taylor (1981) estimator lagged dependent variable. Endogeneity: Not treated.	Tax-revenue equalization transfers.	Tax-revenue equalization grants have a negative effect on states' tax revenue.
Brollo et al (2013)	Broad and narrow corruption measures and observed quality of political candidates.	Sample: 2,217 Brazilian municipalities. Period: Two mayoral terms: January 2001–December 2004 and January 2005– December 2008. Method: Fuzzy Regression Discontinuity Design (RDD), with population discontinuities as an instrument for the transfers actually received. Endogeneity: Not Treated.	Fundo de Participação dos Municípios (FPM): Federal Transfers Program.	Federal transfers to municipalities in Brazil induce political corruption and lower the quality of politicians running for office.

**Table 7: Selected papers on fiscal discipline.**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Rodden (2002)	Yearly data on subnational budget balance, as a way of measuring subnational fiscal discipline.	Sample: 43 OECD countries. Period: 1986-1996. Method: Time-Series Cross Sectional Analysis. GMM estimation Endogeneity: Treated using GMM. Lagged explanatory variables (in differences).	Intergovernmental transfers.	As countries increase their reliance on intergovernmental transfers over time, subnational fiscal performance decline, especially when subnational governments have easy access to credit.
Levaggi and Zanola (2003)	Number of units of expenditure in public health services per capita at the regional level	Sample: 20 Italian regions. Period: 1989-1993. Method: OLS models with hard-budget and soft-budget constraints. Endogeneity: Lagged current level of regional deficits employed.	Categorical lump-sum grants.	Central governments increase grants to those subnational governments with higher deficits and debt stocks to avoid financial stress and eventual bankruptcy.
Pettersson-Lidbom (2010)	Debt measured in per capita terms and at constant prices.	Sample: Panel of 276 Swedish local governments. Period: 1979-1992. Method: 2SLS estimation. Endogeneity: Treated as IV: the fraction of contiguous jurisdictions receiving discretionary grants today	Swedish equalization transfers.	A local government significantly increases its debt level by going from a hard to a soft budget constraint.
Shi and Hendricks (2020)	Debt level measured in three ways-relative to population, personal income, and gross state product (GSP).	Sample: Panel of 50 U.S. states. Period: 1997-2007. Method: Fixed effects with the Driscoll-Kraay (DK) standard error. Endogeneity: Not Treated.	Federal Grants.	Intergovernmental grants from higher levels of governments to lower levels reduce the debt level of governments significantly.

**Table 8: Selected papers on addressing externalities across subnational government units.**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Inman (1988)	Several spillovers indicators: i) the Percentage of state residents who have left the state within the past year; ii) the Percentage of households below poverty level in the state; iii) the New housing starts per capita within the state; iv) and the Number of local governments per square mile in the state.	Sample: 49 states of the U.S. Period: 1952,1962,1972. 1977, 1984. Method: Aid regressions and simple correlations analysis. Endogeneity: Not treated	Several major categories of federal-to-state and federal-to-local grants-in-aid.	Grants are not observed to correct resulting inefficiencies from across-state spillovers
Grossman (1994)	Yearly data on subnational budget balance, as a way of measuring subnational fiscal discipline.	Sample: 49 states of the U.S. Period: 1974,1977,1980, and 1983. Method: Time-Series Cross Sectional Analysis. GMM estimation. Endogeneity: Treated using GMM. Lagged explanatory variables (in differences).	Intergovernmental transfers.	As countries increase their reliance on intergovernmental transfers over time, subnational fiscal performance decline, especially when subnational governments have easy access to credit.

**Table 9: Selected papers on the effects on autonomy and accountability.**

Authors	Main dependent variables	Data and econometric technique	Type of grant	Main results
Gervasoni (2010)	Subnational Democracy: Which includes two indicators of electoral competition, and three indicators of power concentration in the incumbent.	Sample: 22 Argentinian provinces Period: 1983-2003 Method: Random Effects models and G2SLS estimation. Endogeneity: Reciprocal of population employed as instrument.	Annual federal transfers per adult (eighteen or older) averaged over the four years of each gubernatorial term during the period of analyses.	Negative relationship between federal grants and subnational democracy levels.
Azis et al. (2001)	Potential local revenue sources.	Sample: 20,000 identified Indonesian needy villages Period: 1994-1998 Method: Descriptive Analysis	Earmarked Grants.	Increases in grant financing may actually have increased local reliance on the central government.
Bodman and Hodge (2010)	Measures of Fiscal Decentralization	Sample: 67 countries. Period: 1981-1999. Method: Cross-section and Panel Data analysis: OLS and Fixed-Effects estimation Endogeneity: Not Treated.	General Grants.	A negative impact of central transfers on subnational autonomy is found due to the substitution effect of subnational governments as grants increase.
Psycharis et al. (2016)	Revenue Autonomy Indicator estimated as the ratio of the sum of deflated values of own internal revenues.	Sample: 1031 Greek municipalities Period: 1999-2009. Method: Panel Least Squares with cross-section Random Effects. Endogeneity: Not Treated.	General central transfer.	Negative impact of intergovernmental transfers on subnational autonomy.

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