

THE EMPIRICAL RELATIONSHIP BETWEEN FISCAL DECENTRALIZATION AND ECONOMIC GROWTH: A REVIEW OF VARIABLES, MODELS AND RESULTS

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Abstract

The paper aims to complement recent studies that review the empirical relationship between fiscal decentralization and growth and provide an in-depth analysis of the independent and control variables used in the regressions. It analyses 26 both classic and very recent papers that have tested the relationship either cross-country or within a single country. The paper finds more than 30 independent variables that proxy fiscal decentralization and more than 60 control variables that have a certain impact on economic growth. As it also does a brief review of the models and the data used, the paper concludes by providing couple of recommendations on how future studies on this topic should be framed.

Keywords: fiscal decentralization, economic growth, empirical model

1. INTRODUCTION

The classic theory starting from Tiebout (1956) and Oates (1972) suggests that fiscal decentralization can generate a multitude of benefits including better allocation of goods, enhanced efficiency in providing services or increased local economic growth. The latter seems to be the one that has been analyzed the most in the academia and the one that probably provides the most confusion in terms of results. There are almost as many studies that find evidence for a positive, a negative, or no relationship at all. However, the topic has not been analyzed systematically especially since the theory has not yet provided a fully reliable theoretical model. In addition, scholars have analyzed the relationship in different countries and at different times.

Partially due to this ambiguity in terms of results, Baskaran, Feld and Schnellenbach (2014, 2016) and Martinez-Vazquez, Lago-Peñas and Sacchi (2016) have published some very helpful meta-analyses that encompass most of the empirical studies that test the relationship between fiscal decentralization and growth. While their papers accurately review the results, the methodologies and the empirical limitations, they do not seem to make an in-depth analysis of the usage of independent and control variables. This study wants to complement their research and provide a better understanding of the components of the growth regressions. Since it also includes a couple of very recently published papers on the topic, it follows their lead in presenting and comparing the regression results and the models used to reach them. In 13 cross-country and 13 single-country studies the current article

finds more than 30 independent variables and more than 60 control variables. While the usage of the classic ratios of subnational revenue and expenditure to total national revenues and expenditures is observed in almost every study, regressions assessing the impact of local autonomy or of intergovernmental transfers on growth remain rather limited. In terms of control variables, while some scholars include some country- or region-specific indicators, most continue to adhere to the classic variables included in most regressions that search for significant relationships between economic growth and various political, institutional or macroeconomic factors. The paper starts with a review of the theoretical aspects of fiscal decentralization, continues with an analysis of the results generated by the studies that tested the linkage between fiscal decentralization and growth and then it presents an in-depth review of the data, models and variables used in 26 selected studies. The paper ends with a discussion of the results and some recommendations for future studies.

2. THEORETICAL ASPECTS RELATED TO FISCAL DECENTRALIZATION

Fiscal decentralization usually means devolving authority, revenues and decision making from the central government to the subnational governments. Lately, the process has been debated intensely by both scholars and practitioners especially since it has been strongly promoted by organizations like the World Bank, USAID, the UN or various European institutions. The classic theory suggests that fiscal decentralization leads to enhanced economic efficiency because subnational governments, due to their proximity, have better knowledge of local conditions and preferences in the provision of public goods (Oates, 1972). This process also enhances inter-jurisdictional competition and population mobility (Tiebout, 1956) generating subnational innovations, cost reductions, increased productivity and reduced inequalities (Ezcurra and Pascual, 2008; Bodman, 2011). According to Rodríguez-Pose and Krøijer (2009), Asatryan and Feld (2015) and Gemmell, Kneller and Sanz (2013) there are other positive benefits of fiscal decentralization presented in the literature including economies of scale (Prud'homme, 1995; Rodríguez-Pose and Ezcurra, 2010), macroeconomic stability (Martinez-Vazquez and McNab, 2006), fiscal consolidation (Schaltegger and Feld, 2008), market development (Weingast, 1995), enhanced transparency and accountability (Martinez-Vazquez and McNab, 2003; Azfar et al, 1999; Ebel and Yilmaz, 2002), democratic participation (Dabla-Norris, 2006) or increased productive public investments (Kappeler and Valila, 2008).

On the other hand, fiscal decentralization has also been criticized in various theoretical and empirical papers. One of the most discussed negative effect is macroeconomic instability since there have been cases when decentralized subnational governments generated massive deficits and then asked central governments to bail them out (Bodman, 2011; Rodríguez-Pose and Gill, 2003). In this sense, Treisman (2002) suggested that increasing subnational deficits leads to higher central government expenditures and debt along with higher inflation rates. Fiscal decentralization may also impact negatively resource distribution across jurisdictions because business and people mobility can seriously constrain attempts to redistribute income. Nonetheless, as limi (2005) mentioned,

the theoretical assumption that the movement might start right away may be unrealistic, at least in the short term. Fiscal decentralization can also lead to greater inequalities at the subnational level making it less likely for certain regions to benefit from the sharing of best practices and economies of scale (Odero, 2004). Furthermore, regional inequalities in services like infrastructure, education or healthcare may prevent the full use of the production factors (Thiessen, 2003). It should be mentioned, though, that criticism of fiscal decentralization is more predominant in poor and developing countries where local governments have limited capacity and struggle with planning and implementing the newly devolved tasks. Furthermore, as the accounting mechanisms for monitoring public bureaucrats are weaker in these developing countries (Illner, 1998), fiscal decentralization may lead to local capture and increased corruption while also failing to exploit economies of scale and scope (Prud'homme, 1995).

3. FISCAL DECENTRALIZATION AND ECONOMIC GROWTH – EMPIRICAL EVIDENCE

Since the theoretical literature is inconclusive as regards the relationship between fiscal decentralization and economic growth, it is not surprising that the empirical evidence is also ambiguous and provides contradicting results. While studies that analyze the 1970s and the 1980s find mostly negative relationships, more recent papers suggest the relationship is either positive or it does not really exist. There are also mixed results in terms of the samples used especially between developed and developing countries. Ligthart and Oudheusden (2017) believe these contrasting results are due to the lack of relevant theoretical models which does not allow a systematic analysis across studies. Too complex fiscal systems, failure to take into account the political decentralization or to capture the jurisdictional heterogeneity are other reasons mentioned in the literature for the lack of consensus (Voigt and Blume, 2012; Salmon, 2013; Filippetti and Sacchi, 2015; Martinez-Vazquez, Lago-Peñas and Sacchi, 2016).

The most ambiguous results regarding the impact of fiscal decentralization on growth come from cross-country analyses. Yilmaz (1999) on a sample of 30 countries between 1971 and 1990, Ebel and Yilmaz (2002) on a sample of six Central European countries between 1997 and 1999, Thießen (2003) on a sample of 26 developed countries between 1981 and 1995, Iimi (2005) on a sample of 51 countries between 1997 and 2001, Enikolopov and Zhuravskaya (2007) on a sample of 95 countries between 1975 and 2000, Gemmell, Kneller and Sanz (2013) on a sample of 23 OECD countries between 1972 and 2005¹ and Ligthart and Oudheusden (2017) on a sample of 56 countries between 1990 and 2007 all find a statistically significant positive impact of fiscal decentralization on economic growth. On the other hand, Davoodi and Zou (1998) on a sample of 46 countries between 1970 and 1989², Martinez-Vazquez and McNab (2006) on a sample of 66 countries between 1972 and 2003³, Rodríguez-Pose and Krøijer (2009) on a sample of 16 Central and European countries between 1990 and 2004, Rodríguez-

¹ The coefficient is positive only for revenue decentralization. It is negative for expenditure decentralization.

² The coefficient is not significant for the subsample that contained only developed countries.

³ The coefficient is negative only in developed countries. In developing countries it is positive.

Pose and Ezcurra (2010) on a sample of 21 OECD countries between 1990 and 2005, Baskaran and Feld (2013) on a sample of 23 OECD countries between 1975 and 2008 and Filippetti and Sacchi (2015) on a 20 OECD country sample between 1973 and 2007 all find a statistically significant negative impact. Finally, there have also been many cross-country studies that could not find a robust relationship between fiscal decentralization and economic growth, including Woller and Phillips (1998) with a sample of 23 less-developed countries between 1974 and 1991, Martinez Vazquez and McNab (2006) with a sample of 66 countries between 1972 and 2003, Thornton (2007) with a sample of 19 countries between 1980 and 2000, Bodman (2011) with a sample of 18 OECD countries between 1981 and 1998, Baskaran and Feld (2013) and Asatryan and Feld (2015) both using a sample of 23 OECD countries sample between 1975 and 2001/ 2000. All these results are presented in Tables 1 which focuses on cross-country developed and developing countries and Table 2 which focuses only on the OECD countries.

According to Akai and Sakata (2002), Stansel (2004) and Jin and Zou (2005) single country studies might be more accurate than cross-country studies in providing robust conclusions about the real relationship between fiscal decentralization and economic growth, although their results are less generalizable. Indeed, while most studies focus on China and the USA, as presented in Table 3, these single-country studies seem to present a more positive impact on growth. In China, Lin and Liu (2000), Jin and Zou (2005), Jin, Qian and Weingast (2005) and Qiao, Martinez Vazquez and Xu (2008) all confirm the positive relationship using samples that variate between the 1970s and the 1990s. These results are challenged by Zhang and Zou (1998, 2001) which find a negative impact between the mid-1980s and the early 1990s. In the USA most results find a positive relationship in the 1990s (Akai and Sakata, 2002; Akai, Hosoi and Nishimura, 2009) but also on 30 year period between the 1960s and the 1990s (Stansel, 2004). On the other hand, Xie, Zou and Davoodi (1999) find no results in that period. As seen in Table 4, most other single-country studies focus on federation states. In Germany, Behnisch, Büttner and Stegarescu (2002) find that centralization of expenditure has had a positive impact on decentralization between 1950 and 1990. In Switzerland, Feld, Kirchgässner and Schaltegger (2004) find no relationship in the 1980s and 1990s. In India Zhang and Zou (2001) observed a positive impact in 16 major states in the last part of the 20th century. Finally, in Russia, Desai, Freinkman and Goldberg (2005) and Yushkov (2015) find contrasting results. While the former indicate a positive impact in the early 2000s, the latter suggests that relationship is negative. While limited in number, there have been attempts to analyze fiscal decentralization in unitary countries as well. In Spain Gil-Serrat and Lopez-Laborda (2006) find no significant relationship in the 1980s and 1990s, while in Colombia Lozano and Julio (2016) notice a positive relationship between 1990 and 2012.

TABLE 2. CROSS-COUNTRY EMPIRICAL STUDIES ANALYZING THE RELATIONSHIP BETWEEN FISCAL DECENTRALIZATION AND ECONOMIC GROWTH (ONLY OECD COUNTRIES)

OECD countries	Gemmill, Knelier and Sanz (2016)	Asatryan and Feld (2015)	Filippetti and Sacchi (2015)	Baskaran and Feld (2013)	Rodriguez-Pose and Ececurra (2010)	Bodman and Ford (2006)	Thielen (2003)
Dependable variable	GDP	GDPPC	GDPPC 5 year average	Growth rate of labor productivity	GDPPC 5 year average	Average GDPPC over 3 years	GDPPC
Independent variables	FDEXP Negative sig 1% FDEXP_own Negative sig 1% FDREV Positive sig 1% FDREV_own Positive sig 1% FDREV_ownsh Positive sig 1%	AUTONOM1 Negative sig 5% AUTONOM2 Positive sig 1%	FDEXP Negative not sig FD TAX_ own Negative sig 1% FD TAX_ prtax Negative not sig FD TAX_ inctax Negative sig 10%	FD TAX_ own Negative sig 10% FD TAX_ ownsh Negative not sig	FDEXP Negative sig 1% FDREV Negative sig 1% FDEXP_curr Negative sig 1% FDEXP_kap Negative sig 1% FDEXP_econ Negative sig 1% FDEXP_hih Negative sig 5% FDEXP_edu Negative sig 1% FDEXP_soc - Negative sig 10%	FDEXP Negative not sig FDREV Negative not sig FD TAX_ own Negative sig 10% FDREV_own Positive not sig	FDEXP Positive not sig FDEXP_low Positive sig 1% FDEXP_med Positive sig 1% FDEXP_high Positive sig 1%
Control variables	INVEST WORKFORCE TAXBURDEN TRADE INFLATION	INVEST TRADE INFLATION POP URBAN EXPGOVAD1 INTEREST BALANCE POP_DENS WF_SHARE URBAN FDI POLIT	INITGDPPC POP URBAN EDU UNEMPL TRADE INVEST POLIT	INITGDPPC TAXBURDEN EDU INVEST TRADE INFLATION Federation dummy	INITGDPPC POP TRADE DEC_POLIT DEC_ADMIN KAP_GDP EDU_YEARS EXPGOV/GDP	TIERS EMPLOYEE EDU INFLATION EXPGOV/GDP TRANSFERS CREDIT_SD POLIT Subnational election vs appointment dummy	POP INVEST_GROWTH EDU INITGDPPC UNEMPL E.U.
Model	PMG with 2 lags	Fixed and time effects	GMM with fixed effects	Fixed and time effects	OLS regression	Fixed and time effects	GLS regressions
N	23 countries	23 countries	20 countries	23 countries	21 countries	18 countries	22 countries
T	1972-2005	1975-2000	1973 - 2007	1975-2001	1990-2005	1981-1998	1981-1995

Source: own creation based on the analyzed studies

TABLE 3. LIST OF EMPIRICAL STUDIES ANALYZING THE RELATIONSHIP BETWEEN FISCAL DECENTRALIZATION AND ECONOMIC GROWTH IN USA AND CHINA

USA and China studies	Dependable variable	Independent variables	Control variables	Model	N	T
Akai, Hosoi and Nishimura (2009)	GDPPC at state level	FDEXP_loc Positive sig 1% FDREV_loc Positive sig 5%	EDU_T1 GSP_T1 GINI_T1 PATENTS_T1 EXPORTS ETHNIC FARM POP AREA TAXBURDEN_T1 POLIT Regional dummies	MLE with fixed and time effects	50 US States	1992-1997
Akai and Sakata (2002)	GDPCC at state level	FDEXP_loc Positive sig 5% FDREV_loc Positive not sig FDREVEXP Positive sig 5% AUTONOM2 AUTONOM3 Negative not sig	POP INITGDPCC EDU_HS GINI_T1 PATENTS_T1 TRADE_T1 POLIT	Fixed and time effects	50 US States	1992-1996
Xie, Zou and Davoodi (1999)	GDPCC at national level	FDEXP Positive not sig	TAXBURDEN WORKFORCE INVEST TRADE GINI INFLATION EXTSHOCK	OLS regressions (time series)	USA federal level	1948-1994
Qiao, Martinez Vazquez and Yu (2008)	GDPCC at provincial level	FDEXP (per capita) Positive sig 1% FDTAX Negative sig 1% FDTAX_eqly Positive sig 1%	INVEST WORKFORCE WEALTH EXP_XBGT	2SLS	28 Chinese provinces	1985-1998
Jin and Zou (2005)	GDPCC at provincial level	FDEXP_budg Negative sig 1% FDEXP_xbudg Negative not sig FDREV_budg Positive sig 5% FDREV_xbudg Negative not sig	INVEST WORKFORCE TRADE L.INFLATION	Fixed effects	30 Chinese provinces	1979-1999
Jin, Qian and Weingast (2005)	GDPCC at provincial level	FDEXP Positive sig 5%	TAXBURDEN WORKFORCE	Fixed and time effects	29 Chinese provinces	1982-1992
Zhang and Zou (2001)	GDP at provincial level	FDEXP Negative sig 5%	WORKFORCE INVEST TRADE TAXBURDEN INFLATION EXPGOVAD1 EXPGOVAD2 EXP_dev1, 2 EXP_def1, 2 EXP_HK1, 2 EXP_URBAN	Fixed effects	29 Chinese provinces	1987-1993

Source: own creation based on the analyzed studies

TABLE 4 LIST OF SINGLE COUNTRY EMPIRICAL STUDIES ANALYZING THE RELATIONSHIP BETWEEN FISCAL DECENTRALIZATION AND ECONOMIC GROWTH, OUTSIDE USA AND CHINA

	Other countries	Lozano and Julio (2016)	Gil-Serrat and Lopez-Laborda (2006)	Field, Kirchgässner and Schalleger (2004)	Zhang and Zou (2001)	Yushkov (2015)	Desai, Freinkman and Goldberg (2005)
Dependable variable	GDP/PC at regional level	GDP/PC at regional level	GDP at canton level	GDP at provincial level over 5 years	GDP/PC at regional level	GDP/PC at regional level	GDP/PC at regional level
Independent variables	FDEXP Positive sig 1% FDREV Positive sig 1% FDEXP_aut Positive sig 1% AUTONOM1 Positive sig 1%	AUTONOM1 Positive not sig AUTONOM2 Positive not sig AUTONOM3 Positive sig 10%	FDEXP Positive not sig FDREV Positive not sig	FDEXP Negative not sig FDEXP (per capita) Positive not sig FDREV Positive not sig FDREV per capita Positive sig 5%	FDEXP_loc Negative not sig FDREV_loc Negative sig 10% TRANSFERS Negative not sig AUTONOM1 (at municipal level) Positive sig 10%	FDTAX_own Positive sig 5%	
Control variables	INVEST_PRIVK Regional dummies	INVEST_PRIV INVEST_PUB INITGDPPC EDU_EMPPL POP Dummy variables for the various regional taxation systems	WORKFORCE EDU_CAP POP INVEST Language dummy	EXP_DEV1 EXP_NONDEV EXP_SOC EDU_EXP EXP_HTLH EXP_DEV2 AREA GDP_T1 EDU TAXBURDEN	INVEST RESSHARE TAXBURDEN POP TRADE INITGDPPC INFLATION EDU_UNI (all at regional level)	POP EDU_UNI INVEST_PRIV RESOURCE EXPORTS INITGDPPC PRVAID Republic dummy	
Model	AMG	Fixed effects with general and specific time trends	OLS regressions	OLS regressions	Fixed and time effects	Fixed and time effects	
N	24 Colombian regions	17 Spanish Autonomous Communities	26 Swiss Cantons	15 Indian states	78 Russian regions	80 Russian regions	
T	1990-2012	1984-1995	1980 - 1999	1970-1994	2005-2012	1996-1999	

Source: own creation based on the analyzed studies

4. METHODOLOGIES AND MODELS

In this chapter the paper aims to review some of the most important papers that assess the relationship between fiscal decentralization and growth. It includes 13 cross-country and 13 single-country studies presented in Tables 1 to 4 and it follows the lead of some other meta-analyses in the field that have been published recently (Baskaran, Feld and Schnellenbach in 2014 and 2016 and Martinez-Vazquez, Lago-Peñas and Sacchi in 2016). While those studies focus more on the models and the regression results, this study aims to look more comprehensively on the use of independent and control variables. To the author's knowledge this study is the first that analyses in detail the use of control variables in the regressions. Since the study also includes some newer studies, it also provides a brief review of the data, the use of empirical models and the empirical limitations.

4.1. Data

As mentioned before, analyses are either cross- or single-country and mostly assess fiscal decentralization from a budgetary perspective. While for the latter, the data is mostly taken from national sources, like the national statistics offices, for the former, authors mostly use OECD data or IMF's Government Finance Statistics. Lately, however, scholars have become more skeptical about the use of the latter as they might incorrectly suggest a higher degree of decentralization than it is really the case (Baskaran and Feld, 2013; Bodman and Ford, 2006). This is related to the fact that these data sets do not distinguish between expenditures that are under the authority of the local government and those that are transferred in order to perform certain tasks on the behalf of the central government. Furthermore, revenues do not distinguish between taxes for which the local governments can decide rates and bases and taxes under the supervision and control of the central government. Results might also vary due to the fact that some studies may include more countries or more regions in the analysis. For example, while Rodríguez-Pose and Krøijer (2009) analyze 16 Central and Eastern European countries between 1990 and 2004 and find a negative relationship between expenditure decentralization and growth, Ligthart and Oudheusden (2016) using 56 developed and developing countries in roughly the same period, suggest the opposite. The timeframe of the analysis also seems to be important. The studies of Davoodi and Zou (1998) and Iimi (2005) both analyze around 50 development and developing countries. While the former analyzed data between 1970 and 1989 and found a negative impact, the latter used only four years between 1997 and 2001 and found a positive relationship. While some studies have more than 1,000 observations and others less than 100, most studies, according to Baskaran, Feld and Schnellenbach (2014), have an average of 250 observation.

4.2. Empirical modelling

In the absence of an agreed theoretical model, scholars have tried to assess the empirical relationship between fiscal decentralization and growth through many techniques, as seen in Tables 1-4. In terms of the datasets, most studies used panels although a couple of scholars preferred time series. According to Baltagi (1996) and Bodman and Ford (2006) panel datasets provide more validity, less collinearity among the variables, more degrees of

freedom and better control for omitted variables and, thus, can produce more reliable parameter estimates. Within the studies that use panel data, the fixed-effect model tends to be the most popular being used in early studies like the classic one of Davoodi and Zou (1998) but also in more recent ones like the one of Asatryan and Feld (2015). Many scholars also includes time-effects or time trends in their studies. The fixed effects are used in order to tackle the issue of unobserved cross-country or cross-regional heterogeneity while the time effects are included in order to control for temporal shocks within the dataset. The side-effects of using fixed effects include reduced robustness and lower within variance for the fiscal decentralization indicators (Baskaran and Feld, 2013; Asatryan and Feld, 2015). Some recent studies propose various dynamic models including the pooled mean group (PMG) model (Gemmell, Kneller and Sanz, 2016), the augmented mean group (AMG) model (Lozano and Julio, 2016), the generalized method of moments (GMM) model (Filippetti and Sacchi, 2015) or the maximized likelihood estimation (MLE) model (Akai, Hosoi and Nishimura, 2009). Other studies, however, use the classic ordinary least squares (OLS) and the generalized least squares (GLS) regression models. Finally, there is also one study that uses instrumental variable method through the two-stage least squares (2SLS) regressions. Finally, in terms of the dependable variable used in the studies, while most studies use the growth of GDP per capita, Gemmell, Kneller and Sanz (2016) use GDP growth and Baskaran and Feld (2013) use the growth rate of labor productivity. Furthermore, while a majority of studies use annual data for growth, others use 3 or 5 year averages. The use of independent and control variables is discussed in more detail below.

4.3. Independent variables – usage and results

There is an ongoing arduous debate about which indicators measure best fiscal decentralization. In order to correctly measure it scholars need to understand the revenue-sharing mechanisms between central and subnational governments and the discretion of the latter to collect taxes, change their bases and rates and use the generating revenues without control from higher levels of government. It is also relevant to understand the nature of intergovernmental transfers and the level of administrative and political decentralization at the subnational level (Martinez Vazquez and McNab, 2006). The use of expenditure and revenue decentralization indicators, while popular, easy to build and somehow consistent across countries and over time, might not provide accurate measures of authority allocation as scholars believe they tend overestimate the subnational fiscal independence by failing to make an appropriate distinction between autonomy and delegation of tasks or revenue (Akai and Sakata, 2002; Asatryan and Feld, 2015). Most data just provides a breakdown of revenues and expenditures reported at the level of government that receives or operates them, regardless of whether it actually has discretion over them. In this sense, subnational governments that have the power to decide on the bases and the rates, and to determine the allocation of their expenditure, are more decentralized than those whose revenues and expenditures are determined by national legislation (Bodman, 2011). Thus, these indicators might incorrectly suggest a high degree of decentralization, although the autonomy of sub-federal governments over fiscal matters might actually be limited (Baskaran and Feld, 2013). In addition, since subnational revenue share in total revenue

is substantially lower than their expenditure share in total expenditure (due to the inclusion of intergovernmental transfers), results could suggest that economic growth is positively influenced by revenue decentralization but negatively influenced by expenditure decentralization (Jin and Zou, 2005). All these criticisms led many authors to suggest that subnational fiscal autonomy should be included among the main indicators that test fiscal decentralization. In this regard, Stegarescu (2004) proposed a couple of new indicators that supposedly capture the true amount of subnational fiscal autonomy by differentiating tax revenue according to the degree of autonomy that the subnational governments possess to modify tax rates and tax bases (Asatryan and Feld, 2015). While these new indicators only indicate the potential degree of fiscal autonomy and may still overestimate actual fiscal decentralization, they reflect much better the varying degrees of autonomy that subnational governments have (Gil-Serrat and Lopez-Laborda, 2006).

As presented in Table 5, where each indicator has been given an acronym by the author, there have more than 30 indicators used to proxy fiscal decentralization in the analyzed studies. By far the most popular are related to expenditure decentralization with the ratio of subnational expenditure to total national expenditure being the most used indicator in the field. In the analyzed studies this indicator is positively related to growth in eight studies but is statistically significant only four times (once at 10%). Nine studies, on the other hand, suggest it has a negative impact but it is significant only in five of them (once at 10%). There are at least 13 other indicators that have been used to assess the impact of subnational expenditure on growth. Many of them, however, are used to assess fiscal decentralization in certain areas of the economy, rather than at a general level. In terms of revenue decentralization, six indicators have been identified in the analyzed studies. The ratio of subnational revenue to total national revenue is the most popular being used in at least eight studies. In five of them there seems to be no relationship with growth. Two studies find a positive impact and only suggests the opposite. While they also assess revenue decentralization, the indicators related to the fiscal autonomy of the subnational governments have been categorized separately, due to the reasons mentioned above. At least five studies have used at least one indicator of this kind and at least four have included the ratio of own revenues at the subnational level (excluding shared taxes) to total subnational fiscal revenues. The results for this indicator are also inconclusive with one study proposing a positive relationship, one study proposing a negative relationship and two studies that do not see any significant linkage. The indicator that includes the shared taxes provides more positive results. At least seven studies have included indicators that assess the impact of revenues generated by taxes only, with the ratio of own local fiscal revenues to national fiscal revenues being used at least five times. The relation of this indicator to growth seems to be mostly negative as three studies suggest. Two studies found a positive relationship but in only one case it is statistically significant. Very few studies have assessed the impact of intergovernmental transfers on local growth. A single indicator was identified as the ratio of intergovernmental transfers to total subnational revenues which has been used twice. One study suggests a positive relationship while another finds no link to

growth. Finally, a hybrid variable that incorporates both revenue and expenditure decentralization in the formula which seems to influence growth positively was used once.

TABLE 5. LIST OF INDEPENDENT VARIABLES USED TO PROXY FISCAL DECENTRALIZATION IN THE LITERATURE AND THE NUMBER OF STUDIES WHERE THEY HAVE BEEN IDENTIFIED

Acronym	Definition and number of studies it was used in	
Autonomy of the subnational governments		
AUTONOM1	The ratio of own revenues at the county level (excluding shared revenue) to total county fiscal revenues	4
AUTONOM2	The ratio of own revenues at the county level (including shared revenue) to total county fiscal revenues	3
AUTONOM3	The ratio of own revenues at the county level (including shared revenue and certain specific central grants) to total county fiscal revenues	1
Expenditure decentralization		
FDEXP	The ratio of subnational expenditure to total national expenditure	17
FDEXP_aut	The ratio of subnational expenditures excluding transfers to total national expenditure	1
FDEXP_budg	The ratio of subnational budgetary expenditure to national budgetary expenditure	1
FDEXP_curr	The ratio of subnational expenditure to current national expenditure	1
FDEXP_econ	The ratio of subnational expenditure to total national expenditure when counting only economic affairs expenditures	1
FDEXP_edu	The ratio of subnational expenditure to total national expenditure when counting only education expenditure	1
FDEXP_high/ med/ low	Dummy variables for FDEXP – low when the ratio of subnational expenditures to national expenditures is below 30%, medium when the ratio is between 30-45% and high when the ratio is above 45%	1
FDEXP_hlth	The ratio of subnational expenditure to total national expenditure when counting only health expenditure	1
FDEXP_kap	The ratio of subnational expenditure to capital national expenditure	1
FDEXP_loc	The ratio of local own expenditure to total local + state/ regional expenditure	3
FDEXP_nodefss	The ratio of subnational expenditure to total national expenditure, excluding defense and social security expenditures	1
FDEXP_own	The ratio of subnational expenditure to total national expenditure, excluding transfers paid to central government	1
FDEXP_soc	The ratio of subnational expenditure to total national expenditure when counting only social security expenditure	1
FDEXP_xbudg	The ratio of subnational extra-budgetary expenditure to national extra-budgetary expenditure	1
Revenue decentralization		
FDREV	The ratio of subnational revenue to total national revenue	8
FDREV_budg	The ratio of subnational budgetary revenue to national budgetary revenue	1
FDREV_loc	The ratio of local own revenue to total local and state/regional revenue	3
FDREV_own	The ratio of subnational own fiscal and non-fiscal revenue to total national revenue	3
FDREV_ownsh	The ratio of subnational own and shared fiscal and non-fiscal revenue to total national revenue	1
FDREV_xbudg	The ratio of subnational non-budgetary revenue to national non-budgetary revenue	1
Fiscal revenue decentralization		
FDTAX	The ratio of fiscal revenues at the subnational level to total subnational revenues	2
FDTAX_eqty	The absolute value of the difference between the per capita fiscal expenditure at subnational level and the average per capita local fiscal expenditure at national level	1
FDTAX_inctax	The ratio of income taxes collected at the local level to national fiscal revenues	1
FDTAX_own	The ratio of own local fiscal revenues to national fiscal revenues	5
FDTAX_ownsh	The ratio of own and shared local fiscal revenues to national fiscal revenues	1
FDTAX_ptax	The ratio of property taxes collected at the local level to national fiscal revenues	1
Intergovernmental transfers		
TRANSFERS	The ratio of intergovernmental transfers to total subnational revenues	2
Hybrid variable		
FDREVEXP	A variable that incorporates both revenue and expenditure shares calculated as $(FDREV + FDEXP) / 2$ and their variants	1

Source: own creation based on the analyzed studies

4.4. Control variables

Many of the control variables used in the analyzed studies are based on Levine and Renelt's (1992). As shown in Table 6, these factors might be geographical and population-related, political, financial, budgetary, macroeconomic or related to human capital, investment or trade developments. The studies analyzed in this paper propose at least

66 control variables. As regards the geographical and population-related indicators, 14 studies have used population growth and three have used the ratio of subnational jurisdiction surface to total surface. Four other indicators measure the distances between the main cities, ethnicity, farming, and population density. In terms of political factors, at least five studies include dummies that assess various global, regional or national aspects (vote preferences, EU accession, etc.). Other indicators measure the level of political decentralization, the level of freedom or political repression and the number of governmental tiers. The ratio of tax revenue to GDP is the most popular financial indicator, being identified in at least 10 studies. Other nine financial indicators measure various aspects like the levels of domestic credit, central and subnational deficit, exchange rates or state aid. The macroeconomic indicators are some of the most popular indicators used in the studies. The level of GDP per capita in the previous year has been used 13 times, the inflation rate nine times and the growth of the available workforce seven times. Other indicators that measure things like unemployment, the level of wealth or natural resources, the GINI level or the price of energy products have also been included in some studies. The growth of secondary school enrolment is the most used human capital indicator being included in nine studies. Other seven indicators measure various other aspects related to education, including funding, number of high school or college graduates or the number of years of schooling. At least 12 budgetary indicators have been identified that mostly measure the ratio of various policy costs to total public expenditure. However, the most popular indicator seems to be the ratio of governmental expenditure to GDP, observed in four studies. Finally in terms of investment at least 14 studies include the ratio of gross fixed investment to GDP while at least 13 use the ratio of total value of trade to GDP. Two others exclude imports from the ratio. Seven other indicators were used sporadically to assess foreign direct investment, private and public investment, the net capital stock or the number of patents.

In terms of the behavior of the most important control variables in the analyzed studies, population has shown to have a different impact in different studies. For example, while Rodríguez-Pose and Krøijer (2009) found it to be significantly positive, Thießen (2003) found a negative impact. Baskaran and Feld (2013) found no significant relationship. The same inconclusive result was found for secondary school enrolment growth - positive by Feld, Kirchgässner and Schaltegger (2004) and Thießen (2003), negative by Davoodi and Zou (1998) and insignificant by Baskaran and Feld (2013) and Bodman (2011). More conclusive results were obtained for the initial GDP level which was found to be negative by Baskaran and Feld (2013), Davoodi and Zou (1998) or Rodríguez-Pose and Ezcurra (2010), for the ratio of private and public investment to GDP and the ratio of trade to GDP which were found to have a positive effect (Baskaran and Feld, 2013; Feld, Kirchgässner and Schaltegger, 2004; Gemmill, Kneller and Sanz, 2013; Jin and Zou, 2005; Rodríguez-Pose and Ezcurra, 2010 – investment; Jin and Zou (2005) and Rodríguez-Pose and Ezcurra (2010) for trade openness). Thießen (2003), however, found a negative sign for the investment to GDP ratio and replaced this indicator in the analysis with the growth rate of real gross fixed capital formation. At the same time, Gemmill, Kneller and Sanz (2013) found a negative relationship between trade and growth while Desai, Freinkman and Goldberg (2005) and Akai, Hosoi and Nishimura (2009) found

ambiguous results as regards the ratio of exports to GDP. Inflation can have either positive or negative effects on growth though the latter is more usually observed (Zhang and Zou, 1998). Finally, the workforce growth shows mostly positive linkages to growth (Xie, Zou and Davoodi, 1999; Zhang and Zou, 2001; Feld, Kirchgässner and Schaltegger, 2004; Jin, Qian and Weingast, 2005; Jin and Zou, 2005; Qiao, Martinez Vazquez and Yu, 2008).

TABLE 6. LIST OF CONTROL VARIABLES USED IN THE LITERATURE AND THE NUMBER OF STUDIES WHERE THEY HAVE BEEN IDENTIFIED

Acronym	Definition and number of studies it was used in	
Geography and population-related statistics		
AREA	The of subnational jurisdiction surface to total surface	3
DISTANCE	The inverse of the squared distance between the main cities of the country	1
ETHNIC	The ratio of a certain ethnic or racial population to total population	1
FARM	The ratio of workers on farms to total workers	1
POP	Log first difference/ average growth of population	14
POP_DENS	The density of population	1
Politics		
CIVLIB	The level of civil liberties (based on various indexes)	1
DEC_ADMIN	The level of administrative decentralization (based on various indexes)	1
DEC_POLIT	The level of political decentralization (based on various indexes)	1
EU	Dummy variable in relation to the European Union (funding/ accession)	2
POLIT	Political dummy in relation to various political issues	5
POLREP	The level of political repression (based on various indexes)	1
TIERS	Number of governmental tiers	1
Public finance		
BALANCE	The ratio of account balance to GDP	1
CREDIT	Log first difference/ average growth of domestic credit	1
CREDIT_SD	The standard deviation of domestic credit growth	1
DEFGEN_GDP	The ratio of central deficit to GDP	1
DEFLOC_GDP	The ratio of subnational deficit to GDP	1
EXCH	The real exchange rate	1
GDS_GDP	The ratio of Gross Domestic Savings to GDP	1
INTEREST	The rate of lending interest	1
PRVAID	The ratio of state aid provided to private companies to budgetary expenditures	1
TAXBURDEN	The ratio of tax revenue to GDP	10
Macroeconomics		
EXTSHOCK	The price index of energy products	1
GINI	The GINI level	3
INFLATION	The inflation rate	9
INITGDPPC	Logarithm of GDP per capita in the previous year	13
IT	The ratio of owned computers to population	1
RESOURCE	The ratio of fuel and energy production to GDP	1
RESSHARE	The subnational natural resource production of total natural resource production	1
UNEMPL	The average annual growth of unemployment	2
WEALTH	The ratio of per capita GDP to average per capita GDP	1
WF_SHARE	The ratio of workforce to population	1
WORKFORCE	Log first-difference/ average growth of available workforce	7
Human capital		
EDU	Log first-difference/ average growth of secondary school enrolment	9
EDU_CAP	The expenditure on education per capita	1
EDU_EMPL	Log first difference / average growth of proportion of employed population with at least secondary education	1
EDU_EXP	The ratio of education expenditure to total expenditure	1
EDU_UNI	The ratio of higher education graduates to total population	2
EDU_ILLIT	Log first-difference/ average growth of illiteracy	1
EDU_HS	The ratio of high school graduates in total population aged 18–24	1
EDU_SHARE	The ratio of gross secondary school enrolment to population share of secondary school age	1
EDU_YEARS	The average years of schooling of the total population aged +15	1

Budgeting		
EMPLOYEE	The ratio of local civil servants to total civil servants	1
EXP_DEF1	The ratio of defense costs to total expenditures (1) at national level, (2) at subnational level	2
EXP_DEF2		
EXP_DEV1	The ratio of development costs to total expenditures (1) at national level, (2) at subnational level	2
EXP_DEV2		
EXPGOVAD1	The ratio of administration costs to total expenditures (1) at national level, (2) at subnational level	2
EXPGOVAD2		
EXPGOVGDP	The ratio of general government expenditure to GDP	4
EXP_HK1	The ratio of human capital costs to total expenditures (1) at national level, (2) at subnational level	1
EXP_HK2		
EXP_HTLH	The ratio of health expenditure to total national/ subnational expenditure	1
EXP_NONDEV	The ratio of non-development costs to total expenditures at national level	1
EXP_SOC	The ratio of central social and community service costs to total expenditure at national level	2
EXP_URBAN	The ratio of urban maintenance costs to total expenditures at national/ subnational level	1
EXP_XBGT	The ratio of extra-budgetary expenditure to budgetary expenditure	1
Investment and trade		
EXPORTS	The ratio of exports to GDP	2
FDI	The ratio of foreign direct investment to GDP	1
INVEST	The ratio of gross fixed investment to GDP	14
INVEST_GROWTH	The annual growth rate of real gross fixed capital formation	2
INVEST_PRV	The ratio of private investment rate to GDP	3
INVEST_PRVK	The ratio of private capital to population	1
INVEST_PUB	The ratio of public investment to GDP	1
PATENTS	The share of patents	2
KAP_GDP	The ratio of net capital stock to GDP	1
TRADE	The ratio of imports and exports to GDP	13
<i>Any variable having _T1 at the end is understood as the level in the first year of the analysis. Any variable having "initial" at the beginning is understood as the lag of the variable</i>		

Source: own creation based on the analyzed studies

4.5. Limitations

Regardless of the variables or methods used, there a couple of limitations which are applicable to most studies. The most important are endogeneity and omitted variable bias and measurement errors (Asatryan and Feld, 2015; Martinez-Vazquez, Lago-Peñas and Sacchi, 2016). The measurement errors are mostly related to the use of the most reliable indicators that measure fiscal decentralization. The issue has been presented in more detail in the previous sections. As regards endogeneity and omitted variable bias, most studies, especially the recent ones, acknowledge these problems but do not seem to offer reliable solutions. The most important issue seems to be the reverse causality of fiscal decentralization on economic growth which is only partially fixed by the use of country or regional fixed effects in the panel datasets (Rodríguez-Pose and Krøijer, 2009). As a result, some scholars have either used instrumental variables or have undertaken their analysis using more complex dynamic models, as mentioned in the previous sections. Neither, however, fully resolve the endogeneity problem as suggested by Martinez-Vazquez, Lago-Peñas and Sacchi (2016) in their extended review. In this sense, instead of working with instruments of uncertain reliability, some authors like Stegarescu, Büttner and Behnisch (2002), Thiessen (2003) or Gil-Serrat and Lopez-Laborda (2006) assumed that their independent variables are exogenous.

5. DISCUSSION AND CONCLUSIONS

The current paper tries to complement other studies that review the relationship between fiscal decentralization and economic growth. While previous studies focus mostly on the results of the regressions and their models, the current paper aims to do an in-depth analysis of the independent and control variable usage. Furthermore, the study also incorporates some very recent articles that not been included in some of the other studies. Most cross-country studies focus on the OECD countries while the single country studies tend to analyze only federation states or large countries that deal with decentralization. On the other hand, there are almost no studies analyzing scenarios to see what would have happened to local growth in the absence of fiscal decentralization (Rodríguez-Pose and Ezcurra, 2010). Most studies use panel datasets over various timeframes. While some studies use data for less than five years, some other studies test the relationship over more than 40 years. While the average timeframe for the country studies is 13 years, for the cross-country studies it is closer to 19. While some scholars adopted the classic OLS regressions, most empirical models use some form of fixed effects. Due to the continuous debate over the endogeneity problems, some recent studies use the instrumental variable technique or use various dynamic models for their panels.

Due to an arduous debate in the literature about how to correctly measure fiscal decentralization, scholars have diversified their choices over the fiscal decentralization indicators. More than 30 indicators have been identified in the 26 analyzed studies. Although criticized by some for overestimating decentralization, the classic ratios of subnational expenditure and revenue to total national expenditure and revenue continue to be used extensively even in the most recent studies. While still limited in popularity, some scholars also include the fiscal local autonomy indicators proposed by Stegarescu (2004). Even more limited is the use of indicators that assess the intergovernmental transfers which are rather important for this topic. In general, as acknowledged in the other studies, the signs of all these fiscal decentralization indicators vary greatly among studies and do not provide any consensus. While the autonomy indicators tend to be more positive and the transfer indicators more negative, the two classic indicators do not seem to suggest a direction. There is almost an equal number of studies that find a positive relation, a negative relation or no relation at all. Martínez-Vázquez, Lago-Peñas and Sacchi (2016) suggest that results might differ because jurisdiction heterogeneity may be too hard to capture (Salmon, 2013), the institutional set up may be too complex or partially unobserved (Voigt and Blume, 2012) or because the political and administrative dimension are not properly considered (Filippetti and Sacchi, 2015). It should be mentioned, though, that single-country studies tend to provide more positive results.

In terms of control variables, it is noticeable that, although their study was published in the early 1990s, the most used variables continue to be the ones proposed by Levine and Renelt (1992). However, studies include many other control variables in their regressions, albeit some of them measuring the same phenomenon using a different formula. In total, the 26 analyzed studies use more than 60 control variables. The present study observed that

some of them can be joint in various categories including geographical and population statistics, politics, finance, macroeconomics, human capital, budgeting, investments and trade. The most often included variables are population growth, the level of GDP per capita in the previous year, the ratio of tax revenue to GDP, workforce growth, the inflation rate, the growth of secondary school enrolment, the ratio of gross fixed investment to GDP, the ratio of trade to GDP and the ratio of government expenditure to GDP.

As a general recommendation based on the results presented in the study, regressions should use panel data with fixed effects as a standard while keeping the dynamic models as an alternative, and include at least 10 years of observed data. Simple OLS regressions or the use of time series instead of the panels should be limited to studies where yearly data is replaced by 3 or 5-year averages. For comparison reasons, the dependable variable should always be the growth of the subnational GDP per capita. In terms of the independent variables, however, the decision should be based on a case-by-case scenario. Nonetheless, studies should include the classic ratios of subnational expenditure and revenue to the total national expenditure and revenue, some local fiscal autonomy indicators and at least one that evaluates the behavior of intergovernmental transfers. The selection of control variables should be tailored to the assessed country or group of countries but most studies should include some variables that measure population dynamics, the levels of investment and trade, developments in human capita, the initial level of GDP per capita, inflation and the tax burden.

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