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FISCAL DECENTRALISATION AND SPATIAL EXTERNALITIES IN VIETNAM PROVINCIAL ECONOMIC GROWTH*

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This paper aims to investigate the impacts of fiscal decentralisation on the provincial economic development in 62 Vietnamese provinces from 2011-2018. We estimate a Spatial Durbin Model (SDM) based on a growth model with spatial externalities. The focus of the paper is on the spatial spillover effects of fiscal decentralisation on the provincial income levels. The results confirm the existence of spatial interdependency among Vietnamese provinces. The findings indicate that fiscal decentralisation and physical capital not only affects the income level within one province, but also contribute positively to the outputs of nearby provinces. The study does not find significant effects of human capital on provincial income. We also show that these effects vary across five main economic regions of Vietnam. There is also evidence that the total effects are stronger in high institutional quality levels, which points out to the "sand the wheels" effect. Policy implications are also discussed.

Keywords: Fiscal Policy, Fiscal Decentralisation, Economic Growth, Spillover Effects, Vietnam
JEL Classification: E62, O43, R12

1. INTRODUCTION

The influences of fiscal decentralisation on local economic growth are extensively studied in the empirical literature of public finance. However, there are still mixed evidence such as positive impacts (e.g., see Jin and Zou (2005), Kalirajan and Otsuka (2012)) or negative impacts (e.g., see Yushkov (2015), Yang (2016)). The literature is thus extended to a broader view of both direct and indirect effects of fiscal

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decentralisation. For examples, there is a strand of literature investigating the impacts of fiscal decentralisation on local governance, or how local institution affects the linkage between fiscal policy and economic growth. Bojanic (2018), for example, finds that fiscal decentralisation can boost accountability, political participation, civil liberties, and economic freedom in America.

Interestingly, there is an emerging trend in the attention of economists to the effects of fiscal decentralisation on economic growth in the linkages with local governances and the interconnections between regions/provinces (De Siano and D'Uva, 2017; Que et al., 2018). Caldeira et al. (2015) use the spatial lag model and indicate that fiscal decentralisation leads to coordination strategy among local governments. Que et al. (2018) consider spatial correlations in factor segmentation to study in Chinese provinces. They find that fiscal decentralisation causes poor control of environment pollution. However, there are virtually no studies on the influences of fiscal decentralisation on economic growth under the linkages with local governance and the spatial connections among jurisdictions.

We contribute to the literature of public finance by shedding light on the impacts of fiscal decentralisation on economic growth while taking account of both local governance and inter-connections among provinces. This paper fills the gap in the literature by providing a comprehensive analysis of the effects of fiscal decentralisation on the roles of local governance and the connections among them. We take the liberty to implement this research for a particular context of new emerging economies, Vietnam. After more than 30 years of "Doi Moi"[1], Vietnam has witnessed many successes in economic development along with significant challenges ahead (Dollar et al., 2004; Griffin, 2016). In this process, the fiscal policy and fiscal reforms are emphasized as important policy restructures in recent decades. The Budgetary Law 2002 with a significant change in the fiscal policy framework from a highly centered fiscal system to more decentralized one was a notable milestone (Rab et al., 2015).

Regarding this trend, Vietnamese provincial governments have also concern more about the quality of local governance through the introduction of the Provincial competitiveness index (PCI). This creates incentives and pressures for local governments to improve the business environment and lift regional competitiveness across regions. Thanh and Canh (2019) use a panel of 62 Vietnam provinces from 2006 to 2015 and find a positive impact of fiscal decentralisation on economic growth. Notably, they find that the positive impacts of fiscal decentralisation are dominant in good local governance environment.

There is still an ongoing debate as to which is the most suitable fiscal decentralisation model and the effects of this policy (Morgan and Trinh, 2017) such as fiscal inequality, unhealthy competition among local governments (Anh, 2016), and the difference in local governance (Thanh and Canh, 2020). That is, studying the effects of

[1] The Vietnamese term indicates the open of Vietnam economy in 1980s from a closed and planned economic system to a market one.

`fiscal decentralisation on economic growth under the constraints of local governance and the competitions/connections among provinces can further knowledge on the effectiveness of such policy, and more importantly, the mechanism of influences, which would be essential for both literature and policy implications.

The study uses the data of 62 provinces in Vietnam from 2010 to 2018 for empirical analysis. We estimate a Spatial Durbin Model (SDM) based on a growth model with spatial externalities. This method allows us to extract both direct and spillover effects of the explanatory variables on provincial economic growth. According to the empirical results, there is evidence of spatial interdependency among Vietnamese provinces. Fiscal decentralisation and physical capital not only affect the income level within one territory but also contribute positively to the outputs of nearby areas. However, the study does not find significant effects of human capital on provincial income. We also show that these effects vary across the five main economic regions of Vietnam. More importantly, there is evidence that the total impacts are more substantial in high institutional quality levels, which provides support the "sand the wheels" hypothesis.

The study is structured as follows. The next section provides a short literature review on fiscal decentralisation and its impacts on economic growth. The methodology and data are presented in Section 3. The results are presented and discussed in Section 4. The final section is the conclusion of the study.

2. LITERATURE REVIEW

In this section, we present two main lines of the literature. The first subsection is the influences of fiscal decentralisation on provincial economic growth. The second subsection discusses spatial effects in the related literature.

2.1. Fiscal Decentralisation and Economic Growth

The fiscal decentralisation and its effects on regional economic growth are amongst the main focuses in the literature of public finance. In this line, there are two main theories, i.e. the first-generation theory and the second-generation theory (Thanh and Canh, 2019). The first-generation theory explains that the fiscal decentralisation can induce the local public goods provision to its optimal level through fiscal competition, as explained by "voting by feet" mechanism (Tiebout, 1956). In this vein, the theory also argues that residents can inspect public decisions at local levels through fiscal decentralisation, which induces local authorities to have more responsibilities and results in well-matched public resource allocations (Oates, 1972; Tiebout, 1956).

Meanwhile, the second-generation theory focuses on how fiscal and political incentives determine the effectiveness of fiscal decentralisation (Oates, 2005; Weingast, 2009). This line of literature follows the idea of the Leviathan hypothesis that the public services provision of the public sector has a monopoly nature. That is, the mobility of

tax bases and the competition among local governments might restrain the government's monopoly on taxation. At the same time, it can limit the ability of local authorities in matching public expenditures with the residents' preferences, thus result in public resource misallocations (Weingast, 2009). Some studies support this line of literature, such as Garman et al. (2001) and Rodden (2004).

However, the empirical literature is still mixed. Several studies find the evidence of positive effects of fiscal decentralisation on economic growth (e.g., Chu and Yang (2012), Ligthart and van Oudheusden (2015) with evidence in cross-country samples; Xie et al. (1999), Akai and Sakata (2002) with evidence in the US, Jin and Zou (2005) in China, and Kalirajan and Otsuka (2012) in India). Meanwhile, other studies find the negative impacts of fiscal decentralisation on economic growth such as Davoodi and Zou (1998) in developing countries, Zhang and Zou (1998) or Yang (2016) in China, Yushkov (2015) in Russia.

2.2. Fiscal Decentralisation, Local Governance, and Economic Growth: Further Views

According to Martinez-Vazquez and McNab (2003), several studies focus on the direct effects of fiscal decentralisation on economic growth, while only a few studies pay attention to the indirect effects. In which, the local public governance and its implications on the influences of fiscal decentralisation on economic growth receive much attention lately as it is related directly to the incentives and behaviours of local authorities (Rajkumar and Swaroop, 2008). The influential work of de Mello and Barenstein (2001) has shown the link between fiscal decentralisation and local governance. De Mello (2004) add that fiscal decentralisation can boost social capital, a combination of inter- personal trust, civic cooperation, social cohesiveness, efficient governments, and good governance. Faguet (2014) explains that fiscal decentralisation could influence governance by increasing political competition and then inducing government accountability. Altunbas and Thornton (2012) study a sample of 64 developed and developing economies and notice that fiscal decentralisation seems to reduce corruption. However, they also indicate that this negative impact of fiscal decentralisation is reduced in countries with a low degree of political representation. Bojanic (2018) shows that fiscal decentralisation can boost accountability, political participation, civil liberties, and economic freedom in America. In addition, Abdellatif et al. (2015) find the evidence of positive effect of fiscal decentralisation on economic performance in East European countries when local governments allow the private sector to provide public services.

Meanwhile, other studies show the important roles of local governance in the impacts of fiscal decentralisation on economic growth. For instance, Yang (2016) observes a significant difference in the fiscal system (a decentralized system) and governance structure (a centralized one) in China, which causes differences in economic growth and income inequality across China provinces and regions. Hankla (2009)

concludes that the effectiveness of fiscal decentralisation depends on the structures of subnational governments and intergovernmental relations. Recently, Thanh and Canh (2019) use a panel of 62 Vietnam provinces from 2006 to 2015 and find a positive impact of fiscal decentralisation on economic growth. Notably, they find that the positive impacts of fiscal decentralisation are dominant in a sound local governance environment.

Recently, some studies indicated that regional public services delivery is linked with neighbouring regions through spatial connections (De Siano and D'Uva, 2017; Que et al., 2018). Caldeira et al. (2015) use the spatial lag model and note that fiscal decentralisation leads to coordination strategy among local governments, which results in better public goods provision in Benin. Que et al. (2018) consider spatial correlations in factor segmentation to study in Chinese provinces. They find that fiscal decentralisation causes poor control of environment pollution. Interestingly, van der van der Kamp et al. (2017) find that China's fiscal system and promotion system encourage cash-strapped local authorities to disregard central governance reforms due to mismatched incentives, known as "the racing to the bottom" phenomenon. However, much less attention is devoted to the impacts of fiscal decentralisation on local economic growth in constraints of local governance with the light of spatial connections among regions/provinces.

3. EMPIRICAL METHODOLOGY

3.1. Empirical Model

The empirical specification is based on a growth model with spatial externalities, as in (Ertur and Koch, 2007). This model assumes that technological progress is interdependent in a country with N provinces. The production function takes the form of a Cobb-Douglas function with human capital:

$$Y_i(t) = A_i(t)K_i^{a}(t)HC_i^{\eta}(t)L_i^{1-\alpha-\eta}(t). \quad (1)$$

The labour $\left(L_i(t)\right)$, physical capital $\left(K_i(t)\right)$, human capital $\left(HC_i(t)\right)$ have constant returns to scale. The output is denoted $Y_i(t)$ and $A_i(t)$ stands for the aggregate levelof technology.

There are several factors affecting the level of $A_i(t)$. The Solow growth model assumes that the technological progress is homogeneous and exogenous in all spatial units. Besides, resource endowments and institutional features of the region can also affect its level of technology. For instance, Yang et al. (2020) conclude that fiscal decentralisation contributes significantly to the levels of city innovation. They argue that local authorities can focus on innovation-related spending, and thus increasing the technological progress in the region. Thanh and Canh (2019), among other authors, also

assume that technological progress in Vietnam's provinces depends on the degree of fiscal decentralisation. Previous studies tend to constrain these externalities in one spatial unit. For example, fiscal decentralisation in one region can only affect its technological progress, and not the others. This assumption is strong and diminish the case of spillovers across region. One can assume that the externalities in one province can spread to nearby provinces, but the intensity of these effect reduces with the geographic distance from the original region. Therefore, adjacent, or neighbour provinces can receive stronger externalities than regions from afar. Therefore, one can model the technological progress as follows:

$$A_i(t) = \omega(t) FD_i^{\phi}(t) \prod_{j \neq i}^{N} A_j^{\{\lambda \omega_{ij}\}}(t). \quad (2)$$

$\omega(t)$ stands for the homogeneous and exogenous factor in all provinces, $\omega(t) = \omega(0)e^{\mu t}$. Similar to Ertur and Koch (2007), the technological progress is interdependent, governed by the last term of Eq. (2). The technological level of province i depends on the weighted average of the technological stock in the remaining territories. The parameter λ, controls the strength of the spatial externalities, $0 \leq \lambda \leq 1$. However, the aggregate spillover effects depend on how province i connects to other provinces $(j \neq i,\ i = 1, \dots, N)$. There are two common methods to define the connectivity among spatial units. The first one is called the contiguity-based weighting method. If a given province i shares borders with province j, then $w_{ij} = 1$ and $w_{if} = 0$ if the two provinces are not neighbour. Thus,

$$w_{ij}^{b} = \begin{cases} 1 & if\ i\ and\ j\ share\ borders \\ 0 & if\ i\ and\ j\ do\ not\ share\ borders \end{cases}. \quad (3)$$

The second method relies on the distance between the capital of province i and that of province j, denoted $\|d_{ij}\|$. The closer the province i is to province j, the higher the value of w_{ij}. Thus, this method is also called the inverse-distance-based weighting method.

$$w_{ij}^{d} = \frac{1}{\|d_{ij}\|}\ if\ i \neq j. \quad (4)$$

In both methods, w_{if} is non-negative, time-invariant and finite, i.e. $0 \leq w_{ij} \leq 1$, $w_{ij} = 0$ if $i = j$. It is common to assume $\sum_{j=1}^{N} w_{ij} = 1$ with $i = i, \dots, N$. After solving for the steady-state, we can write the equation for real income per worker along the balance growth path at a given time t:

$$\log y_i = \beta_0 + \beta_1 \log s_i + \beta_2 \log(n_i + g + \delta) + \beta_3 \log fd_i + \beta_4 \log hc_i + \rho \sum_{j=1}^{N} w_{ij} \log y_i + \theta_1 \sum_{j=1}^{N} w_{ij} \log s_i + \theta_2 \sum_{j=1}^{N} w_{ij} \log(n_i + g + \delta) + \theta_3 \sum_{j=1}^{N} w_{ij} \log fd_i + \theta_4 \sum_{j=1}^{N} w_{ij} \log hc_i + \epsilon_i, \quad (5)$$

where $y_i = \frac{Y_i}{L_i}$ is the level of income per worker in province i. Like Solow model, s_i is the ratio of saving, n_i is the exogenous growth rate of labour in province i. δ denotes the annual rate of depreciation of physical capital, which is homogeneous for all provinces. hc_i is the human capital, measured by the proportion of tertiary students over the population. fd_i is our main variable of interest in this study. It is the proxy for fiscal decentralisation in province i. The study uses two indices to measure the degree of fiscal decentralisation in each province. Similar to Thanh and Canh (2019), we use two self-financing indicators:

$$fd^1 = \frac{100\%\ retained\ revenues\ of\ provincial\ government}{Total\ assigned\ expenditures\ of\ provincial\ government},$$

and

$$fd^2 = \frac{100\%\ retained\ revenues\ of\ provincial\ government + \text{shared revenues}}{Total\ assigned\ expenditures\ of\ provincial\ government}.$$

In fd^1, we use only the ratio of 100% retained revenues of the local government to the total assigned expenditures. These revenues contain taxes and fees related to lands, lottery revenues, and local charges and fees. Therefore, they stand for the resources under direct discretion and collection of local authorities.

For fd^2, we add revenues shared between national government and subnational government, which include valued added tax (except for taxes on imports), company income tax (except for tax on companies with uniformed accounting), private income tax, excise tax on domestic goods, and oil fees.

fd^1 and fd^2 exploit the link between provincial revenues and assigned local public spending under budget constraints. Thus, these two measures gauge the level of fiscal freedom of local authorities in allocating available resources to finance their expenditures. Higher values imply better self-financing capacity of local governments.

3.2. Estimation Strategy

Writing Eq.(5) in matrix form:

$$y = X\beta + WX\theta + \rho Wy + \epsilon, \quad (6)$$

where y is a $(N \times 1)$ matrix containing the logarithms of real income per worker. X is a $(N \times 4)$ matrix of independent variables, which include a constant term, the

logarithms of physical capital, the logarithms of $(n_i + g + \delta)$ and the logarithms of fiscal decentralization indices. W is the row-standardized spatial weighting matrix. The elements of W can either follow the w_{ij}^b rule in Eq.(3) or the w_{ij}^d rule in Eq. (4). Therefore, WX is the matrix of spatially lagged independent variable and Wy is the matrix of spatially lag endogenous variable. $\beta' = [\beta_0, \beta_1, \beta_2, \beta_3, \beta_4]$, and $\theta' = [\theta_1, \theta_2, \theta_3, \theta_4]$. ϵ is the $(N \times 1)$ matrix of i.i.d error terms.

This model is called the Spatial Durbin model (SDM) in the spatial econometrics literature because it includes both the spatial lags of endogenous variable and exogenous variable. Unlike other spatial models such as the Spatial Lag Model (SLM), the Spatial Autoregressive Model (SAR) or the Spatial Error Model (SEM), SDM could obtain unbiased estimates. Elhorst (2010) proved this result in his study.

From Eq.(6), we have the variance-covariance matrix for y, shown in Eq.(7) and the correlation between the spatial lags of y and the error term ϵ, shown in Eq.(8).

$$\Sigma_y = \sigma^2 (I_n - \rho W)^{-1} (I_n - \rho W')^{-1}, \tag{7}$$

$$E(Wye') = \sigma^2 W (I_n - \rho W)^{-1}, \tag{8}$$

where $\sigma^2 I_n$ is the variance-covariance matrix of the i.i.d error terms. Eq.(7) shows that the variance is heteroscedastic, while Eq.(8) shows that $E(Wye') \neq 0$, or the spatial lags of y is correlated with the error terms. Therefore, OLS estimates will be biased and inconsistent (Ertur and Koch, 2007). However, under the hypothesis of normality of the error term and regularity conditions, one can show that maximum likelihood estimators can obtain unbiased, consistent, and asymptotic efficient estimates.

3.3. Estimating the Spillover Effect of Fiscal Decentralisation

Interpretation of the parameter estimates in SDM model is different from traditional regressions. For example, in the classical linear model $y_i = \beta x_i + \epsilon$ the effect of x_i on y_i is the partial derivative of y_i with respect to x_i. This effect is β.

However, taking partial derivative of y_i with respect to any independent variable on the right-hand side of the regression is much more complicated. For example, in Eq.(5), the partial derivative of $\log y_i$ with respect to fd_i is not equal to β_3. Instead, the total effect of fiscal decentralisation on per worker real income in a province will be governed by several factors: (i) the relative location of the province with respect to the remaining provinces; (ii) the structure of the spatial weighting matrix; (iii) the parameter matrices ρ, β and θ (LeSage, 2008).

According to LeSage (2008), the total effect of an explanatory variable (TE) on the dependent variable can be decomposed into the average direct (DE) and average indirect effect (IDE):

$$TE = DE + IDE$$

For example, the impact of the r^{th} explanatory variable on the dependent variable can be measured by taking the average of all the elements in the following $N \times N$ matrix of partial derivative:

$$\frac{\partial y}{\partial x^{r'}} = (I_n - \rho W)^{-1}(I_n \beta_r + W\theta). \quad (9)$$

The average direct effect measures how the dependent variable will respond to changes in an explanatory variable. This effect is averaged over all n provinces in the country. For instance, if the degree of fiscal decentralisation changes in province i, what will be the average effect on the real income per worker in province i? According to LeSage et al. (2009), one can take the average of the main diagonal elements of the matrix in Eq.(9) to obtain the scalar summary of the direct effects.

The average indirect effect, or local spatial spillovers as in LeSage and Pace (2014), measures the effect of a change in the r^{th} explanatory variable of province j on the outcomes of province $i \neq j$. Each row i of the matrix in Eq.(9) contains the partial derivatives $\partial y_i / \partial x_j^r, j \neq i,\ j = 1, \dots, N$. These derivatives represent the impacts of the r^{th} regressor in provinces j on the outcomes of province i. Therefore, one can calculate the mean of the off-diagonal terms in each row of the partial derivative matrix in Eq.(9) to produce the cumulative indirect effects. This indirect effect quantifies how the real income per worker in province i will respond to changes in the degree of fiscal decentralisation in all other provinces $j \neq i$.

3.4. Data

Vietnam has 63 provinces in total. However, due to missing data, we drop Daknong province from the sample. Therefore, we construct a panel data of 62 provinces in Vietnam. We first collect data from the annual statistical yearbook, published by the General Statistical Office (GSO). Then, the authors calculate the variables in Eq.(5) from the raw data.

This study also examines how real income per worker responds to changes in the degree of fiscal decentralisation in different institutional settings. To this end, we use a set of variables as proxies for institutions in Vietnamese provinces. These variables are part of The Viet Nam Provincial Governance and Public Administration Performance Index (PAPI), which is a product of the collaboration between the Centre for Community Support Development Studies (CECODES) under the Vietnam Union of Science and Technology Associations (VUSTA), and the United Nations Development Program (UNDP). We use three sub-indices in this study, which measure the accountability, transparency, and control of corruption of local authorities in Vietnam. A high PAPI score means better provincial governance and public administration performance.

The PAPI project started in 2008, but it only covers 63 provinces from 2011 onwards. As a result, the empirical study focuses on the period from 2011 to 2018. Several key

statistics are summarized in Table 1.

Table 1. Summary Statistics

	Mean	SD	Min	Max
log$y$	3.363	0.542	2.306	5.558
log$s$	2.734	0.556	1.427	4.583
log$n$	-0.991	0.012	-1.193	-0.956
loghc	7.921	0.235	7.126	8.503
logfd^1	2.260	0.683	0.063	4.206
logfd^2	3.109	0.768	1.101	5.601
logfd^3	3.260	0.773	1.180	5.613
Transparency	5.625	0.513	4.435	7.240
Accountability	5.410	0.568	4.097	7.506
Control Corruption	6.044	0.632	4.054	7.609
Public Administration	7.022	0.324	5.895	7.947
Participation at Local	5.219	0.495	3.751	6.809
Public Service Delivery	6.941	0.361	5.871	8.028

3.5. Moran's I Test

The Moran's Index is a measure of spatial association among geographic units. It can show how Vietnamese provinces are spatially associated with each other. We can write is index for a country with N provinces at a certain time t as:

$$I = \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}(x_i - \bar{x})(x_i - \bar{x})}{(\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij})\{\frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})^2}, \tag{10}$$

where x_i is one of the variables listed in Table 2, $\bar{x} = \frac{1}{n}\sum_{i=1}^{N} x_i$. The value of I in Eq.(10) ranges from -1 to 1. When $I > 0$, a higher value means more positive correlation. In contrast, the Moran's I can be negative, which imply a negative spatial correlation. The value $I \to 0$ indicates random spatial clustering.

Before estimating the SDM model in Eq.(5), it is reasonable to check for spatial dependence of the variables. The Moran's I statistics and their significant levels are presented in Table 2. We run the Moran's I test for each two-years period from 2011 to 2018. The results show a persistent spatial correlation of y for all periods. For the explanatory variables, all the variables exhibit significant geographic correlations, except for the variable s. The institutional measures also show evidence of spatially correlation.

Table 2. Moran's I Statistics

	2011-12	2013-14	2015-16	2017-18
log$y$	11.341***	9.643***	13.101***	14.809***
log$s$	0.248	0.405	1.004	4.200**
log$n$	11.350***	12.851***	11.681***	2.157
loghc	42.331***	43.295***	32.078***	5.177**
fd^1	23.985***	23.036***	26.306***	22.87***
fd^2	32.291***	25.403***	25.296***	25.46***
fd^3	35.527***	27.783***	28.951***	28.801***
Transparency	10.271***	2.660	6.409**	6.932***
Accountability	11.279***	6.12**	1.481	0.024
Control Corruption	5.012**	14.484***	7.368***	5.194**
Public Administration	0.425	4.057**	6.117**	3.534*
Participation at Local	5.823**	12.457***	15.072***	32.478***
Public Service Delivery	0.534	0.328	0.585	3.954**

Notes: ***, ** and * denote significant at 1%, 5% and 10% level, respectively.

4. EMPIRICAL RESULTS

4.1. Baseline Results

Table 3 reports the estimation results of the baseline specification in Eq.(5). We report the results for both fixed effects and random effects. fd^1 and fd^2 are proxies for fiscal decentralisation in each regression. In all specifications, the qualitative predictions of our results for the Solow model are in line with Mankiw et al. (1992). The stock of physical capital significantly increases the income level while population growth has diminishing effects on income.

With respect to the spatial lags of the endogenous variable, the estimation results reveal that the estimated coefficient ρ is significantly positive across all specifications. These findings imply that economic growth in adjacent provinces contributes positively to the income level of the local province. Our regressions are consistent with previous literature, such as Ertur and Koch (2007). For the spatial lags of the independent variables, only the lags of $\log s$ have significant coefficients.

Regarding the effects of fiscal decentralisation on output, the coefficients of fd^1 and fd^2 were significantly positive in all regressions. The spatial lags of fiscal decentralisation is only significant in the random effects model for fd^2. However, as above mentioned, interpretation of these coefficients is not straightforward. Partial effects of fiscal decentralisation on income should be derived from Eq.(9) and decomposed into average direct effects and average indirect effects.

Table 3. Baseline Regression Results,
Dependent Variable: Log of Real Income per Worker

	Fixed Effects		Random Effects	
	(1)	(2)	(3)	(4)
logy				
log$s$	0.125***	0.119***	0.141***	0.136***
	(6.89)	(6.71)	(7.78)	(7.66)
$\log(n+g+\delta)$	-0.720	-0.711*	-0.612	-0.587
	(-1.63)	(-1.66)	(-1.39)	(-1.36)
loghc	0.096**	0.078*	0.092**	0.071
	(2.13)	(1.78)	(2.08)	(1.63)
$\log fd^1$	0.041***		0.049***	
	(2.59)		(3.16)	
$\log fd^2$		0.101***		0.125***
		(5.30)		(6.54)
W				
log$s$	0.201***	0.208***	0.195***	0.206***
	(6.74)	(7.13)	(6.67)	(7.15)
loghc	-0.203***	-0.236***	-0.203***	-0.242***
	(-3.00)	(-3.56)	(-3.07)	(-3.74)
$\log(n+g+\delta)$	-0.607	-0.602	-0.595	-0.594
	(-0.72)	(-0.73)	(-0.70)	(-0.72)
$\log fd^1$	0.016		0.017	
	(0.63)		(0.72)	
log$y$	0.469***	0.410***	0.453***	0.374***
	(10.90)	(8.82)	(10.81)	(8.13)
$\log fd^2$		0.076**		0.089***
		(2.17)		(2.62)
Observations	496	496	496	496

Table 4 reports the decomposition of the total effects of fiscal decentralisation on provincial output into average direct effects and average indirect effects. For fd^1, the direct effect is significantly positive, while the spillover or indirect effect is not significant. However, for fd^2, both direct and spillover effects are significantly positive. The spillover effect is larger than the average direct effect. This is because the spillover effect is accumulated from all neighbour provinces. These results support previous findings in the literature, such as Raza and Hina (2016). In general, if the degree of fiscal decentralisation in one province changes, both per worker income of that province and its adjacent provinces will change. As put forward by the fiscal autonomy and competition theories (Tiebout, 1956), the evidence in this study points to the fact that fiscal decentralisation may encourage Vietnam's local authorities to increase revenues to finance local public good provision. Besides, the magnitude of both direct and spillover effect of fd^2 is larger than fd^1, which is in good agreement with Thanh and Canh (2019). Following Oates (1972), this finding confirms the role of revenue sharing agreements in giving more fiscal freedom to governments at subnational levels. When local governors have more fiscal power and discretion, they can utilise the available

resources more efficiently and thus, leading to higher provincial output.

Table 4. Impacts of Fiscal Decentralisation on Provincial Output

	Mfx	S.E	z	P>|z|	[955 Conf. Interval]	
Fiscal decentralisation 1						
Direct	0.040	0.019	2.17	0.030	0.004	0.077
Indirect	0.058	0.041	1.42	0.157	-0.022	0.139
Total	0.099	0.046	2.14	0.032	0.008	0.189
Fiscal decentralisation 2						
Direct	0.124	0.023	5.37	0.000	0.079	0.170
Indirect	0.185	0.053	3.51	0.000	0.082	0.289
Total	0.310	0.060	5.14	0.000	0.192	0.428

Notes: Direct, indirect and total effects of fiscal decentralisation on provincial output are reported with the estimated values (Mfx), their standard deviation (S.E), the Z statistic, p-value and 95% confidence interval, respectively.

Table 5 shows the total, direct and spillover effects of physical capital and human capital on per worker provincial income levels. The direct effect of physical capital on growth is consistent with the result of the Solow model, which is positive and significantly different from zero. The spillover effect has a larger magnitude than the direct effect, and significantly positive. On the contrary, the effects of human capital are insignificant.

Table 5. Impacts of Physical Capital and Human Capital on Provincial Output

	Mfx	S.E	z	P>|z|	[955 Conf. Interval]	
Physical capital						
Direct	0.178	0.017	10.27	0.000	0.144	0.212
Indirect	0.436	0.037	11.76	0.000	0.363	0.508
Total	0.614	0.042	14.75	0.000	0.532	0.695
Human capital						
Direct	0.069	0.045	1.52	0.128	-0.020	0.158
Indirect	-0.271	0.106	-2.56	1.990	-0.477	-0.064
Total	-0.201	0.124	-1.62	1.896	-0.444	0.042

Notes: Direct, indirect and total effects of physical capital, human capital on provincial output are reported with the estimated values (Mfx), their standard deviation (S.E), the Z statistic, p-value and 95% confidence interval, respectively.

The next step is to investigate whether the impact of fiscal decentralisation on provincial income changes over time. Fig. 1 plots the total effects, direct and indirect effects of fiscal decentralisation over the period 2011-2018, focusing on the indirect impact. The grey area represents the 95% confident interval of the spillover effect. There

were no significant spillovers in the studied period in the case of fd^1, whereas the indirect effects of fd^2 are significantly positive for all years. These further tests concurred with our initial findings, which highlight the importance of shared revenues in the fiscal federalism. It is noteworthy to mention that the spillover effects of fd^2do not show any upward patterns over time, while the average direct effects exhibit an increasing trend. This underlines the role of fiscal decentralisation on provincial output within one locality.

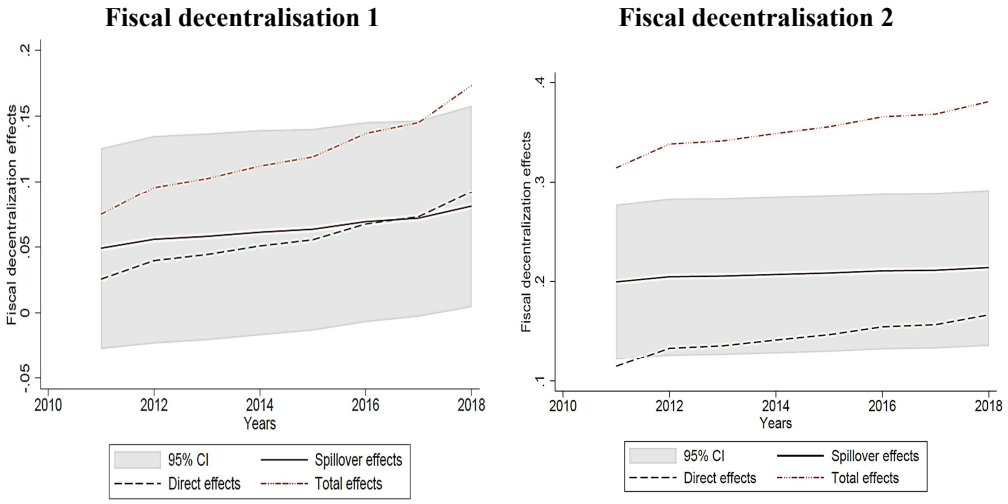

Figure 1. Spillover Effects of Fiscal Decentralisation over Time, 2011-2018

In Vietnam, there are five large economic regions: The Northeast-Northwest, the Red River Delta, the Central Vietnam, the Southeast Vietnam, and the Mekong Delta. According to Thanh and Canh (2019), the link between the levels of fiscal decentralisation and provincial economic development shows a similar pattern across these five regions. Specifically, the national government assigns less fiscal responsibility to provinces with poor economic development, whereas high-income provinces have more fiscal responsibility. Therefore, it is reasonable to argue that the effects of fiscal decentralisation on provincial income levels, including both direct and spillover effects, can be different across these economic regions. To this end, we implement another empirical specification to test this hypothesis.

Fig.2 presents the spillover effects of fiscal decentralisation in five economic regions on a map of Vietnam. The magnitude of the effects is represented by the blackness of the colour. Darker shade implies higher spillover effects. Overall, these results fit well with our previous findings. The Red River Delta and the Southeast regions are filled with the darkest colour in both left and right panels of Fig.2. These two regions are the most

essential economic hubs of Vietnam. Their income levels surpass those of the remaining regions. Concerning the degree of fiscal decentralisation, these two regions also have the highest self-financing indicators (which is fd^1 and fd^2). These findings further lend support to the role of fiscal autonomy in promoting economic development. More importantly, our results emphasise the positivity of spatial externalities of fiscal decentralisation in achieving better income. Higher fiscal autonomy not only contributes to higher output levels within one province, but also promote economic growth in the neighbour provinces. The higher the degree of fiscal decentralisation, the larger the contribution becomes.

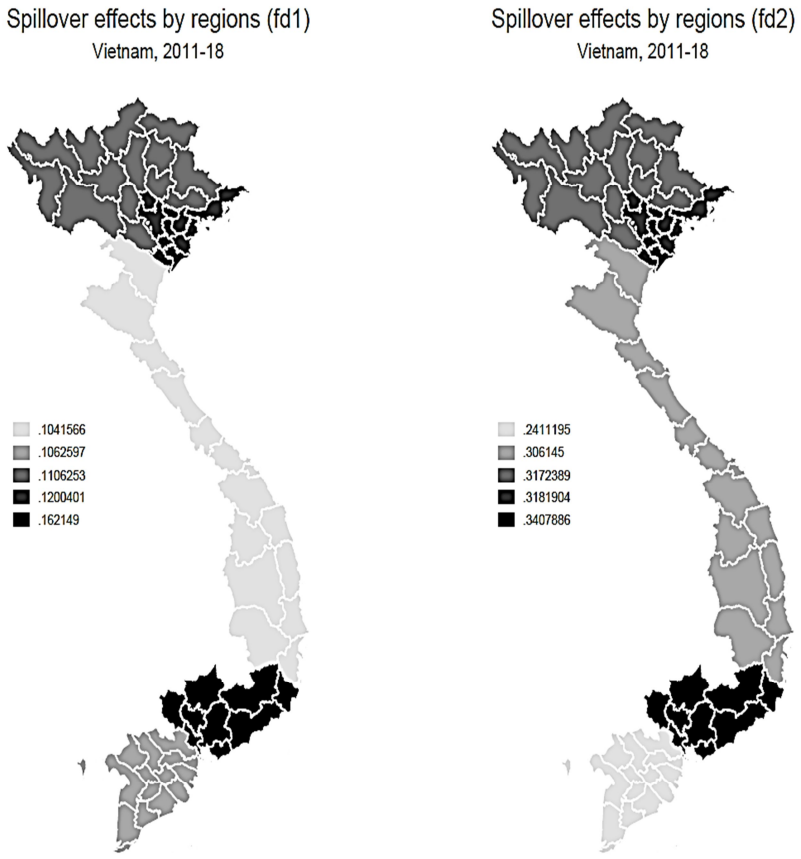

Figure 2. Spillover Effects of Fiscal Decentralisation by Regions, 2011-2018

4.2. Transmission Channels through Institutions

4.2.1. Impacts of Fiscal Decentralisation on Income in Different Institutional Levels

We continue the study by examining the role of local institutions in determining the relationship between fiscal decentralisation and the income level. There was evidence that appropriate institutions can enhance the influence of fiscal decentralisation on provincial outputs. To test this hypothesis, we employ the following indices that cover six aspects of institutions, namely accountability, transparency, control of corruption, public services delivery, participation at local levels and public administration. These variables are taken from the PAPI database.

For each of the six dimensions, we construct a "ranking" variable to group 62 Vietnam's provinces into three categories: low institutional quality, medium institutional quality, and high institutional quality. First, we calculate the $33\frac{1}{3}^{th}$ and the $66\frac{2}{3}^{th}$ percentile of the institutional variable. Then, the low category corresponds to any provinces with an institutional score less than the $33\frac{1}{3}^{th}$ percentile. Provinces with scores larger than the $66\frac{2}{3}^{th}$ percentile will be classified as high category. The remaining ones are put in the medium category.

We report in Table 6 and 7 the impacts of fd^1 on provincial output in different levels of institutions, the corresponding results for fd^2 are shown in Table 8 and 9. For each of the six dimensions, we calculate the total effects, as well as the direct and spillover effects of fiscal decentralisation in different institutional settings.

For fd^1, most of the effects are significantly positive in different institutional levels. Although the magnitude of the spillover effects does not change much across three categories, the intensity of the direct effects varies from one group to another in some of the institutional dimensions. The direct effect in the high category is the largest, while it is the smallest in the low category. We identify three dimensions with significant differences in the direct effects, which are PAPI Accountability, Transparency and Public Administration. In other words, fiscal decentralisation in a particular province will contribute the most to the province's income level if the institutional quality in those three dimensions is high. This finding is related to the "sand the wheels" hypothesis in the literature. This hypothesis explains how better control of corruption can promote economic growth. The advocates of this theory argue that corruption can hinder private business activities, thus dragging both provincial growth and social improvement (Nur-tegin and Jakee, 2020).

The results for fd^2 in Table 8 and 9 show similar patterns. The spillover effects have similar magnitude across three categories of institution. This result is expected since these indirect effects are the average of the partial derivatives across the adjacent provinces. Like previous findings of the study, the intensity of the effects of fd^2 is

larger than that of fd^1. Likewise, we also observe that the direct effects of fd^2 on provincial income levels are larger for high-institutional-quality groups, although the differences among three categories are smaller than those of fd^1.

Table 6. Impacts of fd^1 on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.072	0.019	3.81	0.000	0.035	0.109
	Indirect	0.064	0.039	1.65	0.099	-0.012	0.140
	Total	0.135	0.045	2.98	0.003	0.046	0.224
Middle	Direct	0.042	0.018	2.28	0.023	0.006	0.077
	Indirect	0.063	0.039	1.63	0.103	-0.013	0.139
	Total	0.105	0.045	2.32	0.020	0.016	0.193
Low	Direct	0.029	0.018	1.59	0.113	-0.007	0.066
	Indirect	0.061	0.039	1.58	0.115	-0.015	0.136
	Total	0.090	0.046	1.98	0.048	0.001	0.179
PAPI Transparency							
High	Direct	0.070	0.019	3.64	0.000	0.032	0.108
	Indirect	0.069	0.039	1.78	0.074	-0.007	0.145
	Total	0.139	0.046	3.01	0.003	0.049	0.230
Middle	Direct	0.033	0.018	1.81	0.070	-0.003	0.068
	Indirect	0.067	0.039	1.73	0.084	-0.009	0.143
	Total	0.100	0.045	2.23	0.025	0.012	0.187
Low	Direct	0.042	0.018	2.27	0.023	0.006	0.078
	Indirect	0.066	0.039	1.70	0.089	-0.010	0.141
	Total	0.108	0.046	2.35	0.019	0.018	0.197
PAPI Control of Corruption							
High	Direct	0.046	0.019	2.49	0.013	0.010	0.083
	Indirect	0.062	0.039	1.59	0.111	-0.014	0.139
	Total	0.109	0.045	2.39	0.017	0.020	0.198
Middle	Direct	0.048	0.019	2.48	0.013	0.010	0.086
	Indirect	0.062	0.039	1.59	0.113	-0.015	0.138
	Total	0.110	0.046	2.38	0.017	0.019	0.200
Low	Direct	0.040	0.019	2.08	0.038	0.002	0.078
	Indirect	0.061	0.039	1.55	0.120	-0.016	0.137
	Total	0.101	0.047	2.14	0.032	0.008	0.193

Notes: In this table we measure local governance using several PAPI sub-dimensions, namely Accountability, Transparency and Control of Corruption. We then rank local governance according to the percentiles of the above mentioned proxies into high, middle and low quality. Finally, we estimate direct, indirect and total effects of fiscal decentralisation on provincial income levels in different level of institutions.

Table 6. Impacts of fd^1 on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Public Service Delivery							
High	Direct	0.030	0.019	1.61	0.107	-0.006	0.066
	Indirect	0.050	0.039	1.28	0.199	-0.026	0.126
	Total	0.080	0.047	1.71	0.088	-0.012	0.171
Middle	Direct	0.068	0.018	3.80	0.000	0.033	0.104
	Indirect	0.051	0.039	1.30	0.193	-0.026	0.127
	Total	0.119	0.045	2.66	0.008	0.031	0.206
Low	Direct	0.037	0.021	1.74	0.083	-0.005	0.078
	Indirect	0.050	0.039	1.29	0.196	-0.026	0.125
	Total	0.087	0.046	1.89	0.059	-0.003	0.176
PAPI Participation at Local							
High	Direct	0.048	0.020	2.37	0.018	0.008	0.088
	Indirect	0.059	0.039	1.50	0.134	-0.018	0.135
	Total	0.107	0.046	2.30	0.021	0.016	0.198
Middle	Direct	0.047	0.018	2.54	0.011	0.011	0.083
	Indirect	0.058	0.039	1.47	0.141	-0.019	0.135
	Total	0.104	0.046	2.27	0.023	0.014	0.195
Low	Direct	0.040	0.019	2.08	0.037	0.002	0.077
	Indirect	0.057	0.039	1.45	0.146	-0.020	0.134
	Total	0.097	0.047	2.06	0.040	0.004	0.189
PAPI Public Administration							
High	Direct	0.060	0.018	3.24	0.001	0.024	0.096
	Indirect	0.065	0.039	1.67	0.095	-0.011	0.141
	Total	0.125	0.046	2.72	0.006	0.035	0.214
Middle	Direct	0.040	0.019	2.18	0.029	0.004	0.077
	Indirect	0.065	0.039	1.65	0.098	-0.012	0.141
	Total	0.105	0.046	2.30	0.021	0.016	0.194
Low	Direct	0.041	0.018	2.25	0.025	0.005	0.076
	Indirect	0.064	0.039	1.64	0.101	-0.012	0.140
	Total	0.104	0.046	2.29	0.022	0.015	0.193

Table 7. Impacts of fd^2 on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.121	0.021	5.87	0.000	0.080	0.161
	Indirect	0.182	0.050	3.64	0.000	0.084	0.279
	Total	0.302	0.058	5.21	0.000	0.188	0.416
Middle	Direct	0.118	0.021	5.50	0.000	0.076	0.159
	Indirect	0.181	0.050	3.64	0.000	0.084	0.279
	Total	0.299	0.059	5.10	0.000	0.184	0.414
Low	Direct	0.106	0.022	4.90	0.000	0.064	0.149
	Indirect	0.180	0.050	3.62	0.000	0.083	0.277
	Total	0.286	0.059	4.89	0.000	0.171	0.401
PAPI Transparency							
High	Direct	0.123	0.021	5.89	0.000	0.082	0.163
	Indirect	0.183	0.049	3.71	0.000	0.086	0.280
	Total	0.306	0.058	5.31	0.000	0.193	0.418
Middle	Direct	0.111	0.022	5.10	0.000	0.068	0.153
	Indirect	0.183	0.049	3.70	0.000	0.086	0.279
	Total	0.293	0.057	5.12	0.000	0.181	0.406
Low	Direct	0.111	0.021	5.22	0.000	0.069	0.152
	Indirect	0.181	0.049	3.69	0.000	0.085	0.278
	Total	0.292	0.058	5.07	0.000	0.179	0.405
PAPI Control of Corruption							
High	Direct	0.121	0.021	5.78	0.000	0.080	0.162
	Indirect	0.185	0.049	3.76	0.000	0.089	0.281
	Total	0.306	0.057	5.34	0.000	0.193	0.418
Middle	Direct	0.111	0.021	5.30	0.000	0.070	0.153
	Indirect	0.184	0.049	3.76	0.000	0.088	0.280
	Total	0.295	0.057	5.14	0.000	0.183	0.408
Low	Direct	0.107	0.022	4.96	0.000	0.065	0.149
	Indirect	0.182	0.049	3.73	0.000	0.087	0.278
	Total	0.289	0.057	5.04	0.000	0.177	0.402

Table 7. Impacts of fd^2 on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Public Service Delivery							
High	Direct	0.109	0.022	5.01	0.000	0.066	0.151
	Indirect	0.173	0.050	3.50	0.000	0.076	0.271
	Total	0.282	0.059	4.77	0.000	0.166	0.398
Middle	Direct	0.124	0.020	6.11	0.000	0.084	0.163
	Indirect	0.174	0.050	3.50	0.000	0.076	0.271
	Total	0.297	0.057	5.22	0.000	0.186	0.409
Low	Direct	0.102	0.023	4.52	0.000	0.058	0.147
	Indirect	0.172	0.049	3.49	0.000	0.076	0.269
	Total	0.275	0.058	4.70	0.000	0.160	0.389
PAPI Participation at Local							
High	Direct	0.111	0.022	4.96	0.000	0.067	0.155
	Indirect	0.192	0.049	3.89	0.000	0.095	0.289
	Total	0.303	0.058	5.20	0.000	0.189	0.417
Middle	Direct	0.122	0.021	5.88	0.000	0.082	0.163
	Indirect	0.192	0.049	3.90	0.000	0.096	0.289
	Total	0.315	0.058	5.44	0.000	0.201	0.428
Low	Direct	0.115	0.021	5.46	0.000	0.074	0.156
	Indirect	0.192	0.049	3.90	0.000	0.095	0.288
	Total	0.307	0.058	5.33	0.000	0.194	0.420
PAPI Public Administration							
High	Direct	0.139	0.021	6.72	0.000	0.099	0.180
	Indirect	0.194	0.049	3.98	0.000	0.098	0.289
	Total	0.333	0.057	5.81	0.000	0.221	0.446
Middle	Direct	0.101	0.020	4.95	0.000	0.061	0.141
	Indirect	0.194	0.049	3.96	0.000	0.098	0.290
	Total	0.295	0.056	5.23	0.000	0.184	0.406
Low	Direct	0.114	0.021	5.56	0.000	0.074	0.154
	Indirect	0.192	0.049	3.95	0.000	0.097	0.287
	Total	0.306	0.057	5.40	0.000	0.195	0.417

4.2.2. Impacts of Physical Capital on Income in Different Institutional Levels

Similar to the above approach, we continued to test the impacts of physical capital on income in different institutions. Table 8 report the direct, indirect, and total effects of physical capital on real income per worker in three categories of institutional quality: high, medium and low. As in the case of fiscal decentralisation, the indirect effects of physical capital on income levels are the similar across three categories. The direct effects in the middle category are larger than those in the low category in all dimensions of PAPI, except for the case of Control of Corruption.

Table 8. Impacts of Physical Capital on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.103	0.020	5.05	0.000	0.063	0.143
	Indirect	0.444	0.051	8.68	0.000	0.344	0.544
	Total	0.547	0.056	9.84	0.000	0.438	0.656
Middle	Direct	0.121	0.023	5.34	0.000	0.076	0.165
	Indirect	0.445	0.051	8.71	0.000	0.345	0.545
	Total	0.565	0.055	10.26	0.000	0.457	0.674
Low	Direct	0.096	0.022	4.28	0.000	0.052	0.140
	Indirect	0.444	0.051	8.72	0.000	0.344	0.544
	Total	0.540	0.054	10.00	0.000	0.434	0.645
PAPI Transparency							
High	Direct	0.103	0.020	5.12	0.000	0.064	0.143
	Indirect	0.505	0.057	8.92	0.000	0.394	0.616
	Total	0.608	0.061	9.97	0.000	0.488	0.728
Middle	Direct	0.121	0.025	4.86	0.000	0.072	0.169
	Indirect	0.505	0.056	8.94	0.000	0.394	0.615
	Total	0.625	0.061	10.20	0.000	0.505	0.746
Low	Direct	0.068	0.025	2.75	0.006	0.020	0.117
	Indirect	0.504	0.056	8.94	0.000	0.394	0.615
	Total	0.573	0.058	9.80	0.000	0.458	0.688
PAPI Control of Corruption							
High	Direct	0.103	0.023	4.50	0.000	0.058	0.147
	Indirect	0.489	0.058	8.41	0.000	0.375	0.603
	Total	0.592	0.062	9.50	0.000	0.470	0.714
Middle	Direct	0.107	0.023	4.63	0.000	0.062	0.152
	Indirect	0.489	0.058	8.42	0.000	0.375	0.603
	Total	0.596	0.064	9.36	0.000	0.471	0.721
Low	Direct	0.102	0.024	4.25	0.000	0.055	0.150
	Indirect	0.491	0.058	8.42	0.000	0.376	0.605
	Total	0.593	0.062	9.60	0.000	0.472	0.714

Table 8. Impacts of Physical Capital on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value	[955 Conf.	Interval]
PAPI Public Service Delivery							
High	Direct	0.109	0.023	4.79	0.000	0.064	0.153
	Indirect	0.393	0.052	7.51	0.000	0.290	0.495
	Total	0.501	0.058	8.64	0.000	0.387	0.615
Middle	Direct	0.115	0.021	5.34	0.000	0.073	0.157
	Indirect	0.392	0.052	7.50	0.000	0.290	0.495
	Total	0.507	0.056	9.03	0.000	0.397	0.617
Low	Direct	0.075	0.022	3.42	0.001	0.032	0.118
	Indirect	0.391	0.052	7.48	0.000	0.289	0.494
	Total	0.466	0.057	8.22	0.000	0.355	0.578
PAPI Participation at Local							
High	Direct	0.134	0.021	6.40	0.000	0.093	0.176
	Indirect	0.501	0.049	10.25	0.000	0.405	0.597
	Total	0.636	0.053	11.99	0.000	0.532	0.740
Middle	Direct	0.093	0.021	4.44	0.000	0.052	0.134
	Indirect	0.499	0.049	10.25	0.000	0.403	0.594
	Total	0.591	0.053	11.21	0.000	0.488	0.695
Low	Direct	0.078	0.024	3.22	0.001	0.031	0.126
	Indirect	0.494	0.048	10.24	0.000	0.399	0.588
	Total	0.572	0.051	11.25	0.000	0.472	0.672
PAPI Public Administration							
High	Direct	0.107	0.021	5.02	0.000	0.065	0.149
	Indirect	0.418	0.063	6.62	0.000	0.294	0.542
	Total	0.525	0.070	7.54	0.000	0.389	0.662
Middle	Direct	0.109	0.024	4.56	0.000	0.062	0.155
	Indirect	0.418	0.063	6.61	0.000	0.294	0.542
	Total	0.527	0.070	7.49	0.000	0.389	0.665
Low	Direct	0.094	0.022	4.31	0.000	0.051	0.136
	Indirect	0.418	0.063	6.60	0.000	0.294	0.542
	Total	0.511	0.070	7.33	0.000	0.375	0.648

Moving to the highest category, we observe some heterogeneity. For participation at local levels, the direct effect in the high group is the largest. On the contrary, for public administration, public service delivery, transparency and accountability, the direct effect in the high category is lower than the middle category, but still larger than the low one. These results provide additional support for the nonlinear effects of physical capital on provincial output.

4.2.3. Impacts of Human Capital on Income in Different Institutional Levels

Similarly, we conduct these tests for human capital. Table 9 reports the results for

human capital. The direct effects are insignificant in the case of Accountability, Public Service Delivery, Participation at Local Levels, and Public Administration. These effects are significantly positive for Transparency and Control of Corruption.

For Transparency, the direct effect of human capital on income increases from the low category to high category. It is the smallest in the low category, and largest in the high category. For Control of Corruption, it has the same pattern, although the effect in the middle group is lower than the low group. These findings offer compelling evidence for the importance of Transparency and Control of Corruption on the effects of human capital. Clearly, better transparency and control of corruption enhance the growth effect of human capital in Vietnam's provinces.

Table 9. Impacts of Human Capital on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.085	0.060	1.43	0.152	-0.032	0.202
	Indirect	-0.326	0.099	-3.29	1.999	-0.520	-0.131
	Total	-0.240	0.113	-2.13	1.967	-0.461	-0.019
Middle	Direct	0.028	0.052	0.53	0.594	-0.075	0.131
	Indirect	-0.332	0.100	-3.30	1.999	-0.529	-0.135
	Total	-0.304	0.115	-2.65	1.992	-0.529	-0.079
Low	Direct	0.027	0.052	0.52	0.603	-0.075	0.130
	Indirect	-0.337	0.103	-3.27	1.999	-0.539	-0.135
	Total	-0.309	0.129	-2.40	1.983	-0.563	-0.056
PAPI Transparency							
High	Direct	0.400	0.100	4.00	0.000	0.204	0.597
	Indirect	-0.671	0.162	-4.14	2.000	-0.989	-0.353
	Total	-0.271	0.161	-1.68	1.907	-0.586	0.045
Middle	Direct	0.292	0.102	2.86	0.004	0.092	0.492
	Indirect	-0.681	0.162	-4.20	2.000	-0.999	-0.364
	Total	-0.390	0.157	-2.48	1.987	-0.698	-0.081
Low	Direct	0.259	0.101	2.57	0.010	0.062	0.456
	Indirect	-0.684	0.162	-4.23	2.000	-1.001	-0.367
	Total	-0.425	0.156	-2.72	1.993	-0.731	-0.119
PAPI Control of Corruption							
High	Direct	0.320	0.102	3.14	0.002	0.120	0.519
	Indirect	-0.717	0.165	-4.35	2.000	-1.039	-0.394
	Total	-0.397	0.160	-2.48	1.987	-0.711	-0.084
Middle	Direct	0.244	0.103	2.38	0.018	0.043	0.446
	Indirect	-0.717	0.164	-4.36	2.000	-1.039	-0.395
	Total	-0.473	0.157	-3.00	1.997	-0.781	-0.164
Low	Direct	0.295	0.103	2.86	0.004	0.092	0.497
	Indirect	-0.724	0.166	-4.37	2.000	-1.048	-0.399
	Total	-0.429	0.161	-2.67	1.992	-0.745	-0.114

Table 9. Impacts of human capital on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value	[955 Conf.	Interval]
PAPI Public Service Delivery							
High	Direct	0.077	0.057	1.35	0.177	-0.035	0.190
	Indirect	-0.279	0.094	-2.96	1.997	-0.464	-0.095
	Total	-0.202	0.118	-1.71	1.913	-0.433	0.029
Middle	Direct	0.056	0.048	1.18	0.240	-0.038	0.151
	Indirect	-0.284	0.094	-3.02	1.998	-0.468	-0.100
	Total	-0.228	0.112	-2.04	1.958	-0.447	-0.009
Low	Direct	-0.007	0.056	-0.12	1.096	-0.116	0.102
	Indirect	-0.289	0.094	-3.09	1.998	-0.473	-0.106
	Total	-0.296	0.110	-2.69	1.993	-0.512	-0.080
PAPI Participation at Local							
High	Direct	0.029	0.067	0.44	0.660	-0.101	0.160
	Indirect	-0.304	0.104	-2.94	1.997	-0.507	-0.101
	Total	-0.275	0.130	-2.11	1.965	-0.530	-0.020
Middle	Direct	0.079	0.056	1.41	0.157	-0.030	0.188
	Indirect	-0.304	0.104	-2.92	1.997	-0.508	-0.100
	Total	-0.225	0.125	-1.80	1.928	-0.470	0.020
Low	Direct	0.042	0.050	0.84	0.403	-0.057	0.141
	Indirect	-0.304	0.105	-2.90	1.996	-0.509	-0.098
	Total	-0.262	0.126	-2.07	1.962	-0.509	-0.014
PAPI Public Administration							
High	Direct	0.007	0.056	0.12	0.905	-0.103	0.117
	Indirect	-0.404	0.112	-3.61	2.000	-0.623	-0.185
	Total	-0.397	0.143	-2.78	1.995	-0.677	-0.117
Middle	Direct	-0.000	0.056	-0.01	1.006	-0.110	0.109
	Indirect	-0.403	0.111	-3.64	2.000	-0.620	-0.186
	Total	-0.403	0.131	-3.09	1.998	-0.659	-0.147
Low	Direct	0.058	0.054	1.07	0.285	-0.048	0.164
	Indirect	-0.396	0.110	-3.62	2.000	-0.611	-0.182
	Total	-0.339	0.127	-2.67	1.993	-0.587	-0.090

4.3. Robustness Checks

In the previous sections, we used a contiguity weighting matrix defined in Eq.(3) to estimate the regression model in Eq.(5). To test for the robustness of these results, we replicate all the empirical regressions using another weighting matrix, which is the inverse distance weighting matrix defined in Eq.(4).

All the estimations are reported in the Appendix. Overall, the qualitative predictions of the results do not change much when using an alternative weighting matrix. Further tests carried out with the inverse distance weighting matrix corroborated with our initial

findings. There is strong evidence of spatial externalities in Vietnamese provinces.

It is interesting to mention that we found lower magnitude for the spillover effects of fiscal decentralisation on provincial real income levels. These values are expected since the number of neighbour provinces defined by the inverse distance matrix is generally higher than the number defined by the contiguity matrix. The later only assigns weights to provinces that share borders with the original province, thus limiting the number of neighbours. In contrast, the former uses the inverse of the distance between two provinces as weights. Therefore, it allows proximate provinces to have spatial externalities on each other's, without the requirement of common borders. We can see that the externalities reduce as the distance between two provinces increases. Thus, when we take the average of all these nearby provinces, the spillover effects are smaller than the case with only bordering provinces.

5. CONCLUSION

Using a growth model with spatial externalities, this paper has investigated the impacts of fiscal decentralisation on the provincial output for a panel of 62 Vietnamese provinces. The empirical strategy was based on a SDM model. In this type of model, the total effects of fiscal decentralisation on income levels can be decomposed into the average direct effects and the average indirect effects, or spillover effects. This paper focuses on examining the spillover effects of fiscal decentralisation in one province to the income levels of the adjacent provinces.

We use several self-financing measures as proxies for fiscal decentralisation in Vietnamese provinces. In general, the results support the positive impacts on provincial income of fiscal decentralisation. Furthermore, our findings confirm the role of revenue sharing agreements in fostering provincial economic development. These results implies that lining up revenue collection with local public spending can help allocate local resources more efficiently to achieve higher development.

The empirical results also indicate that the spatial externalities can be different across regions. There was evidence that these externalities are strongest in the Red River Delta and the Southeast region of Vietnam, which are also the most important economic hubs.

After accounting for local institutional characteristics, the analysis did not identify any significant differences of the spatial externalities among different institutional settings. The spillover effects are averaged out, thus explaining a part of the insignificant differences. However, the direct effects of fiscal decentralisation seem stronger at high institutional quality.

The findings can have some policy implications. Fiscal decentralisation in one province not only contribute positively to the income level of that province, but also has a significantly positive effect on the output of its neighbours. Besides, our results indicate that the national government should consider the role of revenue sharing

scheme in the process of fiscal planning. More importantly, the findings show evidence of the "sand the wheels" effect, which could lead to a "race to the top" among local authorities. Therefore, it is reasonable that both national and subnational governments should account for these issues while implementing fiscal reforms.

APPENDIX

Table A1. Baseline Regression Results with Inverse Distance Weighting Matrix, Dependent Variable: Log of Real Income per Worker

	Fixed Effects		Random Effects	
	(1)	(2)	(3)	(4)
log*y*				
log$s$	0.096***	0.092***	0.110***	0.107***
	(5.33)	(5.22)	(6.15)	(6.06)
$\log(n+g+\delta)$	-0.722*	-0.678*	-0.619	-0.552
	(-1.71)	(-1.65)	(-1.46)	(-1.34)
loghc	0.165***	0.150***	0.160***	0.142***
	(3.62)	(3.40)	(3.55)	(3.24)
$\log fd^1$	0.031**		0.040***	
	(2.03)		(2.61)	
$\log fd^2$		0.096***		0.121***
		(5.22)		(6.53)
W				
log$s$	0.275***	0.292***	0.266***	0.288***
	(5.85)	(6.31)	(5.87)	(6.43)
loghc	-0.333***	-0.343***	-0.338***	-0.349***
	(-3.31)	(-3.63)	(-3.54)	(-3.88)
$\log(n+g+\delta)$	-1.009	-1.095	-1.128	-1.194
	(-0.62)	(-0.71)	(-0.72)	(-0.79)
$\log fd^1$	0.035		0.037	
	(1.14)		(1.23)	
log$y$	0.412***	0.349***	0.400***	0.319***
	(6.72)	(5.22)	(6.68)	(4.83)
$\log fd^2$		0.077*		0.084
		(1.73)		(1.96)
Observations	496	496	496	496

Table A2. Impacts of Fiscal Decentralisation on Provincial Output Using Inverse Distance Weighting Matrix

	Mfx	S.E	z	P>|z|	[955 Conf. Interval]	
Fiscal decentralisation 1						
Direct	0.043	0.015	2.85	0.004	0.014	0.073
Indirect	0.085	0.043	1.95	0.052	-0.001	0.170
Total	0.128	0.045	2.83	0.005	0.039	0.217
Fiscal decentralisation 2						
Direct	0.127	0.018	6.88	0.000	0.091	0.163
Indirect	0.175	0.053	3.31	0.001	0.071	0.279
Total	0.302	0.056	5.43	0.000	0.193	0.411

Table A3. Impacts of fd^1 on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value |	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.057	0.018	3.15	0.002	0.021	0.092
	Indirect	0.078	0.046	1.70	0.089	-0.012	0.168
	Total	0.134	0.049	2.77	0.006	0.039	0.230
Middle	Direct	0.031	0.017	1.80	0.072	-0.003	0.065
	Indirect	0.077	0.046	1.69	0.092	-0.012	0.167
	Total	0.108	0.048	2.24	0.025	0.014	0.203
Low	Direct	0.020	0.018	1.16	0.246	-0.014	0.055
	Indirect	0.076	0.046	1.66	0.096	-0.014	0.165
	Total	0.096	0.049	1.97	0.049	0.000	0.192
PAPI Transparency							
High	Direct	0.057	0.018	3.10	0.002	0.021	0.092
	Indirect	0.089	0.045	1.95	0.052	-0.001	0.178
	Total	0.145	0.049	2.97	0.003	0.049	0.241
Middle	Direct	0.023	0.017	1.34	0.181	-0.011	0.057
	Indirect	0.087	0.045	1.92	0.055	-0.002	0.176
	Total	0.110	0.047	2.33	0.020	0.017	0.203
Low	Direct	0.026	0.018	1.51	0.132	-0.008	0.061
	Indirect	0.086	0.045	1.90	0.058	-0.003	0.175
	Total	0.113	0.049	2.31	0.021	0.017	0.208

Table A3. Impacts of fd^1 on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value |	[955 Conf. Interval]	
PAPI Control of Corruption							
High	Direct	0.035	0.018	1.99	0.046	0.001	0.070
	Indirect	0.081	0.046	1.77	0.077	-0.009	0.170
	Total	0.116	0.048	2.42	0.015	0.022	0.210
Middle	Direct	0.033	0.018	1.77	0.076	-0.003	0.069
	Indirect	0.081	0.046	1.77	0.077	-0.009	0.170
	Total	0.113	0.049	2.32	0.020	0.018	0.209
Low	Direct	0.030	0.018	1.63	0.103	-0.006	0.065
	Indirect	0.080	0.046	1.75	0.080	-0.010	0.169
	Total	0.109	0.050	2.21	0.027	0.012	0.206
PAPI Public Service Delivery							
High	Direct	0.019	0.017	1.09	0.274	-0.015	0.053
	Indirect	0.064	0.044	1.45	0.148	-0.023	0.151
	Total	0.083	0.048	1.74	0.082	-0.011	0.177
Middle	Direct	0.062	0.017	3.59	0.000	0.028	0.095
	Indirect	0.064	0.044	1.45	0.147	-0.023	0.151
	Total	0.126	0.046	2.74	0.006	0.036	0.216
Low	Direct	0.025	0.020	1.23	0.219	-0.015	0.064
	Indirect	0.064	0.044	1.44	0.149	-0.023	0.150
	Total	0.088	0.048	1.84	0.066	-0.006	0.182
PAPI Participation at Local							
High	Direct	0.037	0.019	1.91	0.056	-0.001	0.074
	Indirect	0.075	0.046	1.62	0.105	-0.016	0.165
	Total	0.111	0.049	2.26	0.024	0.015	0.208
Middle	Direct	0.037	0.017	2.10	0.036	0.002	0.071
	Indirect	0.074	0.046	1.60	0.110	-0.017	0.164
	Total	0.110	0.049	2.26	0.024	0.015	0.206
Low	Direct	0.026	0.018	1.44	0.150	-0.009	0.061
	Indirect	0.073	0.046	1.58	0.113	-0.017	0.164
	Total	0.099	0.050	1.98	0.048	0.001	0.197
PAPI Public Administration							
High	Direct	0.048	0.017	2.76	0.006	0.014	0.082
	Indirect	0.073	0.047	1.57	0.115	-0.018	0.165
	Total	0.122	0.050	2.45	0.014	0.024	0.219
Middle	Direct	0.021	0.018	1.20	0.232	-0.014	0.056
	Indirect	0.074	0.047	1.57	0.117	-0.018	0.165
	Total	0.095	0.050	1.90	0.057	-0.003	0.192
Low	Direct	0.028	0.017	1.66	0.098	-0.005	0.061
	Indirect	0.073	0.047	1.56	0.118	-0.019	0.164
	Total	0.101	0.050	2.03	0.043	0.003	0.198

Table A4. Impacts of fd^2 on Provincial Output in Different Levels of Institution

		Mfx	S.E	z	p-value	[955 Conf. Interval]	
PAPI Accountability							
High	Direct	0.109	0.019	5.63	0.000	0.071	0.147
	Indirect	0.174	0.059	2.95	0.003	0.058	0.290
	Total	0.283	0.063	4.52	0.000	0.160	0.406
Middle	Direct	0.106	0.020	5.28	0.000	0.067	0.145
	Indirect	0.174	0.059	2.94	0.003	0.058	0.289
	Total	0.279	0.063	4.43	0.000	0.156	0.403
Low	Direct	0.095	0.020	4.64	0.000	0.055	0.135
	Indirect	0.173	0.059	2.93	0.003	0.057	0.289
	Total	0.268	0.063	4.22	0.000	0.143	0.392
PAPI Transparency							
High	Direct	0.111	0.019	5.71	0.000	0.073	0.149
	Indirect	0.173	0.057	3.02	0.002	0.061	0.285
	Total	0.284	0.061	4.66	0.000	0.165	0.403
Middle	Direct	0.097	0.021	4.72	0.000	0.057	0.137
	Indirect	0.172	0.057	3.02	0.003	0.060	0.284
	Total	0.269	0.060	4.48	0.000	0.151	0.387
Low	Direct	0.091	0.020	4.57	0.000	0.052	0.131
	Indirect	0.171	0.057	3.01	0.003	0.060	0.283
	Total	0.263	0.060	4.35	0.000	0.144	0.381
PAPI Control of Corruption							
High	Direct	0.109	0.020	5.53	0.000	0.070	0.147
	Indirect	0.172	0.057	3.01	0.003	0.060	0.284
	Total	0.281	0.061	4.61	0.000	0.161	0.400
Middle	Direct	0.097	0.020	4.89	0.000	0.058	0.136
	Indirect	0.171	0.057	3.00	0.003	0.060	0.283
	Total	0.268	0.061	4.42	0.000	0.149	0.387
Low	Direct	0.092	0.020	4.55	0.000	0.053	0.132
	Indirect	0.170	0.057	2.99	0.003	0.058	0.282
	Total	0.262	0.061	4.33	0.000	0.144	0.381

Table A4. Impacts of fd^2 on Provincial Output in Different Levels of Institution (con't)

		Mfx	S.E	z	p-value|	[955 Conf. Interval]	
PAPI Public Service Delivery							
High	Direct	0.092	0.020	4.57	0.000	0.053	0.132
	Indirect	0.152	0.058	2.62	0.009	0.038	0.265
	Total	0.244	0.063	3.89	0.000	0.121	0.367
Middle	Direct	0.115	0.019	5.99	0.000	0.077	0.152
	Indirect	0.152	0.058	2.62	0.009	0.038	0.265
	Total	0.266	0.061	4.39	0.000	0.147	0.385
Low	Direct	0.090	0.021	4.25	0.000	0.049	0.132
	Indirect	0.151	0.058	2.62	0.009	0.038	0.264
	Total	0.241	0.062	3.91	0.000	0.120	0.362
PAPI Participation at Local							
High	Direct	0.101	0.021	4.77	0.000	0.059	0.142
	Indirect	0.172	0.058	2.96	0.003	0.058	0.286
	Total	0.272	0.062	4.36	0.000	0.150	0.395
Middle	Direct	0.108	0.020	5.51	0.000	0.069	0.146
	Indirect	0.172	0.058	2.96	0.003	0.058	0.286
	Total	0.280	0.062	4.52	0.000	0.158	0.401
Low	Direct	0.098	0.020	4.92	0.000	0.059	0.136
	Indirect	0.171	0.058	2.96	0.003	0.058	0.285
	Total	0.269	0.062	4.37	0.000	0.148	0.390
PAPI Public Administration							
High	Direct	0.127	0.019	6.57	0.000	0.089	0.165
	Indirect	0.177	0.057	3.08	0.002	0.064	0.290
	Total	0.304	0.062	4.92	0.000	0.183	0.425
Middle	Direct	0.083	0.019	4.28	0.000	0.045	0.120
	Indirect	0.177	0.058	3.07	0.002	0.064	0.290
	Total	0.260	0.061	4.27	0.000	0.141	0.379
Low	Direct	0.098	0.019	5.08	0.000	0.060	0.135
	Indirect	0.176	0.057	3.07	0.002	0.063	0.288
	Total	0.273	0.061	4.51	0.000	0.155	0.392

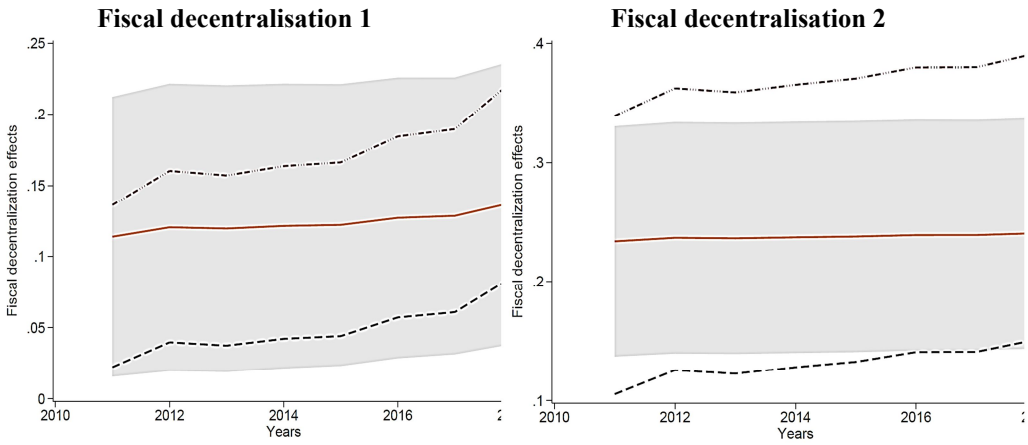

Figure A1. Robustness test: Spillover Effects of Fiscal Decentralisation over Time, 2011-2018

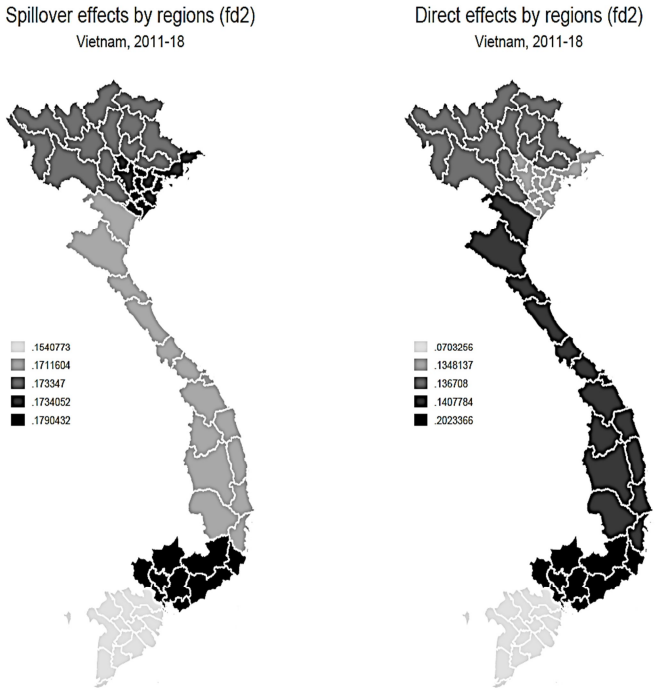

Figure A2. Robustness test: Spillover effects of fiscal decentralisation by regions, 2011-18

REFERENCES

Abdellatif, L., B . Atlam and H. Aly (2015), "Revisiting the Relation between Decentralization and Growth in the Context of Marketization," *Eastern European Economics*, 53(4), 255-276.

Akai, N. and M. Sakata (2002), "Fiscal Decentralization Contributes to Economic Growth: Evidence from State-Level Cross-Section Data for the United States," *Journal of Urban Economics*, 52(1), 93-108.

Altunbas, Y. and J. Thornton (2012), "Fiscal Decentralization and Governance," *Public Finance Revie*w, 40(1), 66-85

Anh, V.T.T. (2016), "Vietnam: Decentralization Amidst Fragmentation," *Journal of Southeast Asian Economies*, 33(2), 188-208.

Bojanic, A.N. (2018), "The Impact of Fiscal Decentralization on Accountability, Eco- nomic Freedom, and Political and Civil Liberties in the Americas," *Economies*, 6(1), 1-20.

Caldeira, E., M. Foucault and G. Rota-Graziosi (2015), "Decentralization in Africa and the Nature of Local Governments' Competition: Evidence from Benin," *International Tax and Public Finance*, 22(6), 1048-1076.

Chu, A.C. and C.C. Yang (2012), "Fiscal Centralization versus Decentralization: Growth and Welfare Effects of Spillovers, Leviathan Taxation, and Capital Mobility," *Journal of Urban Economics*, 71(2), 177-188.

Davoodi, H. and H.f. Zou (1998), "Fiscal Decentralization and Economic Growth: A Cross-Country Study," *Journal of Urban Economics*, 43(2), 244-257.

De Mello, L.R. (2004), "Can Fiscal Decentralization Strengthen Social Capital?" *Public Finance Review*, 32(1), 4-35.

De Mello, L.R. and M. Barenstein (2001), "Fiscal Decentralization and Governance: A Cross-Country Analysis," SSRN Scholarly Paper ID 879574, Social Science Research Network, Rochester, NY.

De Siano, R. and M. D'Uva (2017), "Fiscal Decentralization and Spillover Effects of Local Government Public Spending: The Case of Italy," *Regional Studies*, 51(10), 1507-1517.

Dollar, D., P. Glewwe and N. Agrawal (2004), *Economic Growth, Poverty, and Household Welfare in Vietnam. Regional and Sectoral Studies*, World Bank.

Elhorst, J.P. (2010), "Spatial Panel Data Models," in M.M. Fischer and A. Getis (Eds), *Handbook of Applied Spatial Analysis: Software Tools, Methods and Applications*, 377-407, Berlin, Heidelberg: Springer.

Ertur, C. and W. Koch (2007), "Growth, Technological Interdependence and Spatial Externalities: Theory and Evidence," *Journal of Applied Econometrics*, 22(6), 1033-1062.

Faguet, J.P. (2014), "Decentralization and Governance," *World Development*, 53, 2-13.

Garman, C., S. Haggard and E. Willis (2001), "Fiscal Decentralization: A Political Theory with Latin American Cases," *World Politics*, 53(2), 205-236.

Griffin, K. (2016), *Economic Reform in Vietnam*, Springer.

Hankla, C.R. (2009), "When is Fiscal Decentralization Good for Governance?" *Publius: The Journal of Federalism*, 39(4), 632-650.

Jin, J. and H.f. Zou (2005), "Fiscal Decentralization, Revenue and Expenditure Assignments, and Growth in China," *Journal of Asian Economics*, 16(6), 1047-1064.

Kalirajan, K. and K. Otsuka (2012), "Fiscal Decentralization and Development Outcomes in India: An Exploratory Analysis," *World Development*, 40(8), 1511-1521.

LeSage, J. and R.K. Pace (2009), *Introduction to Spatial Econometrics*, Chapman and Hall/CRC.

LeSage, J.P. (2008), "An Introduction to Spatial Econometrics," *Revue d''Economie Industrielle*, 123, 19-44.

LeSage, J. and R.K. Pace (2014), "Interpreting Spatial Econometric Models," in M.M. Fischer and P. Nijkamp (Eds), *Handbook of Regional Science*, 1535-1552, Berlin, Heidelberg: Springer.

Ligthart, J.E. and P. van Oudheusden (2015), "In Government We Trust: The Role of Fiscal Decentralization," *European Journal of Political Economy*, 37, 116-128.

Mankiw, N.G., D. Romer and D.N. Weil (1992), "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics*, 107(2), 407-437.

Martinez-Vazquez, J. and R.M. McNab (2003), "Fiscal Decentralization and Economic Growth," *World Development*, 31(9), 1597-1616.

Morgan, P.J. and L.Q. Trinh (2017), "Fiscal Decentralization and Local Budget Deficits in Viet Nam: An Empirical Analysis," in *Central and Local Government Relations in Asia*, Edward Elgar Publishing.

Nur-tegin, K. and K. Jakee (2020), "Does Corruption Grease or Sand the Wheels of Development? New Results Based on Disaggregated Data," *Quarterly Review of Economics and Finance*, 75, 19-30.

Oates, W.E. (1972), *Fiscal Federalism*, New York: Harcourt Brace Jonanovich.

_____ (2005), "Toward A Second-Generation Theory of Fiscal Federalism," *International Tax and Public Finance*, 12(4), 349-373.

Que, W., Y. Zhang and S. Liu (2018), "The Spatial Spillover Effect of Fiscal Decentralization on Local Public Provision: Mathematical Application and Empirical Estimation," *Applied Mathematics and Computation*, 331, 416-429.

Rab, H.N., J. Martinez-Vasquez, A.M. Shah, Q.H. Vu, M.V. Nguyen, K.F.N. Monkam, A. Prasad, Q.H. Doan and I. Iyer (2015), "Fiscal Decentralization Review in Vietnam: Making the Whole Greater than the Sum the Parts: Summary Report (English)," Washington, D.C.: World Bank Group.

Rajkumar, A.S. and V. Swaroop (2008), "Public Spending and Outcomes: Does Governance Matter?" *Journal of Development Economics*, 86(1), 96-111.

Raza, Q. and H. Hina (2016), "Fiscal Decentralisation, Provincial Economic Growth and Spillover Effects: A Spatial Panel Data Analysis," *Pakistan Development*

Review, 55(4I-II), 743-760.
Rodden, J. (2004), "Comparative Federalism and Decentralization: On Meaning and Measurement," *Comparative Politics*, 36(4), 481-500.
Thanh, S.D. and Canh, N.P. (2020), "Fiscal Decentralization and Economic Growth of Vietnamese Provinces: The Role of Local Public Governance," *Annals of Public and Cooperative Economics*, 91(1), 119-149.
Tiebout, C.M. (1956), "A Pure Theory of Local Expenditures," *Journal of Political Economy*, 64(5), 416-424.
Van der Kamp, D., P. Lorentzen and D. Mattingly (2017), "Racing to the Bottom or to the Top? Decentralization, Revenue Pressures, and Governance Reform in China," *World Development*, 95, 164-176.
Weingast, B.R. (2009), "Second Generation Fiscal Federalism: The Implications of Fiscal Incentives," *Journal of Urban Economics*, 65(3), 279-293.
Xie, D., H.f. Zou, H. and Davoodi (1999), "Fiscal Decentralization and Economic Growth in the United States," *Journal of Urban Economics*, 45(2), 228-239.
Yang, S., Z. Li and J. Li (2020), "Fiscal Decentralization, Preference for Government Innovation and City Innovation: Evidence from China," *Chinese Management Studies*,14(2), 391-409.
Yang, Z. (2016), "Tax Reform, Fiscal Decentralization, and Regional Economic Growth: New Evidence from China," *Economic Modelling*, 59, 520-528.
Yushkov, A. (2015), "Fiscal Decentralization and Regional Economic Growth: Theory, Empirics, and the Russian Experience," *Russian Journal of Economics*, 1(4), 404-418.
Zhang, T. and H.f. Zou (1998), "Fiscal Decentralization, Public Spending and Economic Growth in China," *Journal of Public Economics*, 67(2), 221-240.

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