Fiscal Imbalances in Nepal's Federalism : An Empirical Analysis

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Abstract

The most overarching and universally accepted imperative to federalize any unitary nation-state is to reduce, both vertical and horizontal, fiscal imbalances as ensured availability of financial resources only could augment any form of well-being and prosperity. Such imbalances constrict all desirable economic outcomes. But, while carving seven States out of the erstwhile unitary state, any other priority like identity or territoriality may have prevailed but fiscal imbalance. This study shows that mainly vertical fiscal imbalance still alarmingly persists even after federalization of the country. The Panel Corrected Standard Error (PCSE) model examines how these imbalances between the federation and the sub-national units (vertical) and, also among the States themselves(horizontal) are likely to impact on the fiscal federalism framework and its functionality. It contends that highly skewed distribution and mobilization of financial resources essentially defeats the very rationale of federalizing Nepal and, much debated identity consideration in federalism has no positive welfare implication.

Keywords: Horizontal fiscal imbalance, Vertical fiscal imbalance, Fiscal federalism, PCSE model

JEL Classification: E62, H7

I. OVERVIEW

The single most rationale of federalizing a unitary state is to establish fiscal equity among the sub-national units by resolving both 'vertical' and 'horizontal' fiscal imbalances. 'Vertical' fiscal imbalance is defined as the difference in mobilizing both expenditures and revenues at different levels of government, and 'horizontal' imbalance refers to the differences between revenue and expenditure, singly or jointly, among the comparable levels of governments (Rao and Singh, 1998). The fiscal federalism literature finds these two set of imbalances, more often than not, causal and related.

But, while implementing the Nepal's federal design under the 2015 Constitution by carving out seven sub-national units, constitutionally termed as States, the implication of both vertical and horizontal, spatially existing or impending, fiscal imbalances were completely ignored, let alone mitigate or resolve the existing ones. The raison d'être of Nepal's federalization was tried to be established away from the financial viability consideration of the newly created sub-national units, which in fact is unequivocally cardinal for both welfare and economic outcomes in their respective economies. One of the consistent pledges was to adopt an identity-federalism (ICG Report, 2016). Among the seven states (States) six (except State 3 with national capital) are, in some way or the other, linked to 'politics' of ethnic orientation.

Despite engrossing political debates on issues including identity and inclusion in Nepal's federalization process, the key missing question is: how would these new delineations of sub-national and, for that matter, 753 local government units, create improved well-being or better economic outcome for the people? There are obvious caveats, both in the politics as well as in the process.

> *"Fiscal transfers from national level to regional level are important and serve as a conflict mitigating mechanism because the central government is delegated the task of controlling and distributing monetary resources equally across provincial borders, as opposed to giving States the task of collecting tax themselves, which often leads to vast inequalities across regions. However, it is important to understand that issues of fiscal redistribution are not a priority in the political discourse. This is mainly because the discourse on federalism has not been conducted in a scientific manner, but is instead a heated debate about ethnic discrimination and autonomy. The actual feasibility of federalism has taken a backseat to the principle of self-governance for ethnic groups" (Hacchethu, 2014, p.72).*

As observed by this assessment, one grossly overlooked dynamics in Nepal's entire federalization process is the fiscal federalism which only could explain potential financial viability of these new sub-national units. As it can be safely argued that without prospects of financial viability, any other form of pay-off, say from recognition of identity as demanded by its protagonists, is unlikely to enhance the prosperity and well-being of the people. Several studies (Rodríguez-Pose and Krøijer, 2009; Blöchliger, 2013 and Yushkov, 2015) found that sub-national fiscal power, particularly to collect revenue, is associated with improved well-being through increased per capita income.

In an OECD-level study Blöchliger (2013) found that sub-national fiscal power, as measured by revenue or spending shares, was positively associated with sub-national economic activity. Increasing the ratio of sub-national to national government tax revenue from 6 to 12 percent was associated with an overall increase of per capita GDP of around 3 percent.

> *"Revenue decentralization appears to be more strongly related with income gains than spending decentralization. This empirical finding may reflect that "true" fiscal autonomy is better captured by the sub-central revenue share, as a large part of sub-central spending may be mandated or regulated by central government.*
>
> *The relationship between decentralization and GDP is weaker for more decentralized countries, probably reflecting that wide sub-central fiscal powers could also have detrimental economic effects and that certain policy areas are not suitable for decentralization" (ibid., pp. 3-4).*

Rodríguez-Pose and Krøijer (2009) studying sixteen Central and Eastern European countries also confirmed similar findings. While expenditure at sub-national tiers and transfers from national government were negatively correlated with overall economic growth, taxes assigned at the sub-national level had a significantly positive correlation with national growth rate. This supports the view that sub-national governments with their own revenue sources respond better to local demands and promote greater economic efficiency. Similarly, a recent empirical analysis of Russian sub-national regions for 2005–12 by Yushkov (2015) showed that excessive expenditure decentralization not accompanied by respective level of revenue decentralization, significantly and negatively impacted the sub-national economic growth. These studies establish the grave consequences of unresolved fiscal balances in federal distribution and mobilization of financial resources.

The following Figures 1 and 2 can explain how little consideration has been given to address the vertical as well as horizontal imbalances of the states while creating these sub-national units. More alarming is the fact that multiple gerrymandering proposals also fail to take these imbalances into account.[1]

[1] Graphic representation by the author based on the data made available by Office of the Auditor General of Nepal.

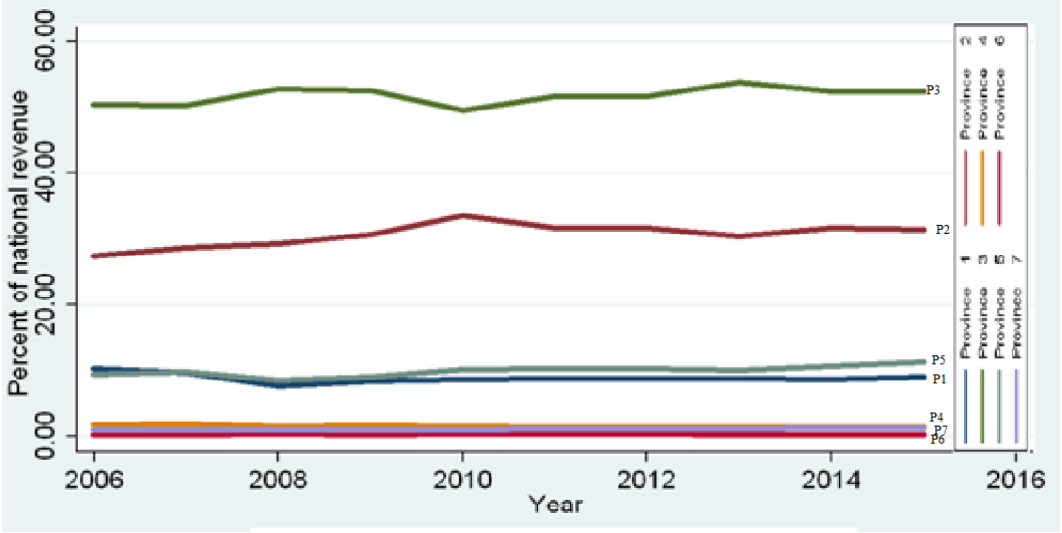

Figure 1: Revenue Generated by States (Percent of Total National Revenue)

The ten-year average contribution to total national revenue is only 0.24 percent from State 6, 1 percent from State 7 and 1.4 from State 4. States 1 and 5 contributed 8.8 and 9.8 percent, respectively. State 2 collected 30.7 percent mainly due to customs duty collection since Birgunj is the only transit corridor with railhead-connected functional dry-port. State 3 alone collected almost 52 percent of the total national revenue on average in the decade covered. Such unequal share of revenue collection of sub-national units explains the extent of vertical imbalance while the very wide differences in size of the revenue source among states expose the precarious horizontal imbalances . Most of the economic activities are concentrated in the national capital region. It is evident that provincial demarcation barely tried to address this vertical imbalance, even marginally.

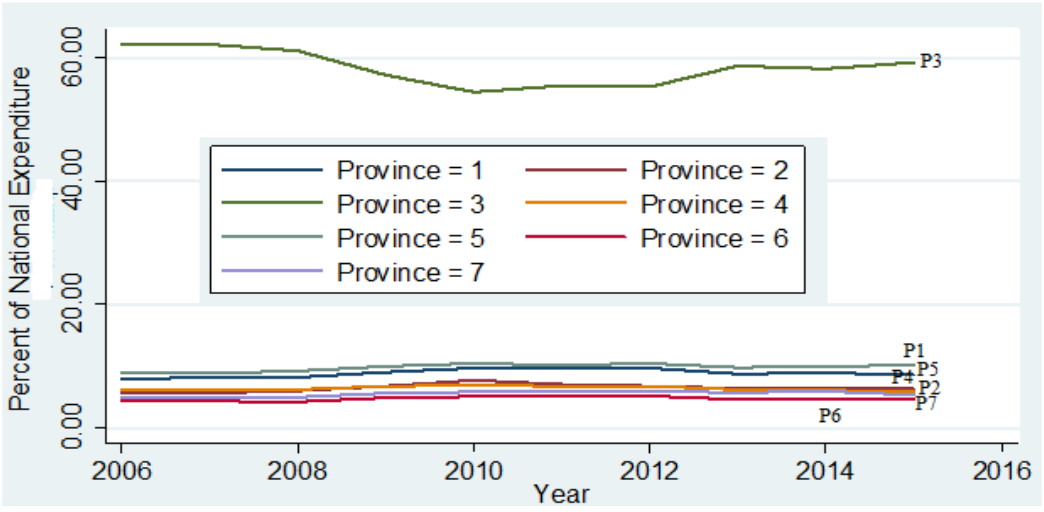

Figure 2: Percent of Total Expenditure of National Budget by States

By contrast, on a ten-year average, States 7 and 6 spend 4.7 and 5.5 percent of total national expenditure, respectively while State 3 spends 58.4 percent (Figure 2). The income-expenditure difference as seen in Figure 3 shows clear vertical fiscal imbalance even in expenditure..

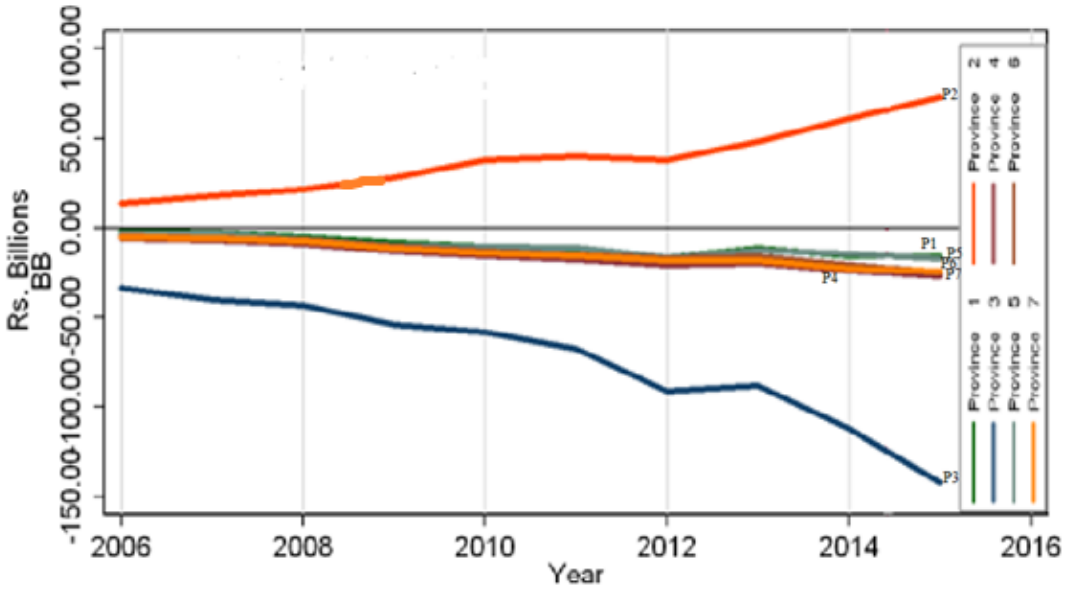

Figure 3: Nominal Budget Balance of States (Rs. billions)

In percentage terms of their own expenses as seen from Figure 3, most of the States could meet only half of their current level of expenditure. The increased demand for public goods is further likely to expand that gap. These are clear examples of stark differentials in financial capabilities of the units. But the focus of political discourse is away from these realties. Even if one assumes that these sub-national units are vested with both identity recognition and adequate political autonomy, the sources of income are unlikely to increase dramatically overnight. New tax-points are hard to create as they depend largely on several other factors like population density, extent of infrastructure support and market access.

Therefore, viewing from the fiscal imbalance perspective, Nepal's federalization process presents very bleak as well as highly skewed economic viability of the sub-national units. This study tries to look into how these fiscal imbalances in Nepal's federal structure, a key measure to ensure viability of sub-national jurisdictions in federal set up. We examine several other key variables including the widely debated identity and their impact on sub-national revenue outcome. We design our model accordingly.

II. RESEARCH QUESTION

We design our model to investigate into:

i) whether Nepal's State-level fiscal imbalances, as explained by the coefficients of the federalization (decentralization) indicators (FI), indicate to better financial viability of the sub-national economy, and

ii) whether the ethnic identity component so forcefully inducted into the political decision-making process of country's federalization, which is represented by the identity variable (ID) in our model, has any impact on economic viability by reducing the imbalance.

As already stated, own revenue income not only reduces fiscal imbalances but also is the most crucial determinant of decision autonomy and economic viability of any sub-national unit in the federal state. Therefore, we use the sub-national revenue income in its logarithmic form as the dependent variable in our regression model. It is more so because these States are newly created, therefore, data to represent well-being or economic performance like State-wise GDP growth rates, State-segregated per capita income figures or HDI indicators are yet to be available in longer time horizon.

III. METHODOLOGY

We use time-series-cross-section (TSCS) dataset, which is essentially a panel dataset but with some differences in nomenclature and also in notation. In political economy models, datasets usually consist of a number of cross-sectional units (geographical areas or political units like countries, provinces etc.), observed generally annually over a long period of time and used in analysis of comparative political economy (Beck and Katz, 1995, 2011). It is because, the concept of random sampling is violated since we work on already defined set of cross-section units like Stats. It clearly violates key OLS assumption of independent and identically distributed (iid) error term. Similarly, most economy-specific variables like budget balance, per capita income, inflation etc. are unlikely to be lag-independent and most right-hand side variables may not be exogenous. Also, there could be across unit heterogeneity which may not be accounted for by the independent variables in traditional econometric models. The proponents of TSCS model argue that such violations of exogeneity and homoskedasticity assumptions make traditional approach to panel estimation using, for example, fixed or random effect models may not provide reliable estimates. This establishes the rationale for using a more specific model incorporating these realities.

For analyzing the political-economy data of this nature, Beck and Katz (1995, 1996, 2004) have recommended use of panel corrected standard error (PCSE) model. They have shown that PCSE is better than Pooled OLS as it gives small standard errors and also better suited than the fixed effect model. Moundigbaye et.al (2017, p.2) argued for PCSE suitability as follows:

> *"FGLS estimator that weights on heteroskedasticity and the Parks estimator, as being most efficient depending on whether T/N is less than or greater than 1.50,*

respectively. And we identify the PCSE estimator as being best for hypothesis testing in all situations" (ibid, p.18).

Since our $T/N < 1$, the PCSE looks most appropriate model for us. Reed and Ye (2011) studied panel datasets with number of cross-sectional units (N) and time periods (T) of small to moderate in size, ranging from 5 to 77 and 5 to 25, respectively and obtained convincing results, even in cases when $T/N < 1$. Our dataset incidentally is within these limits $N = 7$ and $T = 10$ which is, as the rule of thumb, the T_s lower accepted bound for PCSE estimation. Since we do not want our dummy variable ID to be dropped from the regression, fixed effect is not considered here because it drops all time-invariant variables. Therefore, for our inference and analysis, we primarily rely on the results of PCSE estimation to make the final inferences and conclusions.

A. Data and Variables

We first collected district-wise data of all seventy-five districts, from all possible sources, namely records of offices in district headquarters and relevant central government agencies, and then aggregated them State-wise. In case of two out of seventy-five districts that were divided into two different States we split the district data into halves and aggregated under relevant State, accordingly.2 We use data of the ten year period: 2006 to 2015.

i) Revenue Income

We use the log of own revenue income of Nepal's seven sub-national units as the dependent variable across a 10 year time period (2006-2015). The revenue and expenditure data are mainly obtained from the Office of the Auditor General of Nepal and year-specific budget speeches published by the Ministry of Finance, Nepal. In Nepal's context, only data credibly available to measure welfare or prosperity outcome of individual States is only their respective own revenue income. Therefore, lRev has been chosen as the dependent variable. It makes sense to transform this variable into logarithmic form (lRev). Estimating the regression equation with only dependent variable in log form is a common practice. This is important because "...substantial forecasting improvements from taking logs are found if the log transformation actually stabilizes the variance of the underlying series" (Lütkepohl and Xu, 2012, p.1). Wooldrige (2009, p.347) also stated "...the logarithmic transformation significantly narrows the range of the data and also yields functional forms—such as constant elasticity models—that can explain a broader range of data". And, revenue capability in nominal terms gives better picture of financial strength of a sub-national unit than any ratio thereof.

ii) Budget Balance

The structural budget balance (BB) of any federal entity is considered crucial as it combines both short and long term aspects of economic health of the jurisdiction

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[2] Nawalparasi district was divided between States 4 and 5 and Rukum district was divided between State 5 and 6, making total number of districts seventy-seven.

concerned.[3] "The structural budget balance is the government's actual fiscal position purged of the estimated budgetary consequences of the business cycle, and is designed in part to provide an indication of the medium term orientation of fiscal policy" (Hegemann, 1999, p.9). We obtain the budget balance measured by subtracting the yearly sub-national expenditures from the yearly sub-national revenue (in billion rupees) of States. As shown in Figure.2, six out of seven States are spending far larger amount than their own revenue earning, therefore, are primarily dependent on vertical transfers from the federal government, exposing sheer vertical imbalance. If this variable is negative, it implies a deficit provincial budget balance; vice versa. The BB a key explanatory variable to measure the extent of the imbalance and expect the coefficient of to be positive.[4]

iii) Federalization Index

Federalization (decentralization) index FI is our key explanatory variable of interest because it explains the extent of vertical fiscal imbalance. We calculate this using the World Bank (2001) formula on Fiscal Decentralization Indicators. The World Bank since 2001 has put in efforts to develop year-on-year Decentralization Indicators based on Government Finance Statistics of IMF. Among several other formulae proposed by the Bank, including the ratio of sub-national to national ratio, we use revenue-expenditure (equation) as it compositely represents both revenue and expenditure capabilities. The indicators provide an overview of the political, fiscal, and administrative arrangements of countries and "illustrate global, regional, and country trends in decentralization." The Bank has created formulae for more than a dozen such indicators and ratios that may be applied according to the context (Dziobek, 2013).[5] Kim, et al. (2013) have used four key Decentralization Ratios[6] to measure the extent of decentralization, mainly in OECD countries. We use here one of the 'Vertical Imbalance Indicators' computed by the following formula (The World Bank, 2013):

$$\text{FI} = \frac{\text{Sub}-\text{national's own revenue (as \% of national revenue)}}{\text{Sub}-\text{national's expenditures (\% of national expenditure)}} \quad \ldots\ldots\ldots (1)$$

If this ratio increases it implies that the relative fiscal position of a State in relation to the nation has become more balanced. Therefore, a reduction in the ratio value will imply more vertical imbalance in the relative position of a State. For the federal system to be

[3] "... there are lots of bits and pieces of evidence to the effect that politics in general does affect growth" (Przeworski and Limongi, 1993, p.65).

[4] Only State 2 has surplus budget in the dataset.

[5] Dziobek, 2013.

[6] The following are the formulae provided by The World Bank, Intergovernmental Relations and Sub-national Finance, Thematic Group (2013), to compute the decentralization indicators.
Fiscal Decentralization Indicators
Vertical Imbalance Indicators

- Sub-national Government Own Source of Revenue as a Share of Sub-national Expenditures
- Sub-national Government Own Tax Revenue as a Share of Total Sub-national Government Expenditure
- Vertical Grants (Transfers) as Share of Sub-national Government Revenue

effective, we expect this ratio to increase overtime, thus have a positive relation with the dependent variable.

iv) Identity

Identity (ID), is another important explanatory variable in this study to see if it actually has any welfare enhancing role in federalism. We select any particular sub-national unit as an identity-State by examining two issues. First, whether the majority of population of a particular community is present in that State, and their demand for ethnic State has been considered while creating the State. From this perspective, except State 3, all six States fall in the identity-recognized definition. Second, we look into whether the restiveness still persists to realign the provincial borders, or there is a possibility that the boundaries of a State could be altered while fulfilling the demand of other States.[7]

State 1: Long before the constitution was drafted, there was demand for Limbuwan and Khumbuwan[8] ethnic State. After creation of this State, the protesting groups are now limiting their demand only to name this State accordingly, not to re-demarcate it.

State 2: It is unambiguously a Madhesi-dominant State. It is now considered a benchmark identity unit and Madhesi[9] community is only demanding to expand or replicate it.

State 3: Although there were demands to create Newa or Tamsaling[10] States before it was created, but these demands subsided, perhaps, because it turned out to be economically most affluent and racially most heterogeneous State with capital Kathmandu in it.

State 4: There was demand for Magarat and Gurung[11] State. There are no further demands for re-demarcation within it.

State 5: It was created as Tharu[12] dominant State. Demand for extending it to cover all Tharu communities is alive.

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7 It is in fact very liberal assignment of identity status to the States for the purpose of this study to see if it at all have impact on economic viability outcome.

8 Limbus and Khumbus are two Tibeto-Burmese communities in eastern Nepal known as best fighters in wars.

9 Madhesis are people who live in the Madhes or Terai plains of Nepal in the south of the country along the Indian border. They profess closest cultural and familial ties with the population of Indian states of Uttar Pradesh and Bihar

10 Newars (Newa), historically a trading community, is predominant in Kathmandu valley. Tamangs are also of Tibeto-Burmese origin who mainly inhabit surrounding hills of the Kathmandu valley and vicinity.

11 Magars and Gurungs are Tibeto-Burmese communities that live in the western part of Nepal.

12 Tharus are aboriginals that are spread across the southern plains, with more concentrated settlements in western and far-western Nepal.

State 6: This is considered to be the Khasa-Arya[13] State. It's one of the historic towns Jumla is the epicenter of this Khasa-Arya civilization.

State 7: It is the State for the people who speak a separate dialect called Doteli.

Combining these two sets of issues, we construct the identity (ID) dummy variable by assigning value 1 if the State has an ethnic identity and value 0 otherwise.

Table 1: ID Dummy Variable for States

States	Assigned value
State 1	1
State 2	1
State 3	0
State 4	1
State 5	1
State 6	1
State 7	1

v) Corruption

The corruption indicator (CI) in this model is simply the aggregation of number of corruption cases filed[14] in mandated offices[15] and with constitutional ombudsman organization, The Commission for the Investigation of Abuse of Authority (CIAA). The number of such cases appears to be very high in State 3 as CIAA and all other government central offices are located there. We have counted not all complaints registered with CIAA but only those that were actually taken up for investigation. We expect this variable to adversely affect own revenue collection of States since it is directly associated with embezzlement of public funds.

vi) Governance

No sub-national level democracy indices are available or are easy to compute for Nepal. Therefore to have a pulse of the rule of law and law and order we gathered data on the number of criminal cases filed by the district public prosecutors in all seventy-five districts and clubbed them under the new sub-national units. We call it the 'governance indicator' (GI). Most of the data have come from relevant annual reports of the Office of the Attorney General of Nepal. Some data that are missing in these reports, particularly of thirteen remote mountain districts, were filled up from the published records of relevant district police offices. The GI variable in this model has a counter intuitive interpretation. The rise in the number of criminal cases registered may indicate not a bad governance but

[13] Khasa-Arya are believed to be descendants of Indo-Caucasian races and constitute the so called high social class of Brahmins, Kshatriyas and Tahkuris.

[14] Complaints related to financial irregularities, embezzlement of public funds and derelictions of duties as defined by the Corruption Control Act 2002.

[15] Until 2013, Chief District Officers (CDOs) exercised the delegated authority of CIAA to investigate into the corruption cases. In 2013, CIAA established its own regional offices. CIAA in its central office has specialized investigation divisions.

an overall positive environment for revenue collection as the faith in public administration is gradually being restored after 10 years of violent conflict that eroded it. Hence, the coefficient of GI is expected to be positive.

B. The Regression Equation

Based on the discussion above, we construct the following regression equation:

$$\text{lRev} = \beta_0 + \beta_1 \text{BB}_{it} + \beta_2 \text{FI}_{it} + \beta_3 \text{ID}_i + + \beta_4 \text{CI}_{it} + + \beta_5 \text{GI}_{it} + \varepsilon_{it}$$

Where,
lRev = log of revenue income of the sub-national units
BB = Annual Budget Balance of the sub-national units
FI = Annual Fiscal Decentralization Index of the sub-national units
ID = Dummy variable for Identity of the sub-national units
CI = Annual Corruption Indicator of the sub-national units
GI = Annual Governance Indicator of the sub-national units

ε is the error term (ε_{it} is a composite error of idiosyncratic error u_{it} and white noise v_{it});

β_0 is a constant; and $\beta_1, \beta_2, \beta_3, \beta_4, \text{and } \beta_5$ are coefficients of the right-hand side variables. We shall be covering 10 year period from 2006 to 2015 in 7 sub-national units. Therefore,

i = 1,....,7 and t = 1,....,10.

We now propose the following hypotheses based on our research objectives:

i) fiscal decentralization (federalization) reduces the fiscal imbalance thus has a positive significant impact on own revenue collection of a sub-national unit: $\beta_2, > 0$

ii) federalizing with ethno-linguistic consideration may have negative impact on revenue of the sub-national economy : $\beta_3 < 0$

iii) coefficients of budget balance and governance indicator are ambiguous but generally expected to be positive: $\beta_1, \beta_5 > 0$ while the coefficient of corruption indicator is expected to be negative $\beta_4 < 0$

We regress on a panel consisting of seven cross-sections, for ten years: 2006-2015.

IV. REGRESSION AND INFERENCE

i) Descriptive Statistics

We have a strongly balanced panel with seven sub-national units (States). The following table summarizes the dataset. This summary reports means, standard deviations and Min/Max values of the variables. It decomposes the standard deviation into cross-section (between) and across time deviation from the mean (within) of the same variable.

Table 2 : Summary of the Dataset

Variable Name		Mean	Std. Dev.	Minimum	Maxim	Observations
lRev	overall	1.538964	1.823547	-1.684087	3.983871	N = 70
	between		1.952411	-1.448929	3.946026	n = 7
	within		.103068	1.303807	1.785616	T = 10
BB	overall	-14.1106	33.63896	-142.1202	72.71177	N = 70
	between		32.15949	-72.95697	37.92812	n = 7
	within		15.23963	-83.27381	25.30751	T = 10
FI	overall	1.164557	1.539738	.0393584	5.096264	N = 70
	between		1.647056	.0507933	4.781605	n = 7
	within		.1088196	.7502757	1.479217	T = 10
ID	overall	.8571429	.3524537	0	1	N = 70
	between		.3779645	0	1	n = 7
	within		0	.8571429	.8571429	T = 10
CI	overall	428.0429	515.3345	9	2139	N = 70
	between		456.5804	55	1365.3	n = 7
	within		290.3363	-915.2571	1201.743	T = 10
GI	overall	3215.914	3216.572	78	13565	N = 70
	between		2823.776	660.5	9066.3	n = 7
	within		1847.341	-5396.386	7714.614	T = 10

The table shows that between variation of all variables is very high compared to their within variation.

ii) Pairwise Correlation

Here we present (Table 3) pairwise correlation coefficients of the right hand-side variables. According to Hinkle (2003) rule of thumb16, GI shows high positive correlation with CI, high negative correlation with ID, moderately negative correlation with BB and almost no or little correlation with FI. CI is also highly negatively correlated with ID and BB and no correlation with FI. ID is moderately positively correlated with BB and no correlation with FI. FI has low positive correlation with BB. Therefore, our data may have some concerns of multicollinearity: the case of right hand-side variables being linearly correlated with each other. Although except in the case of perfect correlation, multicollinearity does not violate OLS assumptions and estimators could still be BLUE, but it inflates standard errors. The t-statistic becomes smaller making it harder to reject

[16] Rule of Thumb for Interpreting the Size of a Correlation Coefficient (Hinkle, 2003)

Size of Correlation	*Interpretation*
.90 to 1.00 (-.90 to –1.00)	Very high positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.30 to .50 (-.30 to -.50)	Low positive (negative) correlation
.00 to .30 (.00 to -.30)	Little if any correlation

the null. Hence, we carry out one of the most popular formal diagnostic tests on multicollinearity.

Table 3 : Pairwise Correlation Coefficients

	BB	FI	ID	CI	GI
BB	1.0000				
FI	0.5716	1.0000			
ID	0.7193	0.0739	1.0000		
CI	-0.5016	0.2292	-0.7479	1.0000	
GI	-0.6495	0.0712	-0.7479	0.9286	1.0000

"A formal method of detecting the presence of multicollinearity that is widely accepted is use of variance inflation factors (VIF). These factors measure how much the variances of the estimated regression coefficients are inflated as compared to when the predictor variables are not linearly related." (Kutner et.al, 2005, p.408).

In order to conduct the VIF test, we, as required, first obtain the Pooled OLS estimation results and compute the VIF values.17

Table 4 : Pooled OLS

lRev	Coef.	Std. Err.	t-statistic	P-value
BB	.0143694	.0084252	1.71	0.093
FI	.6492123	.1242257	5.23	0.000
ID	-2.626356	.5791907	-4.53	0.000
CI	-.0017278	.0006528	-2.65	0.010
GI	.0004787	.0001091	4.39	0.000
Constant	2.436992	.6589703	3.70	0.000

Number of obs = 70
F(5, 64) = 50.64
R-squared = 0.7982
Adj R-squared = 0.7825
Root MSE = 0.85052

[17] Square root of the VIF value explains how much larger the standard error is, compared with what it would have been if the variable was uncorrelated with other X variables. That means, the coefficient needed to be 3 times larger to be statistically significant.

iii) Variance Inflation Factors

Table 5 : VIF of all X-variables

Variable	VIF	1/VIF
CI	7.43	0.134582
BB	4.33	0.230748
GI	3.94	0.253791
ID	3.24	0.308816
FI	1.81	0.552581
Mean VIF	4.15	

Its diagnostic interpretation is:

> *"The largest VIF value among all X variables is often used as an indicator of the severity of multicollinearity. A maximum VIF value in excess of 10 is frequently taken as an indication that multicollinearity may be unduly influencing the least squares estimates."(ibid. p.409).*

We can see from Table 5 that the VIF values for all the right hand-side variables are well below the accepted level of 10. The highest is for CI: 7.43. We therefore proceed with our original model without worrying about multicollinearity and without dropping any variables from the proposed model. We also run Hausman test for possible endogeneity of regressors by instrumenting sub-national expenditure for BB and, were found exogenous.[18]

Pooled model is not our main model of estimation and carried out as an imperative to evaluate the VIF. However, it provides a basis for comparing the regression results. More importantly, general fitness of the model under Pooled estimation also suggests that multicollinearity is not a real problem in this model. F-statistic is significant at 1 percent level, all variables except BB are significant at 1 percent, and BB at little over 9 percent. Adjusted R-squared is 0.7825. All coefficients have the signs as per model expectation with ID and CI having negative signs. There is no indication of inflated standard errors.

iv) Unit Root Test

Now, we test the panel unit roots. We conduct the following four tests:

1. Levin-Lin-Chu (LLC) unit-root test
2. Im-Pesaran-Shin (IPS) unit-root test
3. Augmented Dickey-Fuller (ADF) unit-root test
4. Phillips-Perron (PP) unit-root test

[18] The null hypothesis in the Hausman Test is: the difference in the coefficients is not systematic. The chi-square value obtained from the test is 0,8773 which is larger than 5 percent , therefore, null hypothesis could not be rejected,

The following table presents comparative p-values of different tests and whether we can reject the given null hypothesis under each test.

Table 6 : Unit Root Test Results

Tests Variables	LLC	IPS	ADF	PP	Remarks
lRev	0.0001 (R)	0.0186 (R)	0.0002 (R)	0.0617 (CR)	
BB	0.0849 (R)	0.9234 (CR)	0.0306 (R)	0.9562 (CR)	
FI	0.0000 (R)	0.2370 (CR)	0.0000 (R)	0.0000 (R)	
ID	-	-	-	-	dummy
CI	0.0000 (R)	0.0011 (R)	0.0001 (R)	0.0000 (R)	
GI	0.0000 (R)	0.0136 (R)	0.0000 (R)	0.0000 (R)	

CR= Cannot reject the null, R= Reject the null

Except lRev in one test, BB in two tests and FI in one test, the rest of the tests indicate absence of unit root in the data. In light of the more popular tests LLC and ADF, we shall assume absence of unit root in our data.

We proceed with the regression.

v) Regression

Table 7 : PCSE Regression with Time Dummies

lRev	Coefficient	Std. Error	z-statistic	P-value
BB	0.017406	0.0078185	2.23	0.026
FI	0.5914217	0.092029	6.43	0
ID	-2.009067	0.7024976	-2.86	0.004
CI	-0.0019607	0.0007189	-2.73	0.006
GI	0.0006343	0.0001511	4.2	0
Year				
2007	0.1615234	0.059947	2.69	0.007
2008	-0.0711026	0.0630488	-1.13	0.259
2009	-0.9257563	0.2342791	-3.95	0
2010	-0.6059211	0.181112	-3.35	0.001
2011	-0.4785778	0.1909403	-2.51	0.012
2012	-0.8481691	0.2459275	-3.45	0.001
2013	-0.958827	0.2631775	-3.64	0
2014	-0.8819543	0.271267	-3.25	0.001
2015	-0.7181064	0.2366696	-3.03	0.002
Constant	2.150143	0.7143237	3.01	0.003

Number of obs = 70
Number of groups = 7
R-squared = 0.8289
Wald chi.sq = 871.97

The PCSE estimates with time dummies are shown in Table 7, above. This regression takes care of time-specific effects on revenue collection. The time dummies appear statistically significant for 2007 and 2009 onwards, suggesting that there was systematic year-specific effect on the revenue trend. All the explanatory variables are statistically significant. R-squared value is convincingly higher than pooled OLS, at 0.8289.

The positive coefficient of BB indicates that own revenue collection of provinces decline with increasing budget deficits, hence rising federal grants accommodate budget deficits. The positive coefficient of FI indicates improvement in vertical balance is accompanied by improvements in own revenue collection. The negative coefficient of ID hints at low revenue collection among identity provinces. Also, number of corruption cases taken up for investigation negatively impact own revenue collection of provinces. Finally, the governance index coefficient indicates positive association between revenue collection of provinces and the number of criminal cases filed in the provinces. It shows revenue collection is improving along with people's faith in government mechanism and that they feel free to report to the public administrative offices.

The coefficients of all variables are statistically significant at z-value less than 5 percent level and their signs are according to our expectation.

vii) Joint Statistical Significance

We test the joint significance of FI and ID to check the joint impact of these two variables in our empirical study. We obtain high Chi-squared value (Chi sq.= 59.79) we reject the null hypothesis and conclude that they are significant jointly. We therefore run regression on the full model with interactive variable FI $*$ ID. The results are reported in Table 8.

Table 8: PCSE with All Variables and FI*ID

lRev	Coefficient	Std. Error	z-statistic	P-value
BB	0.0137859	0.0049386	2.79	0.005
FI	-28.48184	6.768267	-4.21	0
1.ID	-27.45002	5.67706	-4.84	0
ID#c.FI (1)	29.10745	6.754964	4.31	0
CI	-0.0018068	0.0005639	-3.2	0.001
GI	0.0006337	0.0001344	4.72	0
Constant	26.96075	5.572126	4.84	0

Number of obs	=	70
Number of groups	=	7
R-squared	=	0.839
Wald chi.sq	=	951.14

Though all variables are statistically significant, these regression results are critical in several ways. The most striking are individual coefficients of FI and ID (the ID variable represents only the identity States). Both are almost identically negative and statistically significant at 1 percent level.

This implies that federalization across the entire sample has a negative impact on own revenue collection, and identity States are likely to perform poorly with their own revenue collection.

It is important to note that the only non-identity State is State 3 which alone contributes more than 50 percent of national revenue collection (see Figure 2), yet spends almost 60 percent of the national expenditure, hence carry the largest deficit budget balance (see Figure 3). It has undue overarching economic influence and remains a root cause of fiscal imbalance vertically and horizontally. Therefore, when regressed with the full model, including BB in particular, the coefficient of FI (including State 3) becomes negative due to acute vertical imbalance of State 3, which is antithetic to the very principle of federalism. This indicates Nepal's challenges regarding devolving power to resource-scarce States under its new federal polity. CI retains its significant negative coefficient and GI appears with a small significant positive coefficient.

Finally we regress on lRev with all variables along with two interactive variables BB ∗ ID and FI*ID. Results are given in Table 9. When we regressed with FI*ID variable, its coefficient was large positive for all identity States, excluding State 3 (the non-identity State). But FI for overall model became highly negative meant the impact of federalization is not having desirable impact due to State 3 which is evident from the revenue and expenditure monopoly it has as we have explained above.

We introduce a new interacting variable BB ∗ ID here. It is statistically significant at 1 percent level but the coefficient is negative implying identity States are improving their revenue collection although budget deficits are increasing. However, the coefficient of BB for the entire sample is positive that we have found in all earlier models. Coefficient of identity (for identity States) is also negative as in the earlier models. The positive coefficient of FI ∗ ID interacting term has reduced slightly. CI is negative and GI is positive but with reduced impact.

Table 9 : PCSE with All Variables, BB ∗ ID and FI*ID

lRev	Coef.	Std. Error	z-statistic	P-value
BB	0.0233881	0.0065471	3.57	0
1.ID	-25.42664	5.039248	-5.05	0
ID#c.BB (1)	-0.0262792	0.0102273	-2.57	0.01
FI	-25.21672	5.932526	-4.25	0
ID#c.FI (1)	26.01142	5.935997	4.38	0
CI	-0.0014752	0.0004893	-3.02	0.003
GI	0.0005955	0.0001208	4.93	0
Constant	24.65649	4.910411	5.02	0

Number of obs	=	70
Number of groups	=	7
R-squared	=	0.8481
Wald chi.sq	=	962.24

Finally, the coefficients of our both key variables of interest, FI and ID are statistically significant at 95 percent confidence interval in all main regression models. All right hand side variables are statistically significant with expected signs of coefficients in PCSE with time dummies. The coefficient of FI, except in the interactive variable model (Table 8) is showing that federalization has positive impact on sub-national revenue collection. The coefficients of ID are consistently negative, large and all through statistically significant.

V. CONCLUSION

Any considerations beyond fiscal federalism, like creation of sub-national units within a federal state on the basis of ethnic identity etc., or, in other words without making the reduction of vertical and horizontal fiscal imbalances objective while federalizing a nation does not seem to deliver any desirable welfare outcomes. In our study identity as a binary variable has throughout been statistically significant, large but with negative coefficients; inversely impacting on well-being outcomes in these two models, per capita income and revenue collection, respectively. One key finding is that sub-national units may be created with due identity considerations, but if economic realities are ignored in shaping these units, the state restructuring did not address, principally the vertical fiscal imbalance, federalism would rather inversely affect the economic well-being of the entire nation. It is more so if vertical fiscal imbalance is pronounced. After controlling for only one non-identity State that has created a highly skewed distribution of both revenue and expenditure, the interaction between identity and federalism interaction is found to be positive, and the interaction between identity and budget balance is also healthy across identity States.

VI. RECOMMENDATION

This study shows that vertical fiscal imbalance is the serious concern in resource mobilization of the newly created States in federal Nepal. The federalization process apparently didn't address this problem of spatial economic inequality. Nepal should strive to reduce the fiscal imbalances, both vertical and horizontal to make federal polity to work and it be able to cause prosperity and well-being at the decentralized level. There is not only need to justifiably distribute the tax-points among the States but they also have to be created to generate sustainable level of own revenue at different layers of the government. It is desirable that constraints of fiscal imbalances are offset by other favorable policies to allocate resources to the States. The cooperative federalism expected by the Constitution of Nepal 2015 is only possible when horizontal fiscal imbalances are also simultaneously reduced.

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