



FISCAL POLICY AND EXPORT PERFORMANCE IN NEPAL: A GRAVITY MODELING APPROACH

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Abstract: *This study examines the role of fiscal policy measures in enhancing Nepal's export performance using a gravity model from 2009 to 2022. The fiscal policy index has been used as a key variable of the gravity model, among other gravitational factors, GDP, distance, population, inflation, logistics performance index, and export cash incentive. As per the result of the Poisson pseudo maximum likelihood (PPML) model, the fiscal policy index has a positive and significant influence on Nepal's export performance. However, the logistic performance index and a dummy export incentive do not support export performance. Moreover, the result shows that distance significantly and negatively affects the export volume. In contrast, both the population of the home country and partner countries and partner countries' GDP are also good determinants of exports as per the result. The result shows that the GDP of the domestic country is not a significant factor for export performance. The inflation rate of exporter countries is harmful to exports, but it is in trading partners have a positive association with exports.*

Keywords: fiscal policy, export performance, GDP, Government revenue, public expenditure, trade deficit, budget deficit

1. Background

The association between fiscal policy and export performance is an issue to be examined in the context of Nepal, as the economy has been facing a huge trade deficit despite the government's efforts to enhance export performance. Fiscal policy, fundamental government economic policy, is said to positively intervene in the national economy through three key instruments: government revenue, public expenditure, and deficit financing.

The government's budget statement every year and existing tax laws display that the government is levying diverse types of taxes, primarily income tax, value-added tax, excise duty, and customs duty, and allotting those revenues to finance the development and regular activities. The ratio of government tax to GDP was around 21.6 percent in the fiscal year 2021/22, which was just 8.8 percent in 2000/01. Similarly, the ratio of average expenditure to GDP in 2000/01 was around 18.0 percent, whereas in 2021/22 it was almost 26.5 percent. In addition, the budget deficit was around 6.2 percent in 2021/22, whereas it was 5.5 percent in 2000/01 (Ministry of Finance, 2023).

Ironically, the country remains a low-income country having retard and volatile economic growth and encountering a series of acute trade deficits as structural problems of the country. The gap between imports and exports has significantly widened, especially after the quota system was abolished in 2005. Nepal's readymade garments industry experienced rapid growth starting in the 1980s, mainly due to the quota facilities provided by industrialized countries. In the mid-1990s, it had a 29 percent share of the country's total exports and

employed more than 50,000 workers. As per the World Trade Organization's rule to phase out all the textile and clothing quotas by the end of 2004, Nepal's garment industries faced huge challenges, which led to a remarkable reduction in exports and closed many industries.

Nepal's trade volume in 2020 is almost 30 times bigger than the trade volume in 1993, whereas the import volume in the same period was 39 times bigger. In contrast, the export volume is just eight times higher than in 1993. Furthermore, the export and import ratio was 44 percent in 1993, which was 9.16 percent in 2020, and the trade deficit/ GDP ratio was 12.8 percent in 1993, whereas this ratio was 35.5 percent in 2021 (Ministry of Finance, 2023). The entire story's key message is that Nepal's export performance is not impressive yet and the policymakers' expectations have not been met despite the country's various efforts in policy and financial sectors.

Therefore, at the outset, this article aims to assess the determinants of export performance in Nepal through a gravity model, including demand and supply factors of exports, together with fiscal policy measures. For this purpose, we employ a gravity modeling approach covering the period of 12 years from 2009 to 2022. The fiscal policy variables are combined with the composite fiscal policy index by using the principal component method. The main finding from the analysis is that the fiscal policy index effectively raises exports. In contrast, the logistic performance index is insignificant, and cash incentives to exporters have inversely affected export volume.

The paper is structured as follows. After introducing the article in the first section, we present a brief literature review in Section 2. Then, we discuss trends and patterns of fiscal sectors and trade in Section 3, research methodology in Section 4, results and discussion in Section 5, and the final section concludes.

2. Brief literature Review

2.1 Theoretical Aspect

The core functions of the fiscal policy are to provide public goods, distribute income and wealth, maintain high employment and stability, accelerate economic growth, and affect trade balance (Musgrave & Musgrave, 1989).

The theoretical link between fiscal policy and trade balance could be postulated through simple macroeconomic identity. The summation of consumption, investment, and government expenditure measures the country's aggregate expenditure. If domestic expenditure is more than domestic production, there would be an external imbalance or trade deficit (Aslan et al., 2014). This identity says that the trade balance is equal to the net private savings and net government savings. Therefore, the government deficit is directly related to the trade deficit.

Keynesian absorption approach mentions that an increase in the budget deficit increases domestic absorption and import (Baldacci et al., 2004). Similarly, the Ricardian Equivalence Hypothesis argues that the fiscal deficit or taxes do not affect external sector performance. If the government increases expenditure, consumers save and pay expected future taxes (Bernheim, 1988). The twin deficit hypothesis states that a rise in the government budget deficit increases the interest rate, which fosters inward capital movement, which eventually appreciates the exchange rate and escalates the current account (Banday & Aneja, 2019).

Ali Abbas et al. (2011) discussed the relationship between fiscal policy and current account through Intertemporal trade and Intertemporal response. Mundell-Fleming also mentions the Intertemporal trade channel in which the government fiscal policy increases the price of domestic goods, appreciates the real exchange rate, and worsens the trade balance. The authors here explained the Mundell- Fleming model under a flexible exchange rate regime in a small open economy in which the expansionary fiscal policy crowds out the net export as a rise in demand for home goods and money and an appreciation of the domestic currency. However, suppose the capital account is relatively closed, in that case, the rise in interest rate results in crowding out investment and raising private savings, and the impact on currency and trade will be softened. On the other hand, under the fixed exchange rate regime, the central bank policy to respond to the interest rate-seeking capital inflows would reinforce the output multiplier and mitigate the crowding-out effect on net exports.

2.2 Empirical Aspect

Rahman (2010) studied the determinants of exports in Bangladesh using the panel data from 1972 to 1999 and the generalized gravity model. As per the result of this study, the exchange rate, the partner countries' demand, and the openness of the Bangladesh economy are the key determinants of Bangladesh's exports positively. The study found that a 1 percent currency devaluation leads to a 0.34 percent increase in exports to trading partners, other things being equal. Moreover, the proper quality of goods and services must be ensured, and commodity diversification must be done to fulfill the foreign demand for Bangladesh's exports.

Mengistu (2014) studied Ethiopia's export performance with its major trading partners using gravity models from 1995- 2010. The study found that the coefficient of per Capita GDPs of importer and exporter countries and the population size of trading partners positively associated with export performance. In contrast, the distance between nations has a negative and significant consequence. Similarly, the positive association of exporter's per capita GDP suggests that countries with higher per capita income tend to have higher trade volumes, which is why richer countries trade more. In conclusion, the study suggested that the enlargement of the foreign per capita GDP and more populous trading partners are key factors to enhance Ethiopia's exports.

Prasai (2014) used the gravity model approach to examine Nepal's foreign trade pattern. The author also divided the data set into post-liberalization and pre-liberalization periods and estimated two equations: export and import. The study showed a positive association of GDP with bilateral trade with Nepal, which is a proxy for the economic size. However, the negative sign of per Capita GDP showed that Nepal exports labor-intensive goods and imports. As per the study, the distance coefficient strongly determines Nepal's imports. Finally, the author suggested that Nepal should emphasize trade diversification in general and trade agreements with China to benefit from the trade.

Sahu and Heng (2017) investigated the gravity variables of India's exports with its 50 trading partners by using an augmented gravity model in panel data from 2000- 2014. The result estimated that India's economic size (GDP) is positively and significantly associated with its exports. As a result, an increase of 1 percent of India's GDP will increase its exports by an average index of 0.71. However, the result showed that the importer country's GDP is not significant in determining India's exports to that country. As a result, the proxy of the importer country's market size (Population) is a positive and significant factor in increasing India's exports, whereas India's population has no effect.

Paudel (2019) conducted an empirical study about the export performance of Nepal using a gravity model using SITC, with 5 digits of data from 2005 to 2018. As per the result of this paper, a one percent increase in the value weight of products can increase Nepal's exports to partners by more than 0.2 percent. However, the result showed that the liberalization policy has no significant impact on exports. The paper concluded that the government should focus on manufacturing-based infrastructure to improve the logistic performance index and trade competitiveness. As the country has geographical constraints, the government must solve the connectivity issue to make the manufacturing hub and global connectivity.

Osabuohien et al. (2019) estimated the bilateral trade performance in West Africa using a gravity model. Apart from the traditional gravity factors, the author included the trade complementarity index, economic integration agreement, and landlockedness as dummy variables. The author found that the incomes of both exporters and importers significantly determine the extent of bilateral trade among the member countries. Similarly, the distance between the countries hinders bilateral trade. The author of this study proved that geographical barriers are a significant variable that adversely affects bilateral trade due to the high cost of transporting products.

Tota and Yuni (2023) studied the effect of taxation, part of the fiscal policy, on bilateral trade in the Southern African Development Community region by using the gravity model in the data from 2012 to 2018. As per the result, import tax for exporting countries significantly increases bilateral trade, while export tax for exporting countries increases bilateral trade and significantly reduces bilateral trade for importing countries. Likewise, international trade tax for exporting countries significantly reduces bilateral trade. The study suggested that taxation negatively impacts bilateral trade in the region and, therefore, more effective and rational approaches should be

formulated to increase revenue and not hinder trade, development, and growth in the region. The paper also concluded that countries should lower export tax rates for their products to boost growth through lower prices.

As per the review of the different theoretical and empirical works of literature, the consequences of fiscal policy on export enhancement have supported different theories developed in this area. However, there is a lack of studies in the Nepalese case using the gravity modeling approach in which a composite fiscal policy index has been included. Therefore, the study fills this gap, which is essential to exploring possible solutions for effective fiscal policy mobilization for external sector balance in Nepal in the future.

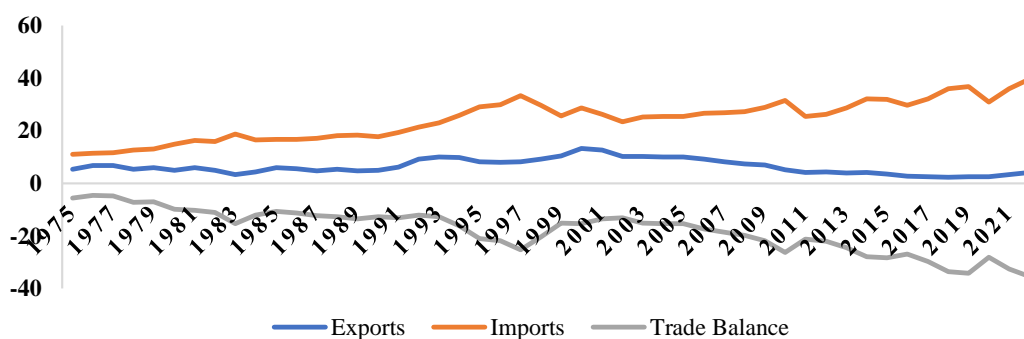
3. Trends and Patterns of Fiscal Sectors and Exports

Figure 1 depicts the ratio of goods export, import, and trade balance, all measured as the ratio with GDP in Nepal from 1975 to 2021. The figure visibly indicates the serious structural problem of trade deficit that Nepal has been encountering for a long time. The figure shows that the trade imbalance worsened from the 1990s when the country adopted a trade liberalization policy. Nepal joined the World Trade Organization (WTO) as an observer in 1995 and became a member of WTO as the first least developed country in 2004 (Sapkota & Cockburn, 2008). Nepal is also part of the regional trade mechanism as it joined the South Asia Free Trade Area in 2006 and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Co-operation (BIMSTEC) in 2006 (Bhattacharjee, 2018). Moreover, it has 17 bilateral trade agreements, including India (Trade and Export Promotion Centre), to promote trade liberalization, enhance cooperation in international trade, and expand the export market. Nevertheless, Nepal has failed to benefit from those agreements as the country is facing an acute trade deficit.

The gap between imports and exports has significantly widened, especially after the quota system was abolished in 2005. Nepal's trade volume in 2020 is almost 30 times bigger than that of 1993, whereas the import volume in the same period was 39 times bigger. In contrast, the export volume is just eight times higher than in 1993. Furthermore, the export and import ratio was 44 percent in 1993, which was 9.16 percent in 2020, and the trade deficit/ GDP ratio was 12.8 percent in 1993, whereas this ratio was 35.5 percent in 2021 (Ministry of Finance, 2023).

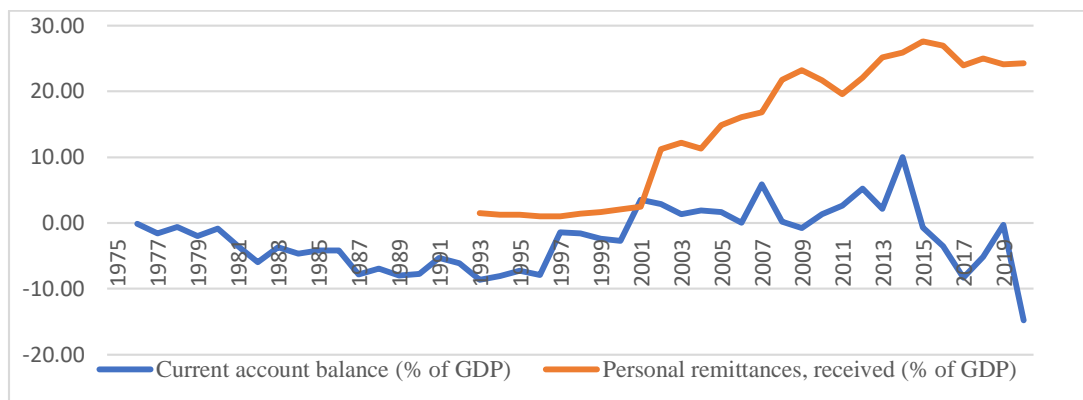
Figure 1

Export-Import Gap (% of GDP)



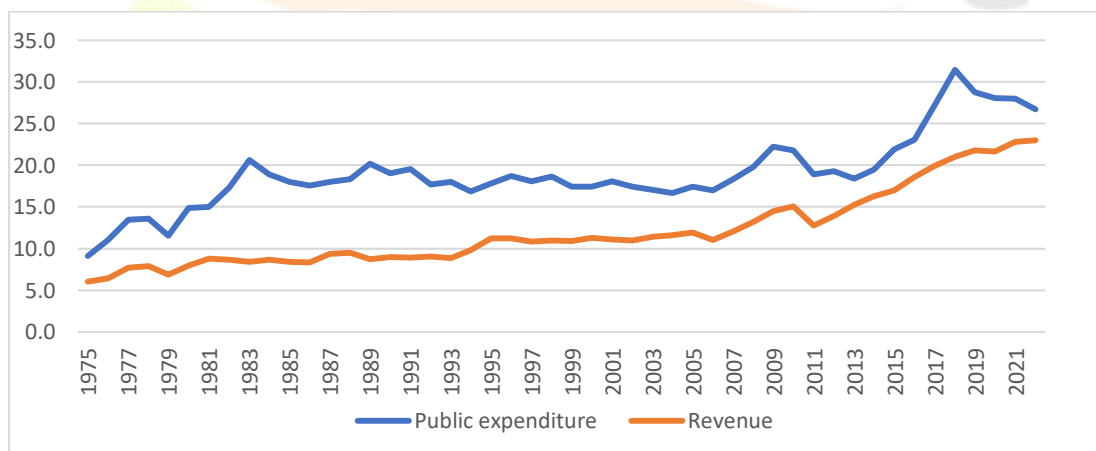
Source: The researcher's calculation based on the Economic Survey, Ministry of Finance, Nepal

Figure 2 shows the ratio of remittance and current account balance with GDP in Nepal. It is seen that remittance dramatically contributes to maintaining the current account balance, particularly after 2000 onwards. Nepal is one of the top countries in the world, having a considerable ratio of remittance inflow to GDP and the most significant ratio in South Asia. The cross-border migration into India has been longstanding because of the more than 1000 km long open border and cultural proximity with India. However, foreign employment in other countries, mainly the Middle East and Malaysia, started in the late 1990s. Remittance is a crucial part of development in Nepal, as the remittance and GDP ratio is about one-fourth.

Figure 2**Remittance and Current Account Balance Ratio**

Source: The researcher's calculation based on the Economic Survey, Ministry of Finance, Nepal.

Figure 3 demonstrates the ratio of public expenditure and revenue with GDP in Nepal from 1975 to 2021. The figure shows that revenue and expenditure are growing consistently with fewer fluctuations. Growing revenue collection underpins the need for more expenditure in Nepal. Fundamentally, after liberalizing the economic policy, growing imports contribute to collecting more revenue in the customs points. The figure also illustrates the gap between public expenditure and revenue compensated by deficit financing.

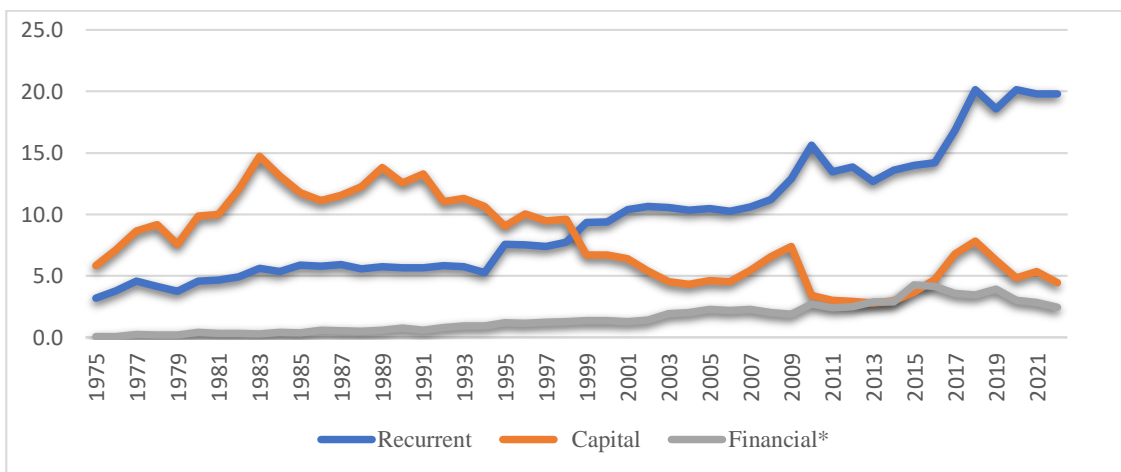
Figure 3**Public Expenditure and Revenue /GDP Ratio**

Source: The researcher's calculation based on the Economic Survey, Ministry of Finance, Nepal

Figure 4 shows the ratio of total capital and recurrent expenditure in which recurrent expenditure exceeded the capital-related expenditure since 1999. The recurrent expenditure comprises salary for government officials, pension, and social security expenses, as well as program expenditure, and capital expenditure comprises roads, building irrigation, etc., which refers to public investment in physical capital formation. The government has a significant role in public goods like physical infrastructure and semipublic goods like education and health because the private sector generally does not have an incentive in these sectors due to the long gestation period and the need for massive investments. These public goods are prerequisites for private production (Shrestha, 2009). The committed expenditure on pension and social security, office management, and interest payment is growing in the recurrent expenditure, a critical aspect of public expenditure management.

Figure 4

Public Expenditure (%of GDP)

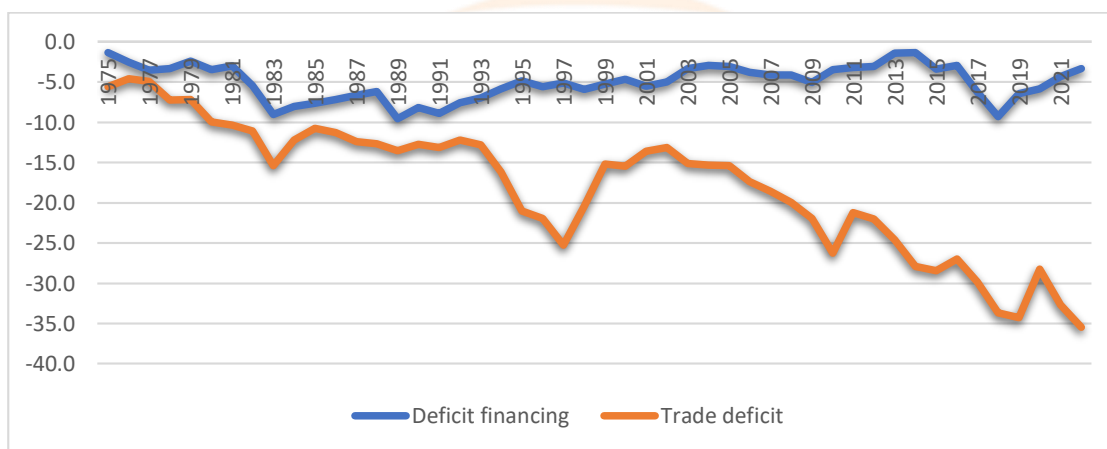


Source: The researcher’s calculation based on the Economic Survey, Ministry of Finance, Nepal

Figure 5 compares the trade deficit and fiscal deficit ratio with GDP, in which the trade deficit and GDP ratio deteriorated over time and reached more than 35 percent in 2021. On the other hand, the government is consistently using the fiscal deficit to upset the revenue and expenditure gap. The figure indicates that deficit financing does not support export promotion and import substitution in Nepal. The figure also signifies that fiscal deficit is not a key factor in this mounting trade deficit as fiscal deficit is less than 5 percent most of the study period, with some exceptions. One of the reasons for this situation is Nepal’s fixed exchange rate system with India because the exchange rate is a key factor that affects the relationship between fiscal deficit and trade deficit as per Mundell Fleming’s framework (Kafle et al.).

Figure 5

Trade Deficit and Fiscal Deficit/GDP Ratio in Nepal



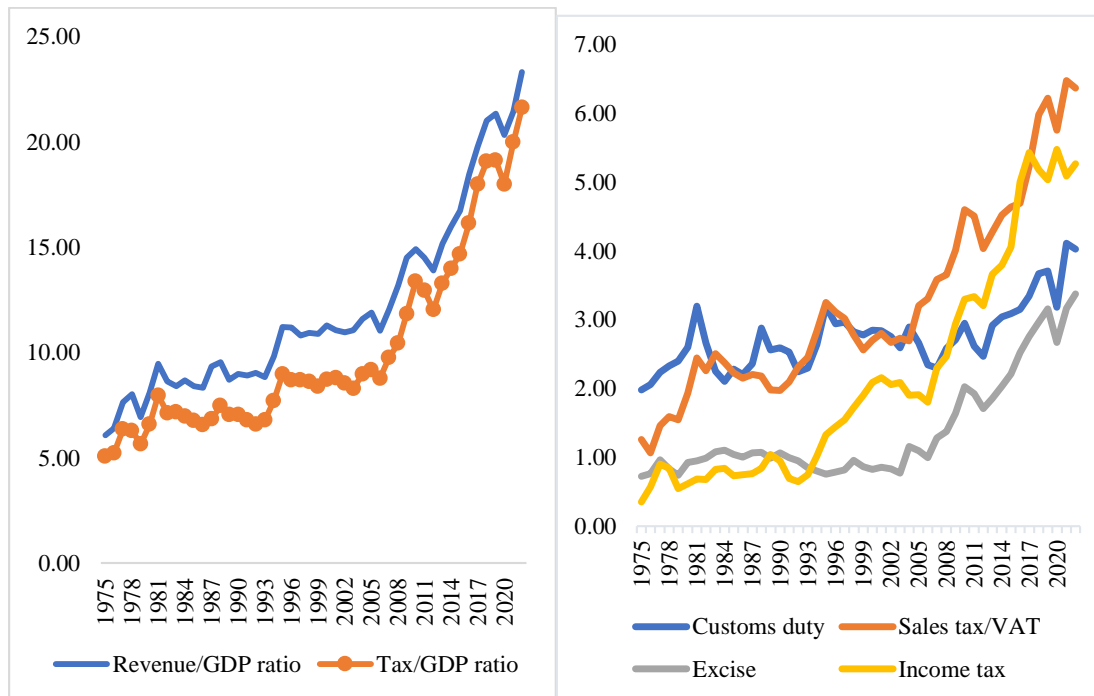
Source: The researcher’s calculation based on the Economic Survey, Ministry of Finance, Nepal

Figure 6 shows the trend and pattern of revenue and key taxes from 1975 to 2019, in which total revenue tax revenue and GDP ratio are growing consistently. Both revenue and tax-to-GDP ratios were more than 20 percent in 2019, whereas those were 5 to 7 percent in the mid-1970s. Out of total revenue, only 10 percent of the share is covered by non-tax revenue, mostly from dividends, interest, royalties, and other fees. Furthermore, the graph on the left-hand side shows a poor relation between tax and GDP growth rate. The graph on the right-hand side demonstrates that customs duty levied mostly on imports still has a significant share in the total tax revenue, which was

around 4 percent of GDP in 2019. The income tax and GDP ratio has grown more strongly than other taxes. However, other taxes, excise duty, and Value Added Tax (VAT) have also increased their share in GDP.

Figure 6

Revenue and Taxes (% of GDP) in Nepal



Source: Researcher's calculation, based on Economic Survey, Ministry of Finance, Nepal

Table 1 shows Nepal's exports to the top 15 countries that cover more than 96 percent of total trade. Out of them, India covered more than 77.47 percent of exports in 2021, which was around 51.54 percent in 2015. The second largest export market is the USA, with 7.70 percent in 2021, though the distance between Nepal and the USA is too far. The table shows that Nepal's export to the South Asia region in terms of country diversification is too poor as India and Bangladesh are only two countries within the top 15 countries. Similarly, despite China being a neighbor country of Nepal, which has a large market, Nepal does not have a strong export market to date and the share in the total export volume is going down. Furthermore, Turkey and Australia have increased their share in the total exports, whereas the share of exports to Canada, Germany, France, United Kingdom, Italy, and Japan has been reduced in 2021 as compared to 2009.

Table 1**Total Export of Nepal to Top 15 Partner Countries (000, \$)**

Country	2021		2015		2009	
	Export (\$000)	Share (%)	Export (\$000)	Share (%)	Export (\$000)	Share (%)
Australia	9399	0.55	4975	0.61	876	0.10
Bangladesh	5939	0.34	6834	0.84	60840	7.27
Canada	8009	0.47	6950	0.85	10273	1.23
Switzerland	3728	0.22	3053	0.38	3254	0.39
China	8408	0.49	11476	1.41	23868	2.85
Germany	29858	1.73	26756	3.29	35972	4.30
Denmark	5214	0.30	2088	0.26	2780	0.33
France	12547	0.73	10058	1.24	14957	1.79
United Kingdom	23542	1.37	20658	2.54	18466	2.21
India	1333726	77.47	419094	51.54	562810	67.24
Italy	8019	0.47	9042	1.11	10999	1.31
Japan	7781	0.45	8375	1.03	7396	0.88
NLD	5627	0.33	3564	0.44	3220	0.38
Turkey	21678	1.26	12642	1.55	6102	0.73
United States	132610	7.70	70399	8.66	63085	7.54
Total Export	1721684		813180		837065	

Source: World Development Indicators, World Bank.

4. Research Methodology

The association between fiscal policy and export performance is figured out in this article through the gravity model. This model a widely used econometric technique to assess determinants of trade flows, has been constructed. It originated based on Newton's law in physics, which says that the gravitational attraction between two objects is equal to the product of their masses and divided by the distance between them (Mengistu, 2014).

Tinbergen (1962) developed an initial specification for this gravity model, which originated from the Newtonian physics notion. The notion states that two bodies attract each other proportionally to the product of each body's mass divided by the square of the distance between their respective centers of gravity (Rahman, 2010).

The gravity model is a widely used econometric technique for assessing the determinants of trade flows. Its strength over other traditional trade theories is that it captures the elements of both demand and supply-side explanations of trade. In other words, the gravity model states that the respective country's size and distance determine international trade between countries. In the gravity model, GDP is a gravitational force, and the distance is the proxy of transportation cost, which is an important factor of trade (Rahman, 2010). The panel captures the relationship between the appropriate variables over the period and also finds the role of the overall business cycle phenomenon.

Oguledo and MacPhee (1994) stated that the gravity model is based on the Walrasian general equilibrium model as it captures all goods' demand and supply functions for international trade. The aggregate income determines the level of demand in the importing countries and the supply level in the exporting countries. The gravity model explains why the level of trade between countries tends to increase or decrease over time. According to the gravity model, the larger country's GDP offers a wide variety of goods.

In this study, the gravity factors, the size of the economy (GDP) and per capita GDP (a proxy indicator for the level of development) of Nepal and its top 15th trading partners in terms of high export value of all the commodities based on the export amount in 2022 have been taken here. Those fifteen countries are India, United States, Germany, Turkey, United Kingdom, France, Australia, Japan, Canada, Italy, Netherlands, Denmark, China, Bangladesh, and Switzerland, which cover more than 96 percent of exports in 2021.

The key variable here is the fiscal policy index which is calculated by other researchers in case of Nepal through principal component analysis of key fiscal policy variables: expenditure, taxes, foreign grants, and deficit financing. The cash incentive scheme for export is a dummy variable, and the logistic performance index calculated by the World Bank has also been used as a fiscal policy variable. The government directly pays the cash subsidy, and the government mostly finances trade logistics. The logistic performance index, population, and inflation of Nepal and trading partner countries have also been used to determine export determinants using the gravity model.

The gravity model's application to international trade flows states that trade flows between two countries are determined negatively by their distance but positively by their income.

$$X_{ij} = \alpha Y_i^\beta Y_j^\gamma D_{ij}^\delta \dots\dots\dots(1)$$

Where,

X_{ij} = Flow of exports from the country (i) into the country (j)

Y_i and Y_j are country (i)'s and country (j)'s GDP

D_{ij} is the geographical distance between the country's capital or major cities

Therefore, the gravity model constructed for the export of Nepal is as follows;

$$\ln(X_{i,j,t}) = \alpha + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(FPI)_{i,t} + \beta_4 \ln(DIS_{i,j,t}) + \beta_5 \ln(INF_{i,j,t}) + \beta_6 \ln(POP_{i,j,t}) + \beta_7 LPI_{it} + \beta_8 D_{it} + \varepsilon_{i,j,t} \dots\dots\dots(2)$$

Where (i) and (j) refer to the exporter and the partner country's bilateral trade and t refers to the time. X= Export, GDP= gross domestic product, FPI= Fiscal policy index, INF= inflation rate, POP= population, LPI= logistic performance index, D= The dummy variable of export incentives is 0 for India and 1 for other countries from 2012 to 2021., DIS= Distance between business cities of partner.

$\varepsilon_{i,j,t}$ = Error term

The error component structure is presented in equation (3)

$$\varepsilon_{i,j,t} = \mu_{i,j,t} + \theta_t + \varphi_{i,j,t} \dots\dots\dots (3)$$

Where,

$\mu_{i,j,t}$ = Fixed effect that might be correlated with explanatory variables

θ_t captures the time-specific effects common to all cross-section units

$\varphi_{i,j,t}$ = an error term uncorrelated across section units and overtime periods

The expected sign of the coefficient of the fiscal policy index is positive as the fiscal policy variables directly or indirectly foster exports. Through its expenditure on infrastructure and other logistics, the government aims to encourage more exports and different taxes are also

designed to incentivize exports. The logistic performance index, which is more related to trade infrastructure and cash incentives to the exporters, is also a key fiscal policy instrument, and therefore, the expected signs of those variables are positive.

Likewise, the expected sign of the coefficient of GDP is positive as it signifies the productive potential of the exporter country and makes the foundation for more exports. Similarly, the expected sign of the trading partner countries is also positive as it is related to the purchasing power of the destination country. The expected signs of the population of the exporter country are negative as they create the domestic absorption effect, and the expected signs of the population of import countries are positive as they specify the larger market for the exporter country. In addition, the expected sign of distance is negative as it is associated with trading costs. The expected sign of inflation in an exporter country is negative as it is related to price stability. In trading partner countries, it is positive as it encourages importing relatively lower-priced products.

The model is estimated using the panel set of bilateral export trade from 2009 to 2021. The dummy variable has been constructed manually based on information about the export incentive policy implemented in Nepal. Equation (2) is a benchmark model for robustness check, and an alternative specification has also been tested by removing some variables.

(a) Poisson Pseudo Maximum Likelihood (PPML) model

There are various methods to estimate the gravity equation, including pooled ordinary least squares (POLS) estimation, fixed effect (FE) estimation, or random effects (RE) estimation. The Poisson pseudo maximum likelihood (PPML) model is the best fit for the export data gap and the fluctuation of trade volume substantially (Paudel, 2019). This model is superior to other regression models because it avoids the problems of autocorrelation, multicollinearity, and heteroskedasticity. Moreover, it is used to check the robustness of regression coefficients and to obtain unbiased estimation (Paudel & Cooray, 2018).

(b) Robustness check

An alternative estimation method was performed to check the consistency of the result. Pooled OLS, random, and fixed effects have been tested for this. The Pooled OLS method is used as a basic gravity model (Prasai, 2014), and random effect and fixed effect have been used in the estimation as the fixed effect is preferred in econometrics due to the country-specific fixed effects in the variables. There are time-invariant and variant gravity variables in the model. The key time variants are the fiscal policy index, export cash incentives, and logistic performance variables. We first estimated the fixed effect and compared it with the result of the random effect. In the fixed effect, the distance variable is dropped as it is a time-invariant variable (Paudel & Rajkarnikar, 2020).

(c) Result and discussion

The table 2 shows the summary statistics of the variables used in this study. As per the table, the mean distance of major business cities from Nepal to the major business cities of the top 15 export partner countries is 6477.99 km, whereas the nearest distance among them is Bangladesh, with 675 km. Similarly, the men's export in USD is 56475.74 thousand whereas the maximum export in USD is 1333726 thousand, which is exported to India as explained before. The maximum GDP value of the destination country is 23000 billion USD, and the minimum GDP value is 102 billion USD. Likewise, the mean value of GDP per capita of the export partner country is 38519 USD, whereas the mean value of GDP per capita of Nepal is 857 USD. Similarly, the mean value of the inflation rate of the destination country is 2.70 percent, and the mean value of the inflation rate of Nepal is 7.35 percent. The population mean value of destination is 247.98 million, and Nepal is 28.07 million.

Table 2
Summary Statistics of Variables

Description	Observation	Mean	Max	Min	Std. Dev.	Jarque-Bera
Distance (km)	195	6477.99	12136	675	3190.41	0.493
Export from Nepal (\$000)	195	56475.74	1333726	876	158825.6	5784.48
Export incentive dummy	195	0.718	1	0	0.451	39.653
Fiscal policy index	195	1.961	2.618	1.214	0.373	1.480
GDP of destination countries (\$000)	195	3.58E+09	2.30E+10	1.02E+08	4.84E+09	359.233
GDP of Nepal (\$000)	195	24207692	36300000	12900000	7569213	18.854
GDP per capita of destination countries (\$000)	195	38.5195	93.457	0.685	23.2824	3.913
GDP per capita of Nepal (\$000)	195	0.857	1.223	0.486	0.250	20.899
Inflation rate of destination (%)	195	2.708	19.596	-1.353	3.265	413.084
Inflation rate in Nepal (%)	195	7.356	11.095	3.627	2.416	18.295
Logistic performance index	195	2.847	3.1	2.21	0.304	47.485
Population of destination (000)	195	247984.5	1412360	5523.095	435135.8	182.96
Population of Nepal (000)	195	28071.56	29674.92	26544.94	902.0873	7.549

Source: Researcher's calculation

The result of the gravity model is presented in table 3. There are four alternative specifications of the model that have been tested for robust results. The first specification is a basic gravity model in which distance, economic size (GDP), and population size of domestic and partner countries are basic explanatory variables, and export is the dependent variable for the gravity model. As the study seeks the consequences of fiscal policy, the fiscal policy index has been used as an explanatory variable. The second equation adds the logistic performance index and export incentives dummy as fiscal policy variables. In the third model, inflation rates of domestic and partner countries are added to see the effect of economic stability. In the fourth equation, the per capita GDP of domestic and partner countries is used instead of GDP, as GDP per capita indicates economic development status.

Table 3
Result of PPML Gravity Model

Dependent variable: exports	(PPML)	(PPML)	(PPML)	(PPML)
Distance (log)	-2.120*** (0.084)	-1.058*** (0.073)	-1.648*** (0.236)	-1.648*** (0.236)
GDP (log)	1.032*** (0.081)	0.014*** (0.030)	-0.400 (0.067)	
Partner's GDP (log)	1.181*** (0.068)	0.589*** (0.058)	1.457*** (0.204)	
GDP per Capita (log)				-0.395 (0.010)
Partner's GDP per Capita (log)				1.458*** (0.204)

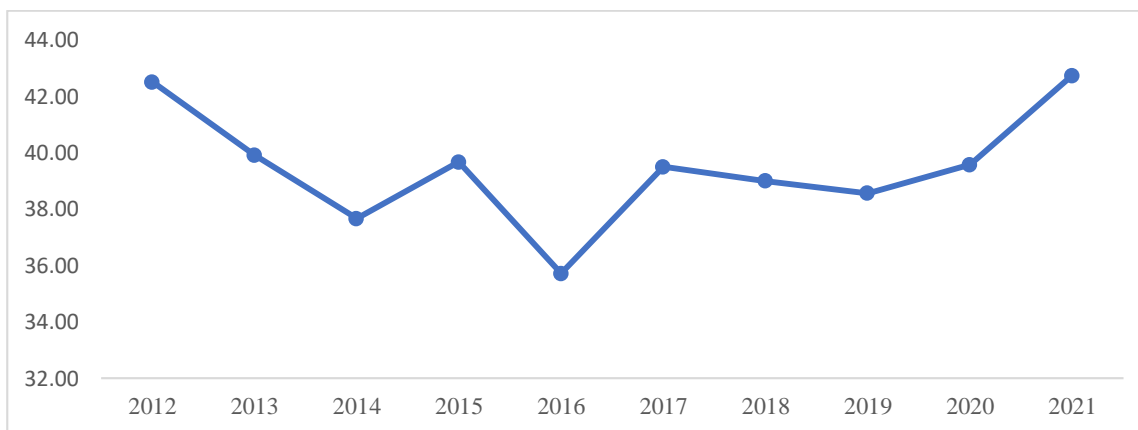
Fiscal policy index	0.630*** (0.042)	0.234*** (0.084)	0.893** (0.061)	0.892** (0.361)
Logistic performance index		-0.19*** (0.01)	-0.039 (0.096)	-0.037 (0.097)
Export incentive dummy		-1.402*** (0.043)	-1.440*** (0.047)	-1.439*** (0.047)
Population (log)	1.938*** (0.224)	6.136*** (0.090)	13.10*** (3.040)	12.679*** (2.835)
Partner's population (log)	0.236*** (0.064)	0.118*** (0.068)	0.064*** (0.069)	0.899*** (0.064)
Inflation rate (%)			-0.149** (0.069)	-0.148** (0.069)
Partner's inflation rate (%)			0.186*** (0.019)	0.186*** (0.019)
<i>Number of observations</i>	195	195	195	195
<i>Pseud R-squared</i>	0.79	0.86	0.91	0.91

Source: Researcher's calculation, using the data from the cited source

Note: ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The figures in parentheses are robust standard errors. GDP and PPML refer to gross domestic product and the Poisson pseudo maximum likelihood model.

As per the PPML result, the fiscal policy index has a positive and significant influence on Nepal's export performance in all four specifications, which is consistent with our expectations. As per the result, an index point increase in the fiscal policy index raises the export amount by around 0.63, 0.23, 0.89, and 0.89 percent, respectively, in the first, second, third, and fourth specifications of the model, holding the other variables constant in the model. Theoretically, the government invests in the trade infrastructure that contributes to helping to reduce the export cost. The quality infrastructure in transportation has tangible and intangible benefits, such as reducing time and cost of operation and increasing labor productivity, which turns into export competitiveness. The result shows that this theoretical assumption has been reflected in Nepal's export performance.

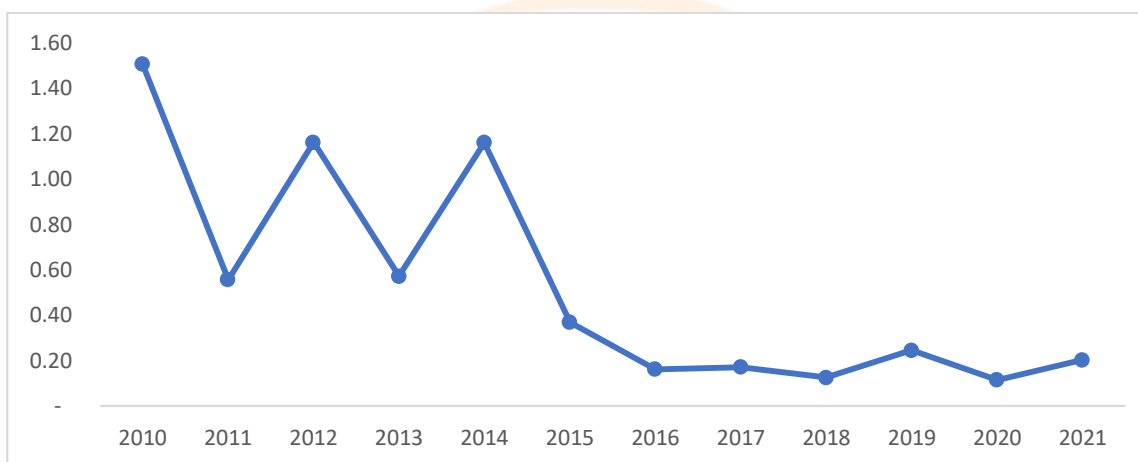
Figure 7 shows that the government of Nepal has been spending an average of 40 percent of its capital expenditures on transportation, including highways and trade corridors. Similarly, the government allocates its budget yearly to other trade infrastructure and programs.

Figure 7**Expenditure on Transportation and Capital Expenditure Ratio**

Source: Researcher's calculation based on the data of Economic survey (d.e)

Government policies toward the country's industrialization also underpin the foundation of export commodities. Similarly, government tax incentives, mainly through reduced tax rates or tax exemptions and holidays, also underpin the volume of exports in the domestic country.

Similarly, the government levied a very low export duty rate in Nepal. Most export items are exempted, and a limited number of commodities are subject to taxable export items. Figure 8 also shows the low effective export duty rate, which has been lower than 0.2 percent in recent years. The government also provides a reduced income tax rate on exports as a tax incentive and a zero VAT rate on exports.

Figure 8**Effective Export Duty Rate (%)**

Source: Researcher's calculation based on the data of Economic survey (d.e)

The government also executes the deficit financing policy through external debt, particularly in trade-related infrastructure such as the construction of highways, dry ports, and other trade logistics. Therefore, the result supports the positive effect of the fiscal policy index on export performance.

However, the coefficients of the other two fiscal policy instruments, the logistic performance index and a dummy export incentive used in the second, third, and fourth specifications, are ineffective in supporting export performance. Fiscal policy is crucial in constructing

appropriate trade logistics, such as trade or economic corridors and ports. However, the logistic performance index results show that Nepal has not made smooth export logistics. As per the PPML result, the logistic performance index is statistically insignificant to export performance.

Cash incentives to exporters are a key fiscal policy tool used in Nepal, in which exporters get a certain percentage of export volume as cash incentives. However, the gravity model shows that export incentives also do not influence the increase in exports, which is correspondingly not consistent with our expectations. The key reason for this result is that India is becoming a strong export partner where export in India is not entitled to get cash incentives. This result is also consistent with other research articles. Defever et al. (2020) proved that cash incentive in Nepal has a limited impact on total exports, eligible exporters in the incentive package are quite low, and the firms received the subsidy are predominantly large exporters that were already engaged in export activities but not supportive of encourage diversification of the products. Similarly, Paudel and Rajkarnikar (2020) empirically proved the negative association of cash incentive schemes with export performance due to poor implementation and narrow coverage of the exporters.

The PPML gravity model result shows that distance significantly and negatively affects the export volume in Nepal in all four specifications, which is in line with the theoretical model and the empirical results of several studies. As per the result, an increase in distance by 1 unit decreases the export by 2.21, 1.05, 1.64, and 1.64 units in the model's first, second, third, and fourth specifications, holding other variables constant. The distance is directly related to the trade cost, a fundamental determinant of export volume. The result suggests that Nepal should emphasize export trade to the neighboring countries to reduce the trade costs generated by distance. Sohn (2005) proved that distance was the most important variable in determining Korea's trade flows with its trading partners. Likewise, Limao and Venables (2001) also found that poor infrastructure and other unfavorable geographic topographies are key impediments to trade flows due to high transportation costs. Orindi (2010) found that distance has an inverse relationship with exports as it is a proxy for transportation costs. The distance coefficient in this result is also consistent with the results of Aliyu and Bawa (2015) and (Mengistu, 2014).

Similarly, the partner countries' GDP is also a good determinant of exports as per the result. This result also aligns with the theory that the income of the partner's country is a strong determinant of export as it is related to the purchasing power of the destination country. Nguyen (2010) empirically concluded that the positive growth of Vietnam's exports was due to the income growth of its trading partners. Similarly, Orindi (2010) empirically justified that the positive coefficient for the importer's GDP indicates that the country's demand for imports increases with the growing income level of the importing country. However, the GDP of the domestic country is also a determinant of exports as it indicates the productive potential (Braha et al., 2017). Mawusi (2020) found that the positive impact of a partner country's GDP on imports highlights the trade influence of large economies. The result shows that the GDP of the domestic country is not a significant factor for export performance.

Theoretically, the effect of the exporter country's population could be positive or negative, which mostly relies on the absorption effect or economies of scale effect. Moreover, a larger absorption effect due to a large domestic population and market may lead to less exports. On the other hand, a large domestic market may imply utilization of the economies of scale so that the expected sign of the population coefficient would be positive (Mengistu, 2014). The domestic country's population shows the labor force's availability to produce exportable products. The population size of the partner countries is a positive determinant of export performance, which specifies the larger market for exporter countries. The population size is also an indicator of market size as it creates the demand for goods in the destination country.

Orindi (2010) proved that a 1 percent increase in the importer's population measures Kenya's exports by 1.94%. Braha et al. (2017) stated that the sign of the coefficient of the population of the exporter might be positive or negative depending on the absorption capacity. The positive coefficient of the exporter's population indicates low absorption of exportable goods in the domestic market. As per the result mentioned in the gravity model, both the population of the home country and partner countries have a positive and significant influence

on the export performance in Nepal. Mawusi (2020) empirically proved that economies of scale can benefit largely populated countries, making their outputs globally competitive and attractive for import.

In addition, the inflation rate represents the stability factor in the domestic and destination country. Moreover, high inflation in the home country discourages production, which will be high and detrimental to the export. On the other hand, inflation in the partner country will positively contribute to creating demand for goods and services from abroad. Therefore, the inflation of the partner countries contributes positively to determining the export volume. The estimated result presented in the table aligns with the theories about the influence of inflation. As a result, a one percent increase in the domestic country's inflation rate results in a 0.15 percent decrease in export volume. Similarly, a One percent increase in the inflation rate in the partner countries results in a 0.19 percent increase in export volume.

As per the estimation, GDP per Capita has a similar result to GDP as domestic Per capita GDP does not significantly impact exports, whereas GDP per Capita of the partner countries positively contributes to determining the export volume. Mengistu (2014) concluded that a positive sign of Per capita GDP implies the consumer's income level or purchasing power of the consumers. The higher Per capita GDP underpins the demand for more goods, increasing exports to those countries. However, an increase in the Per capita GDP of the domestic country increases the domestic consumption of the product, thereby reducing the quantity to be exported to the partner countries (Mengistu, 2014). Therefore, the coefficient of the Per capita GDP of Nepal is in line with this statement that Per capita GDP has an inverse relationship with exports. It is also said that increasing Per capita GDP designates the increasing standard of living that results in growing production, supply to import countries, and net export (Tota & Yuni, 2023). However, this has not happened in the Nepalese case.

5. Robustness Checks

An alternative estimation method was performed to check the consistency of the result. For this, Pooled OLS, fixed effect, and random effect have been tested, and the result is presented in 4. The Pooled OLS method is used as a basic gravity model (Prasai, 2014), and random effect and fixed effect have been used in the estimation as the fixed effect is preferred in econometrics due to the country-specific fixed effects in the variables. There are time-invariant and variant gravity variables in the model. The key time variants are the fiscal policy index, export cash incentives, and logistic performance variables. We first estimated the fixed effect and compared it with the result of the random effect. In the fixed effect, the distance variable is dropped as it is a time-invariant variable (Paudel & Rajkarnikar, 2020). *Fixed effects are due to omitted variables that are specific to cross-sectional units or to time periods*(Egger, 2000). Trade-related policies, including fiscal policy indicators, cash incentives, and tariff rates, are the main forces for fixed effect, whereas the size of the country and geographical and historical determinants are related to random effect (Egger, 2000).

Table 4 displays the estimation of the basic gravity model using Pooled OLS, fixed effect, and random effect estimation methods.

Table 4
Result of Pooled OLS, Random Effect and Fixed Effect

Dependent variable: exports (log)	(POLS)	(FE)	(RE)
Distance (log)	-0.629*** (0.227)	Dropped	-0.607** (0.293)
GDP (log)	-0.771 (0.821)	-0.184 (0.373)	-0.105 (0.372)
Partner's GDP (log)	0.685*** (0.194)	0.736** (0.173)	1.075*** (0.175)

Fiscal policy index	0.965** (0.488)	0.003** (0.226)	0.089* (0.226)
Logistic performance index	-0.555** (0.291)	0.010 (0.138)	-0.001** (0.138)
Export incentive dummy	-1.031*** (0.216)	0.008 (0.116)	-0.044** (0.116)
Population (log)	1.648*** (4.887)	1.559** (2.476)	1.032** (2.407)
Partner's population (log)	0.048 (0.160)	5.856*** (1.288)	1.075*** (0.175)
Inflation rate (%)	-0.207** (0.093)	-0.014* (0.043)	-0.039* (0.043)
Partner's inflation rate (%)	0.132*** (0.027)	0.039** (0.016)	0.047*** (0.016)
<i>Number of observations</i>	195	195	195
<i>R-squared</i>	0.70	0.94	0.57
<i>F statistics</i>	43.66	126.39	6.89

Source: Researcher's calculation, using the data from the cited source

*Note: ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. The figures in parentheses are robust standard errors. GDP, POLS, FE, and RE refer to gross domestic product, pooled ordinary least square, fixed effect, and random effect, respectively.*

As per the result, the fixed policy index supports export performance in Nepal, which is consistent with the result of the PPML method. Similarly, the logistic performance index coefficient shows a negative contribution to export, which is also in line with the result of PPML. The result of the export subsidy dummy also hurts the export performance. Hence, all the variables related to fiscal policy are ineffective in Nepal in encouraging export, and the result of all four methods, PPML, Pooled OLS, RE, and FE, have consistent results as per the sign and significance of the coefficient.

Furthermore, the GDP of the home country is also insignificant, and the GDP of the partner countries has a positive and significant effect on exports in all three methods, which is consistent with the result of PPML. The distance variable has produced negative results in Pooled OLS and RE, similar to the PPML estimation. Similarly, the population size of both home and partner countries positively influences exports as per all three methods. The inflation rate of the home country harms exports, and the inflation rate of the partner countries has positive and significant consequences on exports in all three alternative methods, the result of which is also consistent with PPML.

The gravity model result suggests that fiscal policy instruments implemented by the government are supportive of encouraging exports. However, the investment in trade logistics is subject to improvement as per the result. In addition, the targeted and flagship program of export subsidy is ineffective in fostering export, and therefore, this program should also be reviewed. This result indicates the urgent need for policymakers to review trade logistic-related expenditure and cash incentives for export policy. This finding indicates that tax-related fiscal policy instruments positively play a role in fostering exports. However, special incentives for exporters and expenditure on trade logistics must be carefully reviewed. The government intervention to establish the backward linkages for the exportable products and concrete policy for exportable product diversification are also areas of further improvement in export.

Other variables in the model follow the standard literature, and Nepal's export performance is based on the market size in terms of GDP and population of both the home country and partner countries. The negative impact of distance also complies with the standard assumption of the gravity model.

6. Findings and Conclusion

To find the effectiveness of fiscal policy variables, the gravity model incorporated the fiscal policy index, logistic performance index, and cash incentives to exporters. The fiscal policy index that combines expenditure, taxes, and deficit financing has positively influenced export volume. Nevertheless, as a result, the logistic performance index is insignificant, and cash incentives to exporters have inversely affected export volume. Moreover, distance from trading partners negatively influences export performance, indicating trading costs. The economic size and population of the trading partner countries positively influence exports in Nepal. However, the GDP of Nepal does not significantly contribute to exports, but the population has a positive association with exports in Nepal. The inflation rate of exporter countries is harmful to exports, but it is in trading partners have a positive association with exports.

The study recommends reviewing the current mobilization of fiscal instruments to enhance exports. The export incentive scheme should also be restructured regarding commodities and destinations. As exports are more distance-sensitive due to significant trading costs, the study advises focusing on diversifying destinations in neighboring countries. The growing population and fast-growing economies also have potential for Nepal's export market. As production capacity and potential are critical factors for export performance, the government should intervene to establish the backward linkages for exportable products and create a concrete policy for exportable product diversification.

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