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A Generic Methodology for Dynamic Short-Run Regional Econometric Analysis in Bangladesh

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Abstract

Economic development and regional integration are prerequisites for a country's overall economic and regional growth. Nevertheless, like many other developing countries, Bangladesh is facing a problem of unsustainable economic growth. A lack of organized development planning, along with unstable and insecure employment sectors, have created poverty prone underdeveloped and disintegrated regions in the country. Regional development is a means of reducing regional disparities by supporting employment and wealth generating economic activities across different regions in an economy. It involves a study of a region as a structural or dynamic system, with the interaction of different social and cultural units. This study centers on developing a generic methodology to enable such a regional analysis using short-run econometric methods.

Keywords: Economic Growth, Regional Disparities, Short-Run Econometric Analysis, Economic Base Theory

Introduction

The economic structure of a region may continually change for many reasons. Innovations using new technologies, growing relative competitiveness among regions, and information dissemination all influence changes in economic

structures of regions. Regional development aims to reduce regional disparities and promote regional growth, which can be measured through both short- and long-run changes in regional economic activity (Islam and Das, 2018). Along with modernization, increasing economic integration plays a fundamental role in changing regional economic systems. A comprehensive picture of the structure of regional economies allows us to understand the causes of any changes, and is vital for both regional and national level policy formulation.

Economic Base Theory is a simple, durable, and time-tested method of explaining short-run regional changes in regional economic structure generated in the early 1920s. Because it is easy to apply and understand, the Economic Base Concept and corresponding techniques derived from it have become the most widely used tool of regional planning by the mid-nineteenth century (Krikelas, 1992). Since then, regional analysts and planners consider this theory as a standard tool for regional research due to its simple logic and relatively straightforward data requirement (Gibson and Worden, 1981).

This conventional but durable theoretical framework addresses and explains the major factors that are responsible for economic changes in a region (Poinsot and Ruault, 2019). It purports that the monetary flows from outside a region can boost internal economic activities, assuming that the local economy can be divided into two general sectors: basic and non-basic activities (Williams, 1997). Those activities that export goods and services to points outside the community's economic boundary are generally termed "basic activities". Typical basic activities can include agriculture, forestry, and mining. However, apart from this traditional view, since the 1990s, several authors have extended the boundary of basic activities by incorporating different wage and non-wage sources such as the income of residential commuters who work outside of the region, tourism, unemployment, and other social security payments received (Cobbe, 1994). On the other hand, "non-basic activities" generally do not export any kind of finished goods, and they are primarily local in their product scope and market areas. Examples of everyday non-basic activities include local retailing, local utilities, or local school districts (Glasson, 1978). If the economic structure of a region is assumed to be in the shape of a pyramid, basic activities will be the base of the pyramid. Not being self-sufficient, basic activities require tools and other equipment and supplies that can best be produced locally, hence fostering non-basic activities resulting in dictating the pattern of the remainder of the pyramid (McCarty, 1942).

Economic Base Theory emphasizes that the strength of the local economy is mostly dependent on the basic sectors of a region. It is founded on a simple causal model that assumes that the basic sector is the prime cause of local economic growth. For this reason, "basic activities" have the role of being prime movers that generate multiplier effects in the regional economy (Glasson, 1978). Both basic and non-basic activities within a region can be identified using direct or indirect methods. This particular article employs the "Location quotient" method for the determination of both activities. The economic base multiplier is usually calculated using the following formula:

$$\text{Economic Base Multiplier} \quad = \quad \frac{\text{Total regional employment } (E_t)}{\text{Total basic employment } (E_b)}$$

Source: Glasson (1978, p. 64)

A significant heterogeneity persists in economic growth among different regions and administrative divisions in Bangladesh. A lack of organized development planning, along with unstable and insecure employment sectors, have created poverty prone underdeveloped and disintegrated regions in the country. The development of regional economic planning is imperative to support employment and wealth-generating economic activities, thus reducing regional disparities.

This particular research is grounded on investigating short-run changes in the regional economic structure of the six divisions of Bangladesh through an economic base model. At present, there exist eight divisions in Bangladesh. Mymensingh and Rangpur divisions are separated from Dhaka and Rajshahi divisions respectively, and individual BBS data for the newly formed divisions of Mymensingh and Rangpur is not available. Hence, this study uses combined BBS data of Dhaka and Mymensingh divisions to represent the Dhaka division, and Rajshahi and Rangpur divisions provide the data for the Rajshahi division. This gives us six geographical or administrative divisions from which data is used for this research. These six divisions (Figure 1) of Bangladesh have been categorized into four regions, following a process of formal regionalization based on topography and climate homogeneity (Glasson, 1978; Kamruzzaman et al., 2018) to appropriately serve the purpose of this study. The four regions are endowed with

different sectors due to geographical, locational aspects, and administrative variations. The central region consists of the Dhaka division, which is the central hub of the administration of the country, and primarily specialized in secondary and tertiary activities. Rajshahi division belongs to the northern part of the country, and agriculture is the main economic base of this region. Khulna and Barishal divisions contain a significant share of riverine and forest land area, and are the well-recognized southern coastal region in Bangladesh. Khulna and Barishal are established agricultural areas which thrive on fishing. The region is gradually flourishing by producing and exporting a substantial scale of agricultural goods from its ports, and is also more recently emerging as an industrial area. The eastern region consists of Sylhet and Chittagong divisions, both of which rely on fishing, stone quarrying, and mining for their economic base. As the study regions represent the important economic hubs within Bangladesh, the methodological approach and findings are assumed to be widely applicable for a generic analysis of change in regional short-run economic structure.
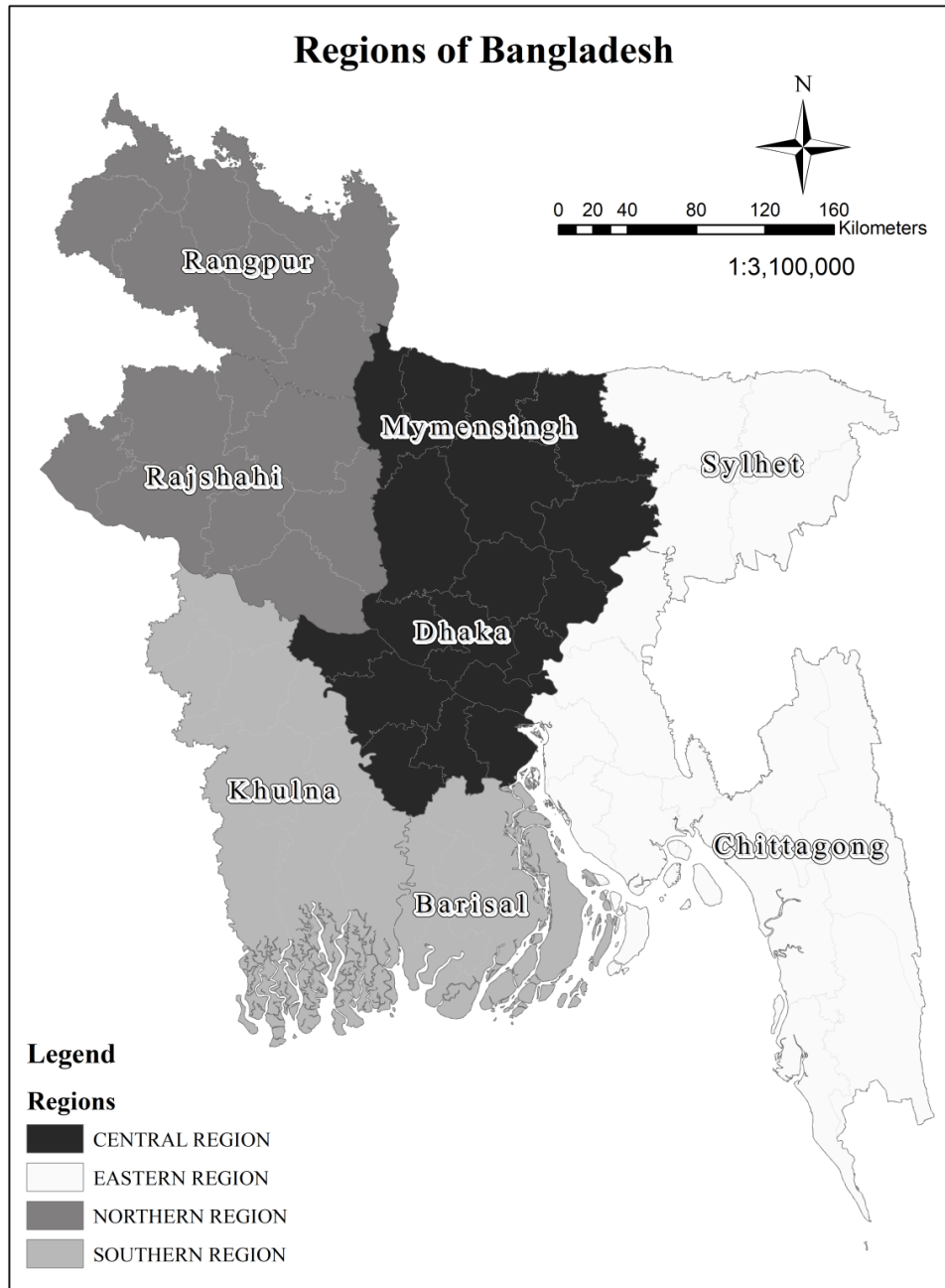

Figure 1: Regions of Bangladesh

Review of Literature

The regional economy principally relies on the internal positive and negative influencing factors of various industries located within that region. The kinetics of its industrial structure also affects a regional economy. The different regions of Bangladesh demonstrate spatial inequalities as measured by economic growth and other development indicators. In the case of a specific region, the expansion and development of various sectors depends much on geographic and locational attributes (Islam et al.*,* 2015; Parvez et al., 2020).

Various methods exist for regional economic analysis and these stem from urban, regional, and geographic economics. These methods are used repeatedly in theory based experimental studies and aim at analyzing the essential topics in the specific research field such as existence and evolution of agglomerations, regional economic growth, and regional inequalities (Wieland, 2019). A large amount of quantitative data needs to be harnessed for such regional analysis.

As mentioned earlier, economic base theory is one of the most frequently used methods for regional economic analysis. This theory shows that regional growth depends to a large extent on the goods and services demanded in other parts of the country, resulting in exports from that particular region (McNulty, 1977). Such export activity constitutes the driving force for economic growth of the region and is premised on increased monetary inflows into the local economy or region. Economic base theory has some criticisms because of its theoretical weakness, but according to the economic development practitioners as well as economic policy analysts, it is the most readily adaptable method for measuring regional growth (Kimbugwe et al.*,* 2010).

Various direct and indirect industrial classification techniques exist to identify whether an industry is import- or export-oriented. The location quotient (LQ) is the most widely used indirect method for identifying export or basic industries. This method is easily applicable and it requires little expertise. The LQ assesses the extent to which total export employment is spread among various industries and where the economic base is more diversified over time (Quintero, 2007). In order to observe the short-run economic growth, location quotient is one of the most widely used methods (Parvez et al.*,* 2020).

McNulty (1977) conducted a test of the export base theory of economic growth which is designed to produce both short- and long-run estimates for regional income multipliers using cross-sectional data. Most such studies use employment rather than personal income data because of the easy availability of the former measure. McNulty's study found that the economic base theory of regional growth fits the facts very well in the long run, but falls short of reliable predictions regarding short-run regional economic development. Sanen and Gamboa (2016) formulated a methodological proposal for the construction of a regional input-output matrix. The authors developed this regional matrix using a top-down approach which is not adequate for regional economic analysis. Thus, the main objective of this paper is to develop a bottom-up approach for the construction of regional input-output matrices. During the process of building this input-output table, it was observed that there are significant differences between a top-down regional matrix and one that is bottom-up. In terms of regional bonding, the top-down matrix resembles the national matrix but with regard to backward bonding, the bottom-up matrix resembles the regional matrix. Therefore, this study demonstrates evidence to support the construction of regional input-output matrices using a bottom-up approach which shows a more exact perspective of regional structures.

When analyzing the integration of regional economic change with technological advantage, Antonelli (2004) paid much attention to the economics of innovation, and to the rate of technological change, focusing on the direction of new technologies being introduced, and to the structural characteristics of the relevant economic system. As a result, the direction and rate of technological change interact in many ways within this context of technological change. In this paper, the direction of the technological change in each particular regional system can be affected in two ways: first, the imbalance conditions in each particular economic system can cause regional economic structural change, thereby leading to the innovation of new technologies. This is followed by changes in relative factor prices and desired demand levels, which ultimately results in changes to the relevant regional economic structure. Second, in order to put forward technological innovation, firms in a particular region and given initial conditions select the technology that is appropriate for the specific regional factor markets. Relative factor prices thus act as the primary determinant for adopting new technologies.

Related to this is the recognition by Das et al. (2020) that regional competitiveness analysis primarily focuses on a region's spatio-functional gap and its median threshold population, both of which bear strongly on a region's economic structure. This paper deals with the required and available socio-economic facilities and their allocation in the optimum location within the study region. The study reveals that the service facilities are inadequate in almost all upazilas and unions (local administrative units) in Khulna district. Due to the shortage of these facilities, the entire economic structure of this region is being hampered.

Furthermore, Rahman et al. (2012) described the process of South Asian regional cooperation and integration. Their study describes the prime role and responsibility of civil society, industry, trade, and trade-in service and regional public goods in achieving regional cooperation. It shows that when the transformation of a region occurs because of economic integration, this leads to new infrastructure, institutions, and the eradication of coordination and information failure. The benefits for peripheral regions tend to be highest from strong regional cooperation and integration. The Bangladesh-India Memorandum of 2010 is a recent example of such a regional cooperation agreement, leading to greater trade between these two countries, as well as the formulation of a framework for Nepal and Bhutan to strengthen cooperation and integration in transport and power. The prospects for accelerating South Asian regional cooperation have been promoted by this, ultimately resulting in the regional development and changes to its economic system (Bhasin, 2011).

Short-run regional change can furthermore be integrated into long-run theories of regional economic change to form a complete regional profile. Stage Theory is widely used for the theoretical foundation and practice of long-run regional economic analysis. It is also known as sector theory with a prime focus on the sectoral change of a region (Glasson, 1978). The agricultural sector is very well-off in the early stages of regional growth, as producers begin to trade with other regions with the improvement of transportation. Regional industrialization occurs soon after this, as diminishing returns begin to set in for agricultural production. The region specializes in export production at a more advanced stage. Moreover, the stage theory of urban or regional economic growth states that urban areas grow by flourishing from an early stage where the local economy is equated with a single large industry to a final stage where the export of region-specific services becomes the dominant function (Dawkins, 2003). Parvez et al. (2020) has tried to link the findings from the evaluation of local economic structure with the stage theory and concluded that an increase in non-basic industries in a region would increase its income elasticity of demand and its labor productivity. With an increase in income, the demand for commodities supplied by the secondary (manufacturing) and tertiary (service) sectors rises faster than the demand for primary (agriculture) products. Thus, the secondary and tertiary sectors within a region can grow faster when the impetus for regional growth sets in, and regions may experience a structural shift from primary to tertiary sectors.

Considering all the international experiences and other findings, this particular research identifies and attempts to address a significant gap in formulating a specific methodology for short-run regional economic analysis. It uses the economic base concept to develop a generic methodology for measuring a region's short-run econometric stipulation; it also integrates how technological innovation and regional competitiveness, cooperation, and integration can lead to change the economic structure of a region; finally, it utilizes policies, recommendations, and methodological approaches adopted in international cases to provide a generic methodology for short-run regional econometric analysis.

Operational Procedure & Data

The overarching methodological approach adopted for this study is a case study based exploratory research approach incorporating predominantly secondary databases from different sources. Data on national and regional GDP at constant prices is collected from the Bangladesh Bureau of Statistics (BBS, 2002). For the regional economic structure analysis, the initial year is assumed to be 1995-96 and the terminal year is selected to be 1999-2000. BBS published district-wise GDP data of Bangladesh for the last time in the fiscal year 1999-2000, and for this reason we had to rely on a limited database and could not use updated data for this research.

Regional basic and non-basic activities are determined using the "Location quotient" method. Location quotient (LQ) for an activity or sector is identified using the following formula:

$$LQ = \frac{\text{Percentage of regional employment in an industry}}{\text{Percentage of national employment in an industry}}$$

Source: McCann (2002)

A ratio of more than unity indicates a basic activity. An obtained value of the location quotient that is greater than 1 denotes that the concerned industry or sector is producing more employment, service, or goods than those are consumed regionally, implying that this sector is exporting goods or services after meeting internal demand within the region. On the other hand, a location quotient value less than 1 implies that the proportion of the regional employment of the concerned sector is smaller than that of national employment indicating importing of goods or services of this industry from outside regions.

The total GDP produced by the basic activities of the study region is computed using the following formula:

Basic employment in Industry i = {(LQ-1) ÷ LQ} * E_i (Source: McCann, 2002)

[Where E_i = Regional employment in Industry "i"]

The amount of basic GDP calculated by this equation reveals the amount that sectors earn by exporting goods or services after meeting internal demand within the region. The linear regression equation and relevant trend lines are formulated to forecast the future GDP to explore the trend in changes of both basic and total regional activities (including both basic and non-basic activities) over the years concerned. Different trend lines are formed using the time period, total basic GDP of the region, and total regional GDP as independent and dependent variable subsequently. Finally, a comparative scenario between different projection processes adopted in this study is formulated to illustrate the degree of deviation among different forecasted results. This comparison has been established after assessing the accuracy of these projection methods through the model fit equation as follows.

$$Model\ Fit = \frac{(Model\ Value\ -\ Actual\ Value)^2}{Actual\ Value\ ^2}$$

Synthesis of Outcome

This paper has generated some exciting findings focusing on the outcome observed from a generalized study area. The basic activities of the four regions are presented in Table 1 in the next page.

The eastern region, blessed by natural hills, cascades, and rivers along with a coastline along the Bay of Bengal, has developed basic industries such as fisheries, mining and quarrying, transport, and community sector. Despite being a drought-prone region, the northern portion of Bangladesh has managed to pull off its agriculture industry as a basic industry, a result of the committed initiatives of Barind Multipurpose Development Authority (BMDA). Moreover, the northern region of Bangladesh is also known for educational facilities. Other than agriculture and education, industries such as real estate, health, and social works, contribute to this region's basic GDP. On the other hand, the southern region contains a large portion of the rivers of Bangladesh. The silt carried by the tide of the rivers makes the soil fertile and this is why this region has been responsible for a high level of GDP produced through fishing, and agriculture and forest industry. The southern region also has the largest mangrove forest in the world, the Sundarbans. Finally, the central region mostly contributes to national GDP through non-agriculture production. Manufacturing and public administration contribute the most to its regional GDP. One of the most populated megacities of the world, Dhaka, lies in the central region. Being the capital and the central hub of almost every administrative agency and function in Bangladesh, Dhaka attracts a large number of migrants every year.

It is expected that a basic industry will flourish and hence the LQ will rise over time. However, the changes in LQs are not significant due to the short time frame of the analysis period. We can see in Table 1 that the basic industries of all the regions have been contributing to the national economy over the time periods shown. Due to a rise in tourism, the hotel and restaurant industry of the eastern region has shifted its tier from a non-basic to a basic industry. Also, because the southern region of Bangladesh is increasingly prone to floods and disasters associated with climate change, real estate and business activities are becoming less attractive there and the LQ values of that industry is decreasing.

Table 1: Values of Location Quotients for the Basic Industries of the Regions of Bangladesh

Regions	Basic Industry	LQ				
		1995-96	1996-97	1997-98	1998-99	1999-2000
Eastern Region	Fishing	1.35	1.34	1.35	1.35	1.35
	Mining and Quarrying	3.15	3.03	3.01	2.95	3.03
	Hotel and Restaurants	0.992	0.999	0.999	0.999	1.003
	Transport, Storage and Communication	1.03	1.02	1.03	1.02	1.02
	Health and Social Works	1.03	1.04	1.04	1.04	1.05
	Community, Social and Personal Services	1.05	1.06	1.06	1.06	1.06
Northern Region	Agriculture and Forestry	1.43	1.44	1.47	1.48	1.47
	Construction	1.29	1.28	1.28	1.27	1.27
	Real Estate, Renting and Business Activities	1.13	1.12	1.13	1.13	1.14
	Education	1.38	1.37	1.38	1.38	1.40
	Health and Social Works	1.15	1.14	1.14	1.13	1.13
	Community, Social and Personal Services	1.23	1.22	1.22	1.21	1.21
Southern Region	Agriculture and Forestry	1.33	1.30	1.30	1.30	1.30
	Fishing	1.62	1.74	1.70	1.72	1.68
	Construction	1.10	1.09	1.11	1.10	1.10
	Real Estate, Renting and Business Activities	1.02	1.00	1.01	0.99	0.98
	Education	1.18	1.18	1.21	1.20	1.20
	Health and Social Works	1.06	1.05	1.07	1.06	1.06
Central Region	Manufacturing	1.56	1.55	1.54	1.56	1.55
	Electricity, Gas and Water Supply	1.30	1.30	1.30	1.28	1.22
	Wholesale and Retail Trade	1.15	1.13	1.13	1.11	1.11
	Hotel and Restaurants	1.14	1.14	1.13	1.14	1.14
	Transport, Storage and Communication	1.12	1.14	1.13	1.15	1.15
	Financial Intermediations	1.26	1.28	1.27	1.29	1.29
	Public Administration and Defense	1.36	1.36	1.35	1.36	1.46

Source: Authors' calculation based on data obtained from BBS (2020)

Table 1 shows that there will be an increase over time in the location quotients for many different industries. Because of its natural beauty, the eastern region has been attracting tourists for a long time. The increase in tourism that has occurred in the last several decades has also generated an increased demand for complementary goods such as hotels and restaurants and related services such that over time hotels and restaurants have become a basic sector. On the other hand, being a land of rivers, Bangladesh is prone to flooding. The disastrous flood of 1998, a result of excessive rainfall all over the catchment areas of the major rivers of Bangladesh, was the most severe in terms of extent and duration. This caused a severe slowdown in the growth of national GDP. Almost all industries faced a slowdown or negative growth. The largest impact of this disastrous flood can be seen specifically in real estate, renting, and business activities of the southern region. These industries were basic industries in the region in the initial time period (1995-95), but because of the flood and economic slowdown, they became a non-basic industry in the terminal year (1999-2000).

In addition to the above analysis, regression analysis has been used to explore the trend of change in GDP over the years and to forecast future GDP. In Bangladesh, both governmental and private investment has fostered significant growth in GDP, making Bangladesh one of the 10 fastest-growing economies. The R^2 value in each regression equation represents the proportion of the variance for each dependent variable that is explained by time. A separate forecast is done for each of the variables - regional GDP, regional basic GDP, and regional non-basic GDP. These forecasts are used to verify the acceptability of the methodological approach of this research (Table 2).

The forecasts from the time-series regression analysis are shown in Figure 2, Figure 3, and Figure 4. The regression equations show changes in GDP (y) as the years (x) change. The analysis indicates an increasing trend of growth over the years for all four regions in Bangladesh. The results are moderately validated for basic and total regional GDP and highly validated for the non-basic GDP of all the regions. The slope of all the calculated regression equation is positive which represents that the correlation will be positive for basic, non-basic, and total regional GDP in all four regions.
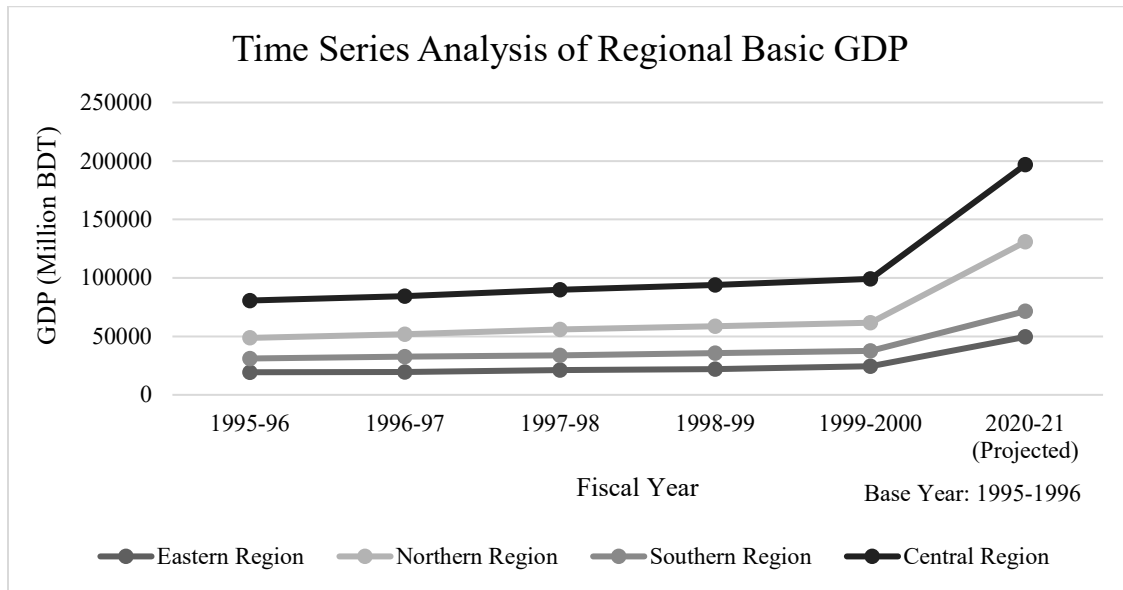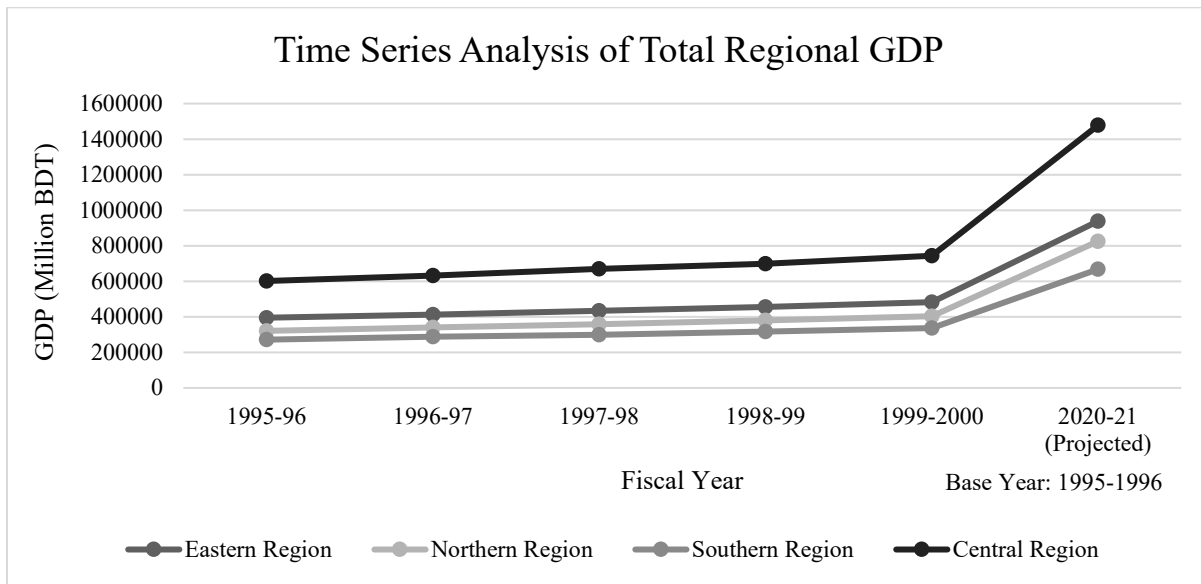

Basic GDP (Million BDT)	1995-96	1996-97	1997-98	1998-99	1999-2000	2020-21 (Projected)	Regression Equation	R^2 Value
Eastern Region	19,331	19,631	21,269	21,906	24,345	49,598	$y = 4{,}746.1\,x + 9{,}401.8$	0.5765
Northern Region	48,706	51,733	55,831	58,585	61,708	130,882	$y = 12{,}673\,x + 23{,}552$	0.5775
Southern Region	31,094	32,646	33,714	35,682	37,704	71,560	$y = 6{,}270.7\,x + 18{,}452$	0.5773
Central Region	80,668	84,424	89,774	93,989	99,217	196,940	$y = 17{,}999\,x + 44{,}507$	0.5775

Figure 2: Time Series Analysis of Regional Basic GDP of Bangladesh

Time Series Analysis of Regional Non-Basic GDP
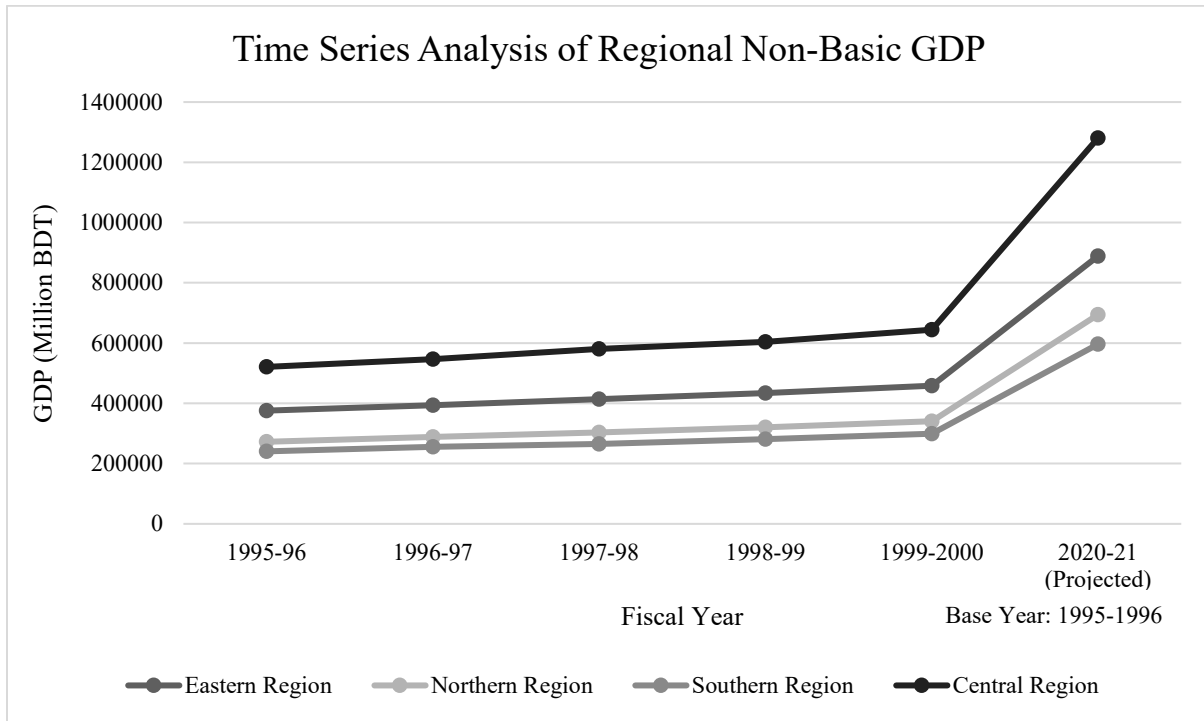
Non-basic GDP	1995-96	1996-97	1997-98	1998-99	1999-2000	2020-21 (Projected)	Regression Equation	R^2 Value
Eastern Region	375,858	393,466	413,430	434,296	458,483	889,086	y = 20,608 x + 353,283	0.9966
Northern Region	272,420	288,805	303,001	320,743	341,076	694,484	y = 16,925 x + 254,434	0.9957
Southern Region	240,631	255,380	264,870	281,207	299,064	596,421	y = 14,269 x + 225,423	0.9897
Central Region	521,018	546,958	580,492	604,230	644,870	1,280,958	y = 30,498 x + 488,021	0.9932

Figure 3: Time Series Analysis of Regional Non-Basic GDP of Bangladesh

Time Series Analysis of Total Regional GDP

(chart)

GDP (Million BDT) vs Fiscal Year

Legend: Eastern Region, Northern Region, Southern Region, Central Region

Base Year: 1995-1996

Total Regional GDP	1995-96	1996-97	1997-98	1998-99	1999-2000	2020-21 (Projected)	Regression Equation	R² Value
Eastern Region	395,189	413,097	434,699	456,202	482,828	938,684	y = 84,233 x + 225,299	0.5774
Northern Region	321,126	340,538	358,832	379,328	402,784	825,365	y = 77,955 x + 165,152	0.5775
Southern Region	271,725	288,026	298,584	316,889	336,768	667,981	y = 61,309 x + 148,748	0.5774
Central Region	601,686	631,382	670,266	698,219	744,087	1,477,898	y = 135,632 x + 329,210	0.5774

Figure 4: Time Series Analysis of Total Regional GDP of Bangladesh

The projected values from the above figures show us that by the fiscal year 2020-2021, the total basic activities of the northern region will contribute the highest percentage (almost 16%) of the total sum of regional GDPs, while the lowest percentage will be contributed by the eastern region (5% of aggregated total regional GDP).

An analysis of national basic and non-basic GDP shares both in the base and terminal years (Figure 5 and Figure 6) indicates that an increase in basic regional GDP will increase the flow of income, demand for goods and services, and a corresponding increase in the volume of non-basic GDP, thus contributing accordingly to the total national GDP. This confirms the role of the basic economy as a prime mover in any regional economy.
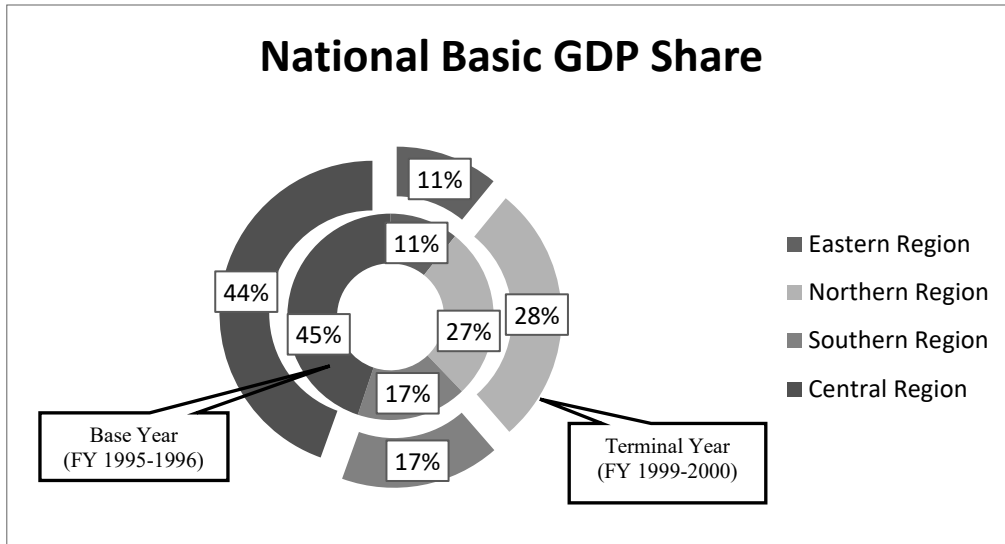
Figure 5: Basic GDP share in National Economy of Bangladesh
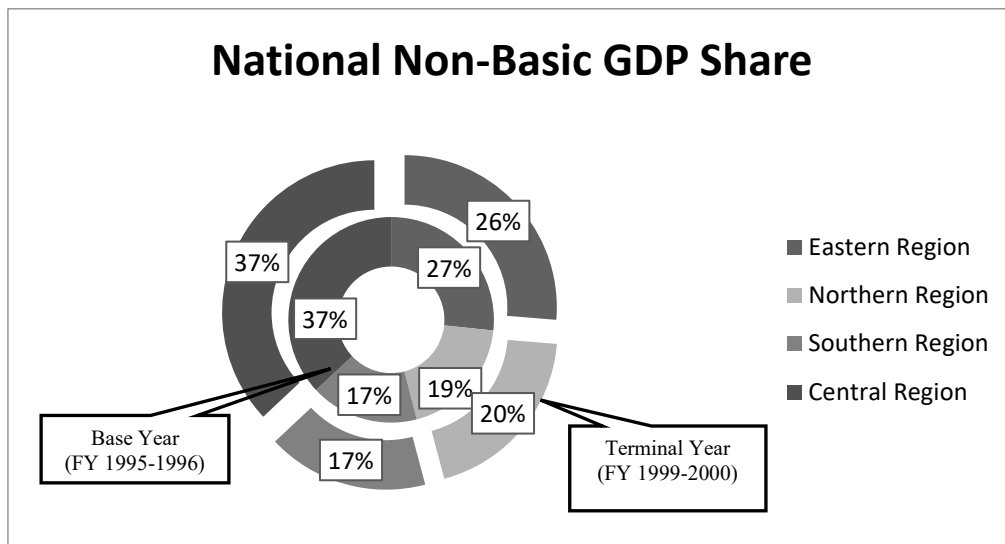*Source:* Authors' Calculation

Figure 6: Non-basic GDP share in National Economy of Bangladesh
Source: Authors' Calculation

The trend line of the "economic base multiplier" (Figure 7) shows the impact of regional basic GDP on total regional GDP. The trend represents changes in the economic base multiplier (y) as years (x) change. The economic base multiplier of the eastern and northern regions decreases over the years, resulting in an expansion in basic activity and a reduction in non-basic activity. However, the regression equation obtained for these regions is weakly validated, ultimately leading to a negative correlation between total regional activity and basic activity. On the other hand, the economic base multiplier of southern and central region increases over time, representing an increasing non-basic to basic ratio. Although the R^2 value shows a poor fit, non-basic activities in the central region appear to increase sufficiently to meet the demand of an increasing population over the years. The regression equation obtained for the southern region is highly validated, suggesting that the overall economy of the southern region will deteriorate over the time period for which the analysis is carried out and projections made.
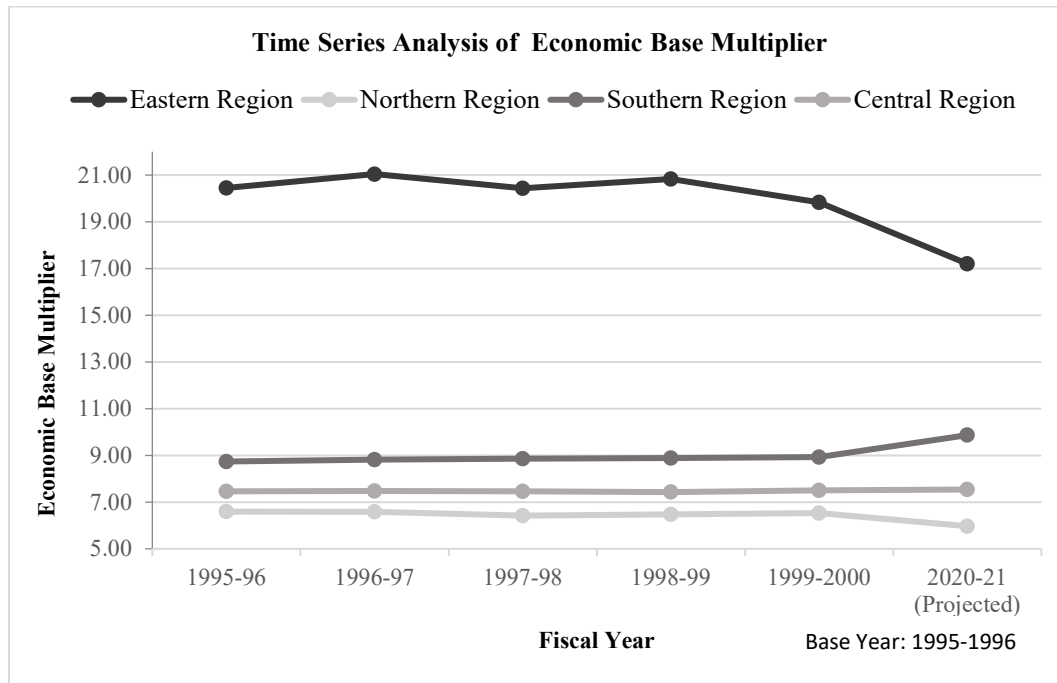
Time Series Analysis of Economic Base Multiplier

Economic Base Multiplier	1995-96	1996-97	1997-98	1998-99	1999-2000	2020-21 (Projected)	Regression Equation	R² Value
Eastern Region	20.44	21.04	20.44	20.83	19.83	17.20	y = -0.14 x + 20.95	0.2434
Northern Region	6.59	6.58	6.43	6.47	6.53	5.97	y = -0.02 x + 6.59	0.287
Southern Region	8.74	8.82	8.86	8.88	8.93	9.87	y = 0.04 x + 8.71	0.9523
Central Region	7.46	7.48	7.47	7.43	7.50	7.54	y = 0.003 x + 7.46	0.0365

Figure 7: Time Series Analysis of Economic Base Multiplier of Bangladesh
Source: Authors' Calculation

Table 2: Model fit for different projection method

		Million BDT	Model Fit Value
Actual Value	FY 2018-19	11,057,936	
Projections	Linear Regression	3,723,713	0.44
	Projected Base Multiplier	3,719,854	0.44
	Average Base Multiplier	3,770,463	0.43

Source: Authors' calculation based on data obtained from BBS (2020)

Table 2 shows that all three projection methods represent almost 43%-45% of the actual GDP of fiscal year 2018-19, and can be considered a good fit. Likely other factors that are not explained in the above model are the government's initiatives to foster national GDP to achieve a place among the middle-income nations in the world (Ministry of Planning, 2012; Sarker, 2018). Moreover, Bangladesh was ranked as one of the top 5 fastest-growing economies in the world on more recent years (World Bank, 2019, 2015; UNB, 2019). Considering the projection

methods as a good fit, the study predicts the national economic growth for the fiscal year 2020-21. Figure 8 shows that projection of GDP using the average base multiplier contains nominal deviation among the three processes of projection under consideration here. Hence, the average base multiplier is incorporated in this study as a means for national GDP projection.
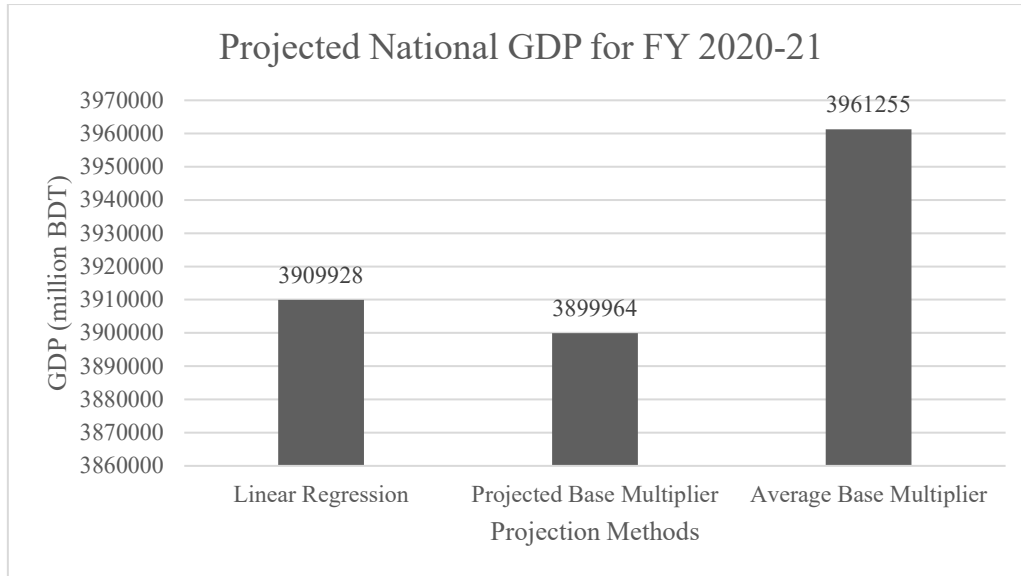

Figure 8: Deviation of results among different process of projection and actual GDP
Source: Authors' Calculation

Finally, further analyzing the growth rate of different regional economic sectors (Figure 9), it is found that until the end of the last century, agricultural activities dominated the economic sectors of Bangladesh. As a result of this initial condition, the agriculture and forestry and fishing sectors experienced a significant rise in growth rate from the base to the terminal period, along with a few other sectors such as mining and quarrying, wholesale and retail trade, and utility service. The highest growth within this time frame was noted in the educational sector, as the government placed significant emphasis on tackling the challenge of eliminating illiteracy in the country beginning in the 1990s. With improvements in literacy rate coupled with technological advances in the last two decades, the conversion rate from farm to non-farm activities started rising upwards. Moreover, in the mid-2000s, the government decided to strengthen and build law enforcement, public defense, and good governance in order to provide better civic facilities to match rising economic prosperity. Consequently, significant growth in the sectors of industrial manufacturing, electricity, gas and water supply, financial intermediations, public administration, and health and social works has been projected for fiscal year 2020-21.
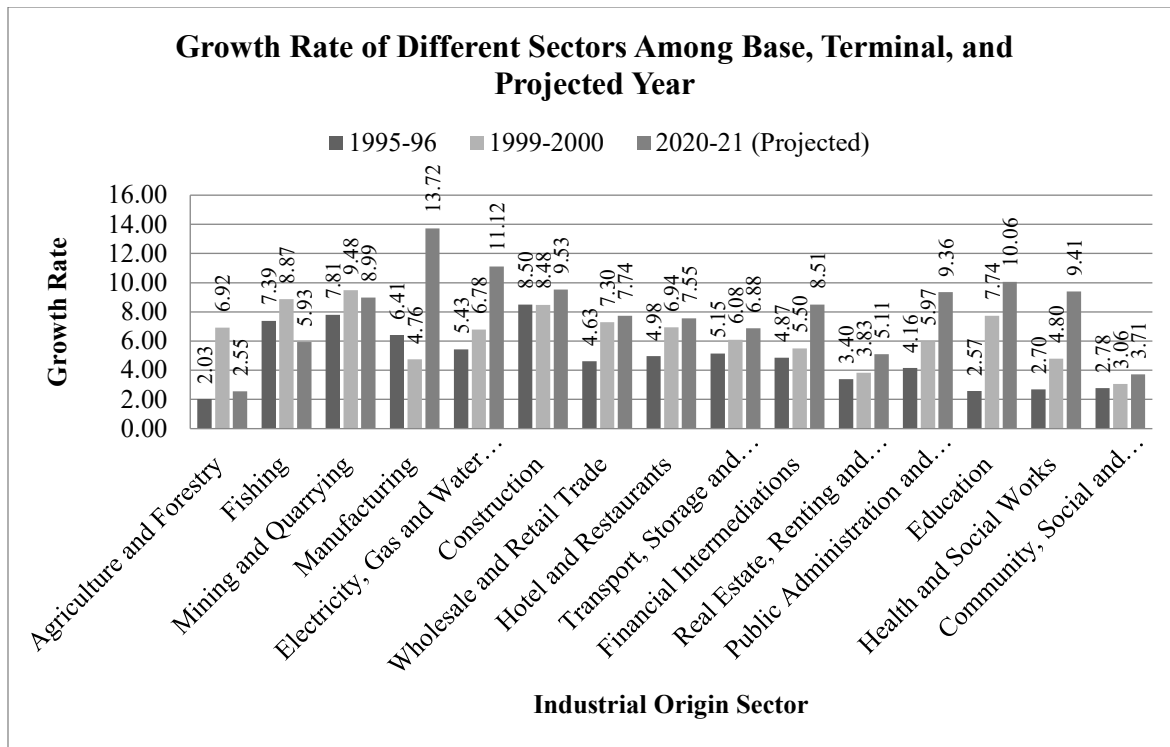
Figure 9: Growth Rate of Different Sectors Among Base, Terminal, and Projected Year
Source: Authors' Calculation

Conclusion

A comprehensive representation of the regional economic structure is vital for both regional and national level policy formulation. To undertake this, it is imperative to understand the causes of the change in the country's regional economic structure. The methodological approach adopted in this study can be followed as template for short-run regional econometric analysis for a region. The findings from this study demonstrate that all four regions have great potentials for further economic development. Because of geographical, locational, and environmental variations, these regions have managed to develop different basic sectors that influence the development of non-basic sectors in the respective regions. Although the contribution of the basic sector to the regional GDP is nominal for the northern and central regions, this study can identify the potential basic sectors in each region to be emphasized while preparing a future economic plan to ensure better contribution from these sectors to national development. An increase in non-basic activities derives a positive impact on the elasticity of demand as well as labor productivity. Nevertheless, basic industries drive the economic structure of a region. Overall, in Bangladesh, the economy is going to overcome its dependency on the agricultural sector in the near future with the advancement of technology and a growing rate of literacy. Rather, the manufacturing industry is expected to lead major contributions to future economic development. Accordingly, this particular research could provide a baseline methodological approach for further dynamic short-run econometric analysis of any region and hence be useful in guiding future potential regional development.

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