COST-BENEFIT ANALYSIS: STRENGTHENING THE TAX BASE IN BANGLADESH

BIPLOB KUMAR NANDI, SENIOR LECTURER, DEPARTMENT OF ECONOMICS, EAST WEST UNIVERSITY
BAZLUL HAQUE KHONDKER, PROFESSOR, DEPARTMENT OF ECONOMICS, UNIVERSITY OF DHAKA

Benefits and costs of strengthening Bangladesh's VAT structure

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Bangladesh Priorities

Biplob Kumar Nandi
Senior Lecturer, Department of Economics, East West University

Bazlul Haque Khondker
Professor, Department of Economics, University of Dhaka

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info@copenhagenconsensus.com
www.copenhagenconsensus.com

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Introduction and Background

Sustained and improved domestic resource mobilization offers a cure to aid dependence in developing countries and creates more fiscal space for promoting growth. Although Bangladesh has maintained a sustained growth rate of over 6 percent in recent years, tax revenue-to-GDP ratio remains at around 10 percent, one of the lowest in the world (**Figure-1**). Scatter plot indicates that a positive significant correlation exists between the higher tax efforts to higher economic growth. In the scatter diagram below, Bangladesh's position in terms of tax-to-GDP ratio has been registered to be the lowest in the region, even lower than the tax-to-GDP ratio of Nepal[1]. In order to improve revenue mobilization, Bangladesh has set a target to raise tax revenue-GDP ratio to 14.1 percent in FY20, the final year of the Seventh Five Year Plan (7FYP). Targeted tax revenue-GDP ratio of the 7FYP is 4.8 percentage points higher than the 9.3 percent that has been achieved in FY15 (i.e. the terminal year of the Sixth Five Year Plan).

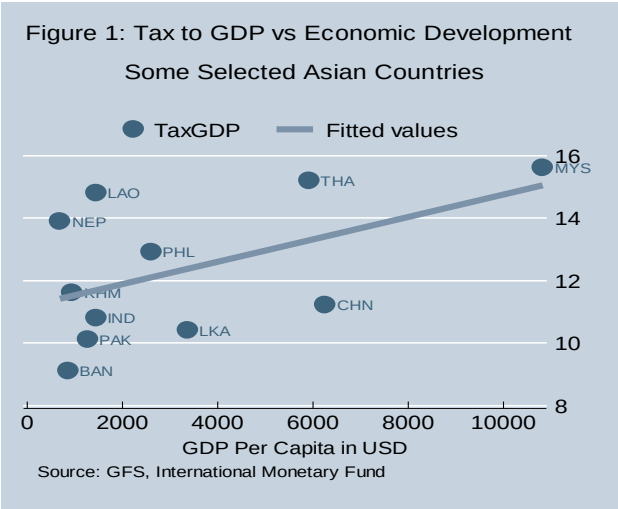
Table 1. Bangladesh: Tax Revenue Target, FY15 -20

(In Percent of GDP)

	FY15	FY16	FY20
Categories of Tax	**Actual**	**7PYP Period**	
Tax Revenue	9.3	10.3	14.1
Income tax	3.3	3.7	5.4
Value Added Tax	3.3	3.8	5.1
	(In billion of Taka)		
Tax Revenue	1427	1792	4112
Income tax	499	636	1575
Value Added Tax	503	661	1487

Source: Seventh Five Year Plan

[1] In this scatter diagram, it has been considered comparator countries of Bangladesh in terms of likely to similar pattern of growth and economic development, and GDP Per capita is taken to capture economic development among some selected countries. Our sample countries in this scatter plots includes Bangladesh, India, China, Lao PDR, Pakistan, Sri Lanka, Nepal, Philippines, Cambodia, Malaysia and Thailand. Fitted line shows the positive association in response to economic development on an average, and each dotted points below the fitted line indicates lower tax efforts than average with the given level of economic development.



Moreover, domestic- base tax revenue constitutes almost 75 percent of tax revenue to GDP share, thus, to what extent the total tax revenue GDP ratio will increase depends on the performance of domestic VAT and income tax, as both of these components share 70 percent of total tax revenue. As a result, during the 7FYP period (FY16 to FY20), Bangladesh has set a target of achieving 10.5 percent of GDP as tax revenue from VAT and Income tax in FY20, which is 3.9 percentage points higher than the base year value of the plan period (i.e. 2015). 7FYP assumes that 2.1 percentage points will be generated from income tax, while 1.8 percentage points from Value added tax (VAT). Thus, the overall tax revenue performance of the entire plan period depends critically on two domestic revenue sources –VAT and income tax. During the plan period, every year, the combined revenue collection from these two sources would need to increase by 0.8 percentage points of GDP, shared roughly equally between the two major sources. To achieve the target, the plan assumes some specific reform strategies which are described in **Box I**.

Box I: NBR Tax Reform Required for Attaining Tax Targets in Seventh Plan

Tax Policy Reforms

- Effective Implementation of VAT and Supplementary Duty Act 2012
- Incorporating transfer pricing in the Income Tax Ordinance, 1984
- Incorporating Alternative Dispute Resolution (ADR) in Income Tax, VAT and Custom Acts
- Drafting of a new Direct Tax Code
- Drafting of a new Customs Act

Box I: NBR Tax Reform Required for Attaining Tax Targets in Seventh Plan

Tax Administration Reforms: Income Tax

- **Broadening of the taxpayers' base**: This will require monitoring of the ownership of all sizable physical and financial assets of taxpayers and determining the income generation out of those assets.
- **Broadening of the tax revenue sources**: Traditionally, there has been an excess dependency on taxing financial institutions and a few large non-financial corporations. The tax department should explore other smaller organizations in the formal sector as well various corporations.
- **Focusing on income from service providers and self-employed (who are difficult to tax)**
- **Treating all sources of income equally for the tax purpose without discrimination for the households:** This would imply taxation of capital gains from land, real estate/housing, and stock market. Wealth accumulation in Bangladesh is primarily happening through accumulation of urban land and real estate, untaxed/low tax income of the rapidly growing RMG sector, and relatively low tax incidence on income through financial instruments.
- **Automation of TIN registration and linking TIN with National I.D.**
- **Integrated Revenue Management Program:** Business Process- An integrated revenue management program seeks to connect the three departments at transactional level by linking the taxpayer identification numbers i.e. TIN and BIN in the database. The methodology for setting up such an integrated system is to first centralize the database and transaction processing of the three departments at one location and then to build an information system that can mine data in the three databases and thereafter process the same for exception reports.
- **Integrated Revenue Digitalization Program:** This program will seek to set up a country-wide integrated ICT platform to capture all tax payment information from tax returns, banks, TDS deductions, third party collection agencies etc. Under this program, a Central Processing Centre is to be set up for processing all Income-tax and VAT returns, whether e-filed or paper filed at one integrated processing centre.
- Aggressive imposition and expansion of withholding taxes, particularly on individual taxes which could potentially improve tax compliance, expand the income tax base and address administrative issues pertaining to tax collection efforts through increased transparency and efficiency.

Tax Administration Reforms: VAT and Custom

- Implementation of the new VAT Act
- Expanding VAT base especially on businesses and organization
- Incentivizing VAT payment with benefits for small businesses to bring them into the VAT coverage as well as promoting increased formalization of businesses currently operating in the informal sector Reform of the VAT administration along functional lines
- Automation of the whole tax administration through Central Data base including Central VAT Registration; electronic submission and return process.

Source: Seventh Five Year Plan

As indicated in **Box I**, significant progress is being made on the VAT front in terms of the new VAT Law, which has already been enacted in December 2012, and administrative restructuring and modernization of VAT administration. Many of these initiatives should be in place before the introduction of the new VAT Law, effective from July 2016. Moreover, the Bangladesh government focuses more in case of direct tax base strengthening through enacting automation procedure in the direct tax system.

In this paper, we will focus on two VAT related reforms to assess their revenue generation potential and cost of generating additional revenue. These are: (i) removal of tariff values currently applicable on some domestically produced items and replacing them with actual market prices and (ii) automation in the VAT system through registration and VAT return in the online system.

The rest of the paper is composed of seven more sections. An overview of the VAT structure in Bangladesh has been presented in section two. Section three provides description of the proposed interventions. Data and Methodology is discussed in section four. Section five presents revenue gains from proposed interventions. Cost implication and benefits are analyzed in section six and seven respectively. Benefit-cost assessments are presented in the final section.

Overview of the VAT Structure in Bangladesh

Like many other developing countries, during the first two decades, trade-based taxes dominated the tax structure in Bangladesh with customs duties alone accounting for about a third of tax revenue. However, the scenario started to change after the introduction of VAT[2]. The share of VAT revenue has continued to increase; it recorded from 23.6 % during the period 1990-95 to 36.8 % in 2011-15. A more dramatic change is observed for custom duties with its share declining to 12.6 percent of the total NBR revenue in 2011-15. The reduced share of trade-based taxes in Bangladesh also reflects a better integration of Bangladesh with the global economy through the removal of trade barriers. Since early 1990s, the Bangladesh economy experienced a process of integration with the global economy resulting in a more open economy and reduced tariff barriers. Revenue loss from the trade-based taxes has mainly been compensated through the expansion of VAT coverage to many services, wholesale and retail, as well as the continued increased share from direct tax**.**

[2]At the beginning of July, 1991 sales and excise taxes were replaced by Value Added Tax system. Initially, VAT system is engaged to mainly in manufacturing sectors, also, exits numerous exemptions, reduced rates and cascading problems. While, agriculture sector was fully VAT exempted.

Though the VAT base compared to the income tax base has expanded at a faster rate; both income tax and VAT bases still suffer due to the lack of coverage, numerous exemptions, prevailing reduced rates and some implemented unequal treatments in case of income tax and VAT collections. Meanwhile, reforms in VAT have been attributed to greater domestic and import-stages VAT revenue performances in recent periods, but still now VAT productivity is lower than its potential, while both direct and indirect tax systems are more buoyant. Mansur, Yunus and Nandi (2011) conducted research to evaluate the tax system of Bangladesh. Using cross-country panel analysis to estimate the VAT efforts against VAT potentiality, they pointed out that performance of the VAT system in terms of efficiency indicators (tax base and administrative indicators such as government effectiveness and institutional quality) is not impressive. The coefficient of the VAT base indicators such as industry value addition is not significant at the 5 percent level, which reflects the prevalence of a narrow base and different exemptions. Additionally, the coefficient of tax administration indicators is also insignificant, indicating weak administration capability of the current VAT system. They also calculated the VAT and income tax efforts index are significantly lower than unity which are also low compared to other comparators. This implies that Bangladesh has huge tax potential in terms of both income tax and domestic VAT; and further reforms in both domestic VAT and income tax may raise tax efforts. **Box II** and **Box III** respectively capture the key features of the Bangladesh VAT system and structure.

Box II: Current Bangladesh VAT System

Characteristics of VAT System	**Exemptions and Deductions**	**Current tax status with rates**
❑ Invoice method VAT applied to manufactures	❑ Firms with turnover less than Tk. 8 million per annum.	❑ 15 percent at standard rate
❑ VAT is applicable to imports and selected services and goods at the domestic wholesales and retails	❑ 3.0 percent turnover tax is applicable and no rebate is allowed on inputs	❑ Fixed VAT amounting Tk. 14,000 for small retailers of Dhaka City Corporation
	❑ Education, public administration, housing and charitable health services, cold storage, travel agency, indenting firm, construction faces a reduced tax without credit from invoiced tax	❑ Fixed VAT amounting TK. 10,000 for small retailers of Chittagong City Corporation
		❑ Fixed VAT amounting TK. 7,200 for small
❑ Exports are exempted from VAT	**Goods Exempted:**	

Box II: Current Bangladesh VAT System

- VAT is levied on the base inclusive of Customs duties and supplementary duties
- Distortion–chain base system-i.e. tariff values and truncated base
- Wholesalers and retailers may register for VAT(those who want to engage in standard VAT system)
- Animals, meat, eggs, hides, fish, vegetables, fruit, grain, flour, cattle and poultry feed, primary milk products, insecticides, jute cuttings, oilseeds,
- A few chemicals and drugs, fertilizers, domestic textiles. Cottage industries (defined as a unit with an annual turnover of less than taka 2 million and a capital; machinery value added up to taka 300000). Some plastics, metal products, electricity used in the agricultural sector and a wide range of machinery and scientific apparatus.

retailers of other city corporations

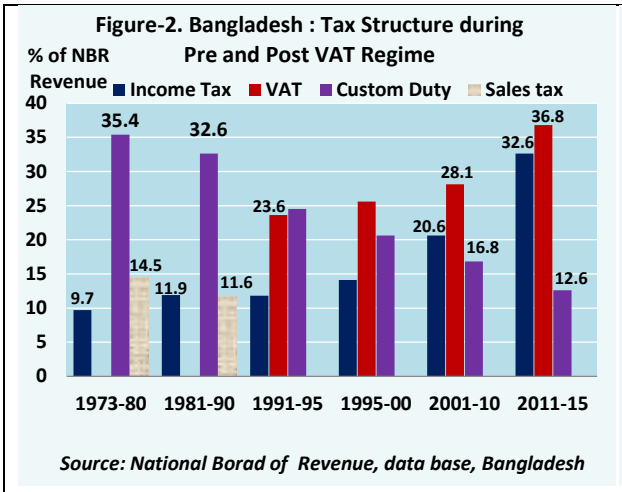
- Fixed VAT amounting TK. 3,600 for small retailers of all districts
- Truncated rates of 1.5%, 2.5%, 4.5%, 5% and 5.5% in cases where invoice method is difficult to apply. 3% for land development firm
- Commercial importers and fixation of VAT deductible at source at the rate of 4.5%. It varies in others types-services provided by commercial importers and businesses (3%), construction firms (7.5%), furniture manufacturers (6%), furniture sellers (4%) and procurement providers (4%).

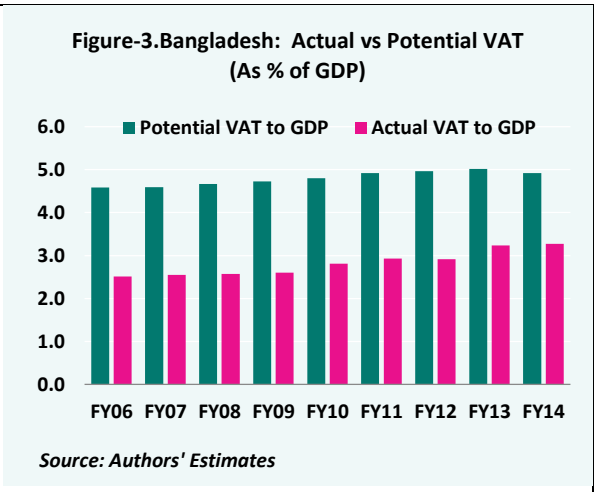
Source: National Board of Revenue, Bangladesh

Box III: Salient Features of VAT Structure

Revenue loss from trade-based taxes has mainly been compensated through the expansion of VAT coverage as well as the continued increased direct tax effort. Due to an enacted VAT Law and although VAT efforts continued to increase, it is still far below the potential. In terms of buoyancy,[3] Bangladesh maintains top position among the South Asian countries with a tax buoyancy ratio of 1.25. Indirect taxes appear to be slightly more buoyant than direct taxes. A higher buoyancy ratio of indirect tax indicates that the growth rate of the indirect tax was faster than its base and potential scope for raising further tax revenue collection from this source still exists.

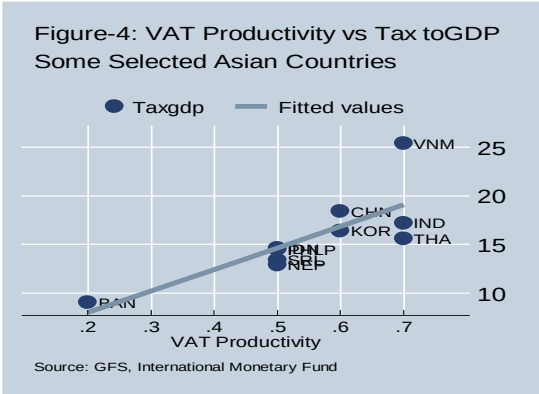
[3]Tax revenue buoyancy is defined as the percentage of change in tax revenue to percentage of change in GDP. In contrast, tax elasticity summarizes the impact of both tax policy (base effect with an unchanged tax administration) as well as tax administration (efficiency in raising additional tax revenue from the same base with an unchanged tax policy).

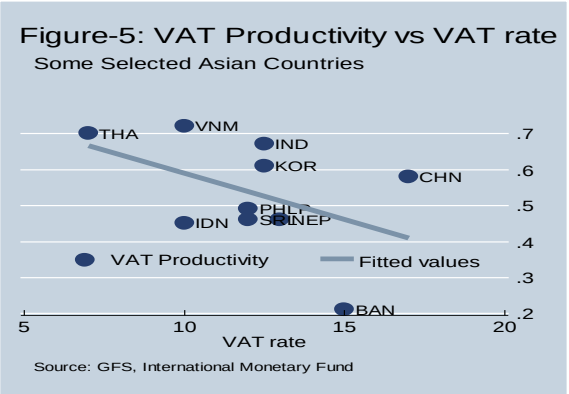




A cross-country comparison shows that tax-to-GDP and VAT productivity in Bangladesh is significantly lower than other countries with similar levels of socioeconomic development[4]. The fitted relationship is positive and statistically significant, suggesting that as the efficiency of VAT collection increases so does the tax-to-GDP ratio.

Contrary to these conditions, multiplicity of tax rates as well as the prevalence of widespread exemptions, tariff values eroded the efficiency of the VAT system in Bangladesh. Thus, Bangladesh's relatively low VAT-to-GDP ratio is mainly characterized by a low level of domestic taxes and high statutory nominal VAT rate.





Description of Policy Interventions: Strengthening of VAT Base

As mentioned above, VAT productivity in Bangladesh is lower compared to other countries in the region, suggesting that VAT productivity is below its potential and mainly due to narrower base. Moreover, it is possible to significantly boost VAT productivity through lowering exemptions, broadening the base and increasing administrative reforms. Accordingly, in this paper the following two policy interventions have been proposed**.**

[4] The estimated regression is tax-to-GDP ratio = 3.11 + 4.84*VAT productivity, R^2 = 0.81 with a calculated t ratio of 2.9 on the estimated coefficient of VAT productivity ratio. Where, VAT productivity is simply the ratio of VAT to GDP to standard VAT rate for each country (***Source: Mansur, Yunus and Nandi, 2011, "An evaluation of Bangladesh tax system" IGC Working Paper***).

TABLE 2: SUMMARY OF THE PROPOSED POLICY INTERVENTIONS

Name of Intervention	Description of Intervention	Objective of Intervention	Expected Outcome
(A) Elimination of all Tariff Values on selected commodities.	○ All tariff values[/1] in the commodities will be replaced by current market value of commodities.	○ Broadening the domestic VAT base ○ Reduce cascading problems in the existing VAT system.	Revenue to GDP is expected to rise by about *0.6 to 0.7percent.*
(B) Automation of VAT tax system under VAT Online Program (VOP) project	○ All registration process for VAT tax payers of the current system will be replaced by on-line system ○ Enhancing the skill of tax administrators through developing new ICT system for VAT collection	○ Increase the number of active registered VAT tax payers from 50,000 in 2014-15 to 85,000 in 2018-19. ○ Improve transparency in the VAT administration ○ Ensuring to provide better services with the minimum level of administrative costs for tax payers, and to raise awareness the need to register and file to VAT.	Revenue to GDP is expected to *rise by 1 percentage point.*

Note /1& Note /2: See tariff values in Box IV

Since the inception of VAT in 1991, NBR has introduced various ad hoc measures in the VAT system which is only specific to Bangladesh. Since such specificity also includes tariff value further explanation may be warranted. This is briefly discussed below.

Box IV: Tariff Value in the VAT System of Bangladesh

- Tariff values or administered value as tax bases for certain notified products. Tax base (i.e. in this case tariff value) is composed Q and P. Assuming that Q is known, NBR essentially uses administered prices (P) which are lower than market prices to derive the product specific tariff values. For example, market price of refined edible oil in Bangladesh equals to 113,400 taka per metric ton; and a trader purchases an amount of 10 metric tons for selling to the end customers. Thus, according to the VAT rule, the VAT base of refined soybean oil should be (113,400 x 10). However, NBR uses the tariff value for per metric ton soybean as 4,110 taka. Given the same quantity, the VAT base of refined soybean oil under the tariff value system will be (4,110 x 10). Thus, in this manner the VAT bases have been truncated compared to the actual market price of specific commodities and services that are not exempted in the VAT system.

Box IV: Tariff Value in the VAT System of Bangladesh

- It has been argued that use of lower than market prices for a number of products helped safeguard revenue as well as to lessen the impact on domestic prices. Revenue collection from tariff value items in FY13-14 was Tk. 69.8 billion or 16% of total domestic indirect collected tax revenue (i.e. Tk. 429 billion).

Source: NBR VAT Structure, Bangladesh

Data and Methodology

The analysis presented in the report is very data intensive, primarily based on secondary data available from various official sources for recent years and using FY14 as the base. Import Values with VAT, SD, and other different types of taxes and duties levied on imports such as customs duty (CD), and regulatory duty (RD) have been collected from the ASYCUDA Plus/World system. This is operated by the Customs Wing of the National Board of Revenue (NBR).Tariff Values set by the NBR for various goods for the latest years (i.e. FY12 to FY14) have been generated from the information contained in various budget documents. However, since this data set does not indicate the current market prices for the products subject to tariff value, to overcome this information gap, interviews have been conducted with key informants/market participants to gather market prices for the relevant tariff value items. The aforementioned data has been used to estimate potential revenue gains from the replacement of the tariff values in the VAT system.

However, additional data has been used to estimate the benefit from the second intervention – automation in the VAT system under the VOP project[5]. Recently, 35,000 VAT tax payers have maintained their VAT return on regular basis (active VAT payers), but National Board of Revenue(NBR) notes about 600,000 listed VAT registered entities. In general, entities in the

[5] **VAT Online Program Project** will introduce automation, including on-line VAT taxpayer services, and improve transparency in the VAT administration system. The project will support the government to implement the new VAT law which comes into effect in 2015, aims to reduce administrative costs, and seek to increase the number of active registered taxpayers from 35,00 to 85,000 in 2018-19.

automation system enjoy benefit to save the compliance cost that includes the cost relating to tax accounting, preparing tax returns, submissions, settlements and dispute resolutions, covering both in house and outsourcing. Because in an automated system each tax payers reduce compliance cost to submit their return through the online. Thus, the savings of compliance cost from the VOP program project will be considered as a benefit from this second intervention. To calculate the benefit from the savings of an entity's compliance cost, we use the survey data on Tax Perception and Compliance Cost of the formal firms conducted by International Finance Corporation (IFC) in April, 2013.[6]

There may be two types of costs: (i) direct cost of revenue mobilization; and (ii) indirect cost to society – imposing taxes distort prices and resource allocation. Different types of tax expenditure data have been collected from the Medium-term-Budgetary Framework (MTBF, 2014-15) to calculate direct costs for tax collection. Moreover, we also use the VOP project's costs from the World Bank as another direct cost for the intervention of VAT automation. Information on the value of Marginal Cost of Funding (i.e. raising tax revenue, MCF) has been obtained from various reports on MCF calculations for the VAT of Bangladesh[7]. To assess the probable impact on welfare loss from the expansion of VAT base, it has been used the MCF value of VAT that ranges from 1.07 to 1.18 as a measure of the indirect cost of tax collection. If the MCF value exceeds unity, it indicates the welfare loss. We use the highest possible value of the MCF based on different reports conducted to calculate the MCF value of VAT or indirect taxes, to quantify indirect costs from distortion. Empirical evidence suggests that replacing a cascading VAT system with a uniform base and reduction in the exemptions, yields to less distortion and a lower level of welfare loss (***Auriol & Warlters, 2009***). Though our proposed interventions expand the VAT bases that subsides the impact of tax distortion, we also consider the highest value of MCF to estimate the maximum loss, which may actually be lower than our calculations.

[6] The survey of formal firms was carried out with 1000 firms to quantify the compliance costs for businesses registered with NBR (formal firms). This survey gathered information about the time and financial costs of complying with tax obligations and to help measure "non-traditional payments'. Databases of different business chambers was collected and used to develop a population frame of 6,933 formal firms, and finally survey was carried out 1000 firms as a sample.

[7]MCF value indicates the deadweight loss due to distortion from after taxation. MCF shows the changes in welfare loss due to any incremental change in tax revenue from reforms. In this study it has been taken MCF values to estimate deadweight loss from the studies of ***Suithwart-Narueput&Thierfelder*** (2002) and ***Devaranjan et al*** (2001). Basically, they calculate the different MCF values to measure welfare loss based on ***Computed General Equilibrium (CGE)*** model for some selected developing countries. MCF technically corresponds to the "***Equivalent Variation***".

There is no readily available method to estimate the benefit of additional revenue. It is assumed that the additional revenue would be used as investment, leading to further income generation. We have used an Input-Output model to assess the benefit of additional revenue gain, assuming that the resource has been implemented efficiently.

Revenue Gains from Proposed Interventions

Tariff value Elimination

Under the proposed intervention, existing tariff values have been replaced by market values to determine the true VAT bases for the tariff value items. As mentioned above, tax base is defined as *Value = Q x P*.NBR data shows revenue(R) against tariff value items. Assuming P as unity (P=1), product specific tariff value is divided by product specific revenue to derive implicit quantities (Q) for each tariff value item. After that, actual market prices[8] are then used along with the estimated quantities to derive actual tax bases for all tariff values. Finally, revenue gains from tariff value elimination intervention have been estimated by imposing 15% VAT rate on the derived tax bases (***See detail in Appendix-1***).

Revenue implication from the first intervention is provided in Table 3. Revenue collection from tariff value items in FY13-14 was Tk. 69.8 billion or 23.9% of the total domestic VAT revenue collection (i.e. Tk. 292 billion). When tariff values are replaced with market values, the total revenue from these sources m amounts to Tk. 146.2 billion, implying a 109.4% increase over the revenue currently collected from tariff value items.

TABLE 3: REVENUE GAINS FROM TARIFF VALUES ELIMINATION, 2013-14

(IN MILLION OF TAKA)

Broad Product Categories	Current System (Tariff Value)	Proposed system (Market Value)
Total VAT From Consumer Goods	32,124	73,855
Total VAT From Intermediate Goods	36,538	69,694
Total VAT From Capital Goods	1,171	2,662
Total VAT Revenue	69,833	146,212
Revenue Gain from Tariff Value Elimination		**76,378**

Source: Authors' Estimates

Revenue Gain from VAT Automation

Automation should lead to greater tax revenues as both the direct costs (e.g. bookkeeping, physical filing of receipts, in person meetings at tax offices) and indirect costs (dealing with unscrupulous tax

[8]For this purpose, market prices of all consumer items have been collected through interviews. Interviews generally revealed that tariff values in most cases were significantly below their market prices sometimes by as much as 300%-400%. Also, in the case of intermediate and capital goods, market prices of all products could not be ascertained and the prices for the missing products have been assumed to be twice their current tariff value prices.

officials) of tax compliance are reduced. This line of reasoning builds upon standard economic models of criminal behavior, (e.g. Becker 1974), where an individual weighs off the benefits of committing the crime, against the risk of getting caught and the costs of punishment, if caught. In this case, by reducing compliance costs, the benefits of tax avoidance are lower, and at the margin should lead to increased compliance and revenue generation.

India provides an example of the benefits of automating tax compliance. At the beginning of the century, India underwent a number of tax reforms, including automation, which collectively raised the tax-to-GDP ratio from 14% in 2001 to 20% in 2009 (Ernst and Young, 2011, Mansur and Yunus, 2012). In terms of estimating the revenue gain in the Bangladesh context, the World Bank targets 50,000 more VAT payers and tax-to-GDP ratio increase of 1% (World Bank, 2015). Due to the absence of specific data, we assume that each new tax payer is willing to pay 75% of the direct compliance cost avoided by automation (**Table 4 for the costs of compliance**). This implies that each tax payer pays about 480,000 taka per year in VAT, significantly less than the current average VAT payer liability of approximately 1,000,000 taka.

Table 4: Revenue Gains from VAT Automation Under VOP Project

Components of Compliance Issue	**2013-14**	**2018-19****
No. of active registered VAT Payers	35000	85000
Willingness to payment per VAT payers under VOP project[1]		479,745
Revenue Gain per year ((50,000 x 479,745)/ 5), In billions of Taka		24.0
Compliance Costs to VAT revenue ratio[2]	11.6	7.0
Assumptions:		
Marginal reduction of compliance cost of per VAT payer***	0	666,153
No of total VAT payers including active and non-active registered	113113	144364
No of non-active VAT payers	78113	59364

Source: Author's Own estimates

** Indicates the end period of VOP Projects

*** Marginal reduction of compliance cost equals to zero in 2013-14 because of no automation during this period.

/1 we consider that without any incentive new VAT payer will try to evade tax return if automation reduces to compliance cost zero. In this line, any incentive is needed for new VAT payer. Here, we assume the incentive for tax return as the positive gap between maximum benefits (Marginal reduction of compliance cost per VAT payer) and the actual tax payment. Thus, tax return for each new VAT payer must below the marginal reduction of compliance cost.

/2 compliance cost to VAT declines, but not zero because we consider only additional 50,000 non-active registered VAT payers are involved in automation. This implies that a VAT payer in the automation bears zero compliance cost.

It is estimated that the total revenue gain from VAT automation will amount to 24 billion taka per year (0.18% of GDP) or 121.2 billion taka total over five years until the end of the VOP program project. Thus, overall revenue gains from these two interventions amounts to 100.4 billion taka during 2013-14 or 0.75 % of GDP.

Cost Implication of the Intervention

Direct Cost from Tax Administration

The previously discussed cost associated with the proposed interventions can be attributed to two categories, i.e. direct administrative cost to collect revenue and the cost of the VOP projects for automation in the VAT system and indirect cost which may generate from price distortion and welfare or dead-weight loss due to the expansion of overall VAT base. The cost of the VOP projects for automation in the VAT system and the administrative cost for revenue collection are found in the form of material cost and manpower cost, i.e. staff salaries, infrastructure costs, training and capacity development costs.

Table 5 shows the direct administrative cost of VAT revenue collection. Based on 'Medium-Term Budgetary Framework' (MTBF, 2014-15) data, cost per 100 taka VAT revenue collection accounts to 3.7 taka. But, actual collection cost per 100 taka revenue may rise from the fiscal year of 2015-16 due to recent salary hikes of government officials; modernization and automation of the VAT system and construction of new tax zones and custom houses in both district and Thana level. In addition, after the inclusion of the VAT automation project cost, total estimated direct cost for these proposed interventions amount to 21.2 billion taka. These additional costs of the VAT automation project increase to 4.76 taka as direct cost for VAT revenue collection per 100 taka. Break down cost categories have been provided in Table 5 below.

Table 5: Direct Costs of VAT Revenue Collection in Bangladesh, 2013-14

Cost Categories	Core Taka
National Board of Revenue	736
Customs Houses	88
Customs, Excise and VAT Commission rates	128
Bond and Appellate Commissionerates	24
Other Customs and VAT Offices	6
Tax Zones	221
Tax Appellate Zone	25
Tax Intelligence and Inspection	25
Training	17
A. Total VAT Revenue Collection Institutional Costs	**1,270**
B. Incentives, PSI fees, Band-roll and Stamp, etc	**376**
C. Cost of VAT automation VOP Project	**470**
D. Total VAT Revenue Collection Costs (A + B+C)	**2,116**

E. VAT Revenue Collection	**44,500**
F. Cost per 100 Taka VAT Collection (D/E x 100)	**4.76**
Total direct Costs for Policy Intervention (*Revenue Gains from Intervention* x 0.0476*)	**477.2**

Source: MTBF, 2014-15, Ministry of Finance, Bangladesh

* Total revenue gain from two interventions has been estimated to be Taka 100, 40 crore. Direct cost is calculated as taka 477.2crore (100, 40 x 0.0476= 477.2)

Indirect Cost from Price Distortion

A major concern with indirect tax reform (e.g. VAT and sales tax etc.) is the potential impact on prices faced by consumers. The revenue impact of the reforms envisaged in the context of tariff value elimination and the automation of the VAT system have been estimated to be 100.4 billion taka. Revenue gains from the domestic and import stage of the VAT system may range from 20% to 30% over the current VAT revenue collection. However, since there could be a one to one relationship between the increase in tax incidence and price changes in the market, it is important to estimate the likely result of revenue impact on the general price level in Bangladesh[9]. In general, the price hike due to arise in tax revenue collection would lead to a distortion in prices that creates welfare or dead weight loss. Due to the scarcity of data, the calculation of demand and supply elasticity for various commodities in Bangladesh is very difficult to estimate. As a result, to quantify the welfare loss due to these proposed interventions, the value of the MCF Bangladesh has been used. Experiences of other countries suggest that the pass on the effect of revenue increase on the welfare loss is significantly less in the VAT base expansion than on the base expansion in direct tax and other indirect taxes (***See Box V***).

Box V: VAT Reforms and Assessing the Efficiency or Dead-weight Losses of Revenue Increase

Dead-weight Loss Measurement: The appropriateness of a given tax increase must be gauged on the efficiency loss associated with it, i.e. its deadweight loss (***Feldstein 1997***). Efficiency loss associated with tax increases depends on the behavioral responses of economic agents which affect the tax bases. An appropriate metric for gauging such loss should compare the economic cost and the extra revenue for a given tax increase. One such metric is the so-called marginal cost of public funds(MCF), which is defined as the ratio between the change in consumer surplus and the extra tax revenue obtained from a given marginal tax increase. The MCF can be calculated using the following formula:

$$MCF_{i,k} = \frac{\Delta W_{i,k}}{\Delta TR_i}$$

[9]Mansur and Khondker (2015) found that the estimated overall price increase may range between 0.25% and 0.5% after the implementation of the new VAT Law 2013.

Where, $\Delta W_{i,k}$ is the welfare loss due to the increase of tax k in a country i and is calculated as the change in consumer indirect utility function. ΔTR_i indicates the change in tax revenue due to any reform. This technically corresponds to the equivalent variation. Therefore, MCF provides a metric for the loss in welfare per unit of tax revenue gain. If the MCF value equals one, the tax is merely a lump-sum transfer from households to government with distortion. Typically, however, the MCF is greater than one, so that MCF = 1 +α, with α>0 representing the cost of distortion. This means that for every taka that goes into the government's purse, the economy pays an efficiency cost of α taka. Thus, the higher value of MCF, the larger the distortive cost associated with the tax revenue gains.

VAT Reforms and Dead-weight Loss in Cross-Country Experiences

Cross countries' evidences (***Dahlby, 2008***), (***Devaranjan et al***, ***2001***), (***Ahmad and Stern, 2002***) of tax reform suggested that countries where the relevant tax burden is already high tend to have higher MCF value. Table no 6 depicts a comparison of the level of distortion for VAT and overall taxes and their weights as a share of GDP explains that the lower value of MCF combined with a lower tax burden offers greater potential for further tax increases in order to minimise related the distortionary effects.

Table 6: Efficiency Loss for Raising Tax Efforts
(Some Selected Countries in the World)

Country	Range of MCF Value for all taxes	MCF Value of VAT	Tax to GDP (%)/1
Australia	1.15-1.51		21.3
Bangladesh	0.95-2.18	1.07-1.18	9.1
Canada	1.25-1.53		11.6
China		2.31	11.2
Indonesia	0.97-1.75	1.03-1.19	10.6
India	1.54-2.17	1.59-2.12	10.8
Sweden	1.69-2.29		20.7
USA	1.08-1.47		10.5
African Average	1.21	1.11	14.2

Source:*Devranjan, et al(2002), Ahmad and Stern(1997),Dahlby(2008), Laffont, et al(1997)*

1/ All figures of tax-to-GDP are considered as 2012, and collected from World Development Indicators(World Bank)

Emmanuelle Auriol and Michael Warlters (2010) estimated the MCF in 38 African countries by using the Computed General Equilibrium Model (CGE). The estimate of the average MCF from marginal increases in all taxes is 1.2 while VAT accounts to 1.1 on an average from the expansion of the VAT base by removing some exemptions, and elimination of the cascading VAT system. This study argued that MCF value would have been lower than estimates keeping the lower level of VAT administration cost.

Delfin S. et al (2005) estimated the average MCF of a VAT in South Africa, which was 1.03. This MCF value was higher for low-income households than for rich households. Indeed, rich households were better off because they received a bigger share of the total lump sum transfer from the tax increase. Low-income households now pay higher prices for commodities such as food that are subject to a higher VAT in this scenario. It was interesting to note that in the aggregate, the value of MCF amounted to negligible for a VAT in the reform of South African VAT system.

Since VAT and related revenues are essentially consumption tax paid by the final consumers, any increase in revenue from these sources would need to be paid by the consumers. In other words, consumers would be required to pay this additional amount in the form of higher prices. Thus, taxes are distortionary, inducing changes in private sector behavior that are adverse to efficiency, and impose a deadweight burden. In consequence, the MCF will typically be greater than one (***Bevan. D, 2012***). Overall deadweight loss also highly depends on the tax system in an economy. A poorly designed tax system may actually reduce existing deadweight losses by accidentally offsetting a distortion created elsewhere in the tax system. Thus, to test the effectiveness of any tax reform-either direct or indirect taxes – it is logical to evaluate the estimated deadweight losses from reforms in various tax categories.

One recommended approach is to estimate the impact on deadweight loss as a result of the intervention or reform. In general, the estimation of MCF value by using the general equilibrium framework (CGE) has been treated as a well-known approach to quantify deadweight loss due to reforms in VAT[10]. But estimating the impact of these interventions is taken as reforms in VAT on deadweight loss is beyond the scope of this paper. However, while assessing the revenue and welfare or deadweight loss impacts of the VAT for developing countries, ***Devaranjan, Suthiwart-Narueput&Thierfelder (2001***) found that the estimated overall the marginal cost of VAT revenue fund increase for Bangladesh ranged between 1.07 and 1.18 ***Bevan. D (2012)***, however***,*** found that the estimated overall marginal cost of the entire tax revenue fund increase for Bangladesh ranged between 0.95 and 2.18. Obviously, the welfare loss of VAT reform is lower than the reforms in direct and other import-base taxes (**See Box-V**).

Moreover, the range of estimated MCF value (1.07 to 1.18) of Bangladesh has been considered to estimate the deadweight loss due to these VAT interventions. Thus, distortions faced by consumers due to these interventions may have less deadweight loss. If we consider the lower bound of MCF equals to 1.07, which implies that a 1 taka increase in VAT revenue yields 0.07 taka of deadweight loss, while considering the upper bound of the MCF value of VAT deadweight loss per taka may amount to 0.18 taka in Bangladesh. Total revenue gain under the two interventions has been estimated to be 100.4 billion taka. Deadweight loss from price distortions has estimated from these interventions amounts to 7 billion taka from the lower bound of MCF value, while, it increases to 18.1 billion taka in

[10]See details in Devaranjan et al (2001), Suithwart et al (2002), Auriol&Warlters (2009).

the case of upper bound of MCF value (***Table 7***). Thus, overall distortion from VAT intervention is likely to be limited to range between 7% and 18% of the overall gain from these proposed interventions.

However, there is reason to believe the deadweight loss from these VAT interventions may be much lower than in the upper bound level of MCF value[11]. This is because the removal of all tariff values in the VAT system and automation in the VAT administration cost may reduce distortions, rather than create them. These distortions include: cascading in the VAT system, reduced and multiple rates and the long list of exempted commodities truncated the VAT bases (***Auriol &Warlters, 2009***).

Table7: Estimated Deadweight Loss and Indirect Cost in Bangladesh in FY13-14

Key Variables	In billions of taka
A. Revenue Gain: Tariff value system	*76.4*
B. Revenue Gain: Automation in VAT System	24.0
C. Revenue Gain: From VAT Interventions	**100.4**
Revenue gain as % of GDP	**0.75**
Indirect Cost from Price distortion:	
A. Indirect costs (Lower Bound)**	7.0
A. Indirect costs(Upper Bound)**	18.1
B. Average Indirect costs from Deadweight Loss	**12.5**
Memorandum Items:	
Value of Marginal Cost of VAT Revenue (Lower Bound)	*1.07*
Value of Marginal Cost of VAT Revenue (Upper Bound)	*1.18*

Source: Author's own estimates

** *Indicates the Deadweight loss estimates that is estimated by this formula: Dead weight loss per extra taka VAT revenue (MCF – 1) X total revenue gains from VAT reform.*

Estimated Benefit of the Interventions

Benefits from Savings of Compliance Costs

Benefits from automation have been treated as the savings of compliance costs of VAT returns and accounting procedures of firms without maintaining the active registration process and returns files through the regular online system. Thus, firms without maintaining tax returns at regular basis have to incur costs from compliance issue that includes the cost relating to tax accounting, preparing tax returns, submissions, settlements and dispute resolutions covering both in house and outsourcing. Since the implementation of the VOP projects helps to reduce the time and financial costs of

[11] MCF values from VAT reform will be higher when VAT system are more flawed with cascading problem, long listed of exemptions and truncated base. Truncated bases cause to higher effective tax burden for VAT payers leads to the more welfare loss. But, our proposed interventions reduce the truncated bases Of VAT with lower level of VAT exemptions that may keep minimum level of distortions from VAT reforms in Bangladesh.

complying with tax obligations, the newly targeted 50,000 firms under VOP projects through automation save their non-traditional payments (compliance costs) from the time of VAT returns. Based on the Survey on Tax Perception and Compliance Cost of the Formal Sector, it has been calculated that the total benefits or the total firms' cost savings from compliance cost after implementation of VOP projects. This benefit is calculated by using the formula given below:

(Number of active registered VAT payers in 2018-19 – Number of active registered VAT payers in 2013-14) x (Average reduction of marginal compliance costs for each firm in automation system)

TABLE 8: BENEFITS FROM AUTOMATION OF VOP PROJECTS

Categories from Compliance Costs:	**In BDT**
Average reduction of marginal compliance cost from Value Added Tax	**666,153**
Of Which:	
Costs from obtaining TIN costs	4295
Average staff time spent (working days) on Book-keeping and Tax- Accounting	615,892
Average cost of outsourcing bookkeeping	45435
Average staff time cost of tax inspection	531
No of active registered VAT payers in 2013-14	35,000
No of active registered VAT Payers in 2018-19, under VOP Project	85,000
No of new active registered VAT payers under VOP Projects/1	**50,000**
Total benefit from automation, in million taka	**33,307**
Benefits of VAT Automation as % of GDP	**0.25**

Source: Author's own estimates

/1 33,307 million taka benefits will be generated from VOP Projects. Thus, indirect benefits from VAT automation per year amount to 6661.5 million of taka.

The Bangladesh survey report on tax perception and compliance cost of the formal sector conducted by IFC has calculated the average compliance cost to return the VAT per entity to the amount of 6, 66, 153 taka. We assume that extra 50,000 new business firms will be included under this VOP program, and every firm of 50,000 will reduce their compliance cost by amount of 6, 66,153 taka. Thus, total estimated benefits from automation as the reduction of compliance costs of VAT return amounts to 33.31 billion taka implying 0.25 percentage increase of GDP at the final year of VOP project. Thus, indirect benefit from automation registers to 6.66 billion of taka in 2013-14.

Benefits from Enhanced Investment

Bangladesh faces huge resource constraints in infrastructure investment, but investment in the infrastructure sector will play a pivotal role in contributing growth and productivity through capital

accumulation. Based on the World Bank report, Bangladesh needs to invest as much as 471 billion taka per year to reach the investment target of 4.1– 5.5 trillion taka for transport, electricity and WSS by 2020[12]. In the context of Bangladesh, Annual Development Programs (ADP) has been used for capital formation. A review of ADP allocations against the targets set out by World Bank suggests that there are huge gaps between them. For instance, in FY14 ADP allocation to these sectors increased only by 72 billion taka against the estimated requirements of 471 billion taka (the lower bound case) and 634 billion taka (the upper bound case (***Table-9***). Given the extent of gaps, the additional revenues are most likely to be allocated for investment in infrastructure.

Table-9. Bangladesh: Infrastructure Gaps and Investment Requirements

	In billion of Taka	
Categories of Investment:	**2013-14**	**2014-15**
	Actual allocation in ADP	
Transport	154	194
Electricity	91	93
WSS	55	105
Sub total	**299**	**392**
Allocation Increase, per year	**72**	**93**
Actual Requirement to fill Infrastructure Gap, per year/1	**471**	**471**
Actual Requirement to fill Infrastructure Gap, per year/2	**634**	**634**
Shortage of investment to fill Gap, per year/1	**399**	**378**
Shortage of investment to fill Gap, per year/2	**562**	**541**

Source: Authors own estimates. 1/ indicates lower bound case and 2/ indicates upper bound case

The additional revenue gain may be invested to generate income. We converted the Input-output Table 2012 into an Input-output model to assess the total impact of additional investment. The total revenue gain has been estimated at 100.4 billion taka. The additional revenue may be allocated to the 'Annual Development Program (ADP), boosting productive capacity and income. However, funds allocated for ADP are not entirely used for gross capital formation. It has been found that a significant part of ADP has been used for salary and wages of project staff, maintenance and purchase of office equipment, stationery etc. Although BBS in a dated study found the proportion of ADP allocation used for non capital formation purpose is as high as 37%, no recent estimate is available. In this exercise we have retained the 37% as non-capital formation expenditure. 63.24 billion taka would be available for investment (i.e. 100.40 – 37.16 = 63.24 taka). Thus, 63.24 billion taka has been injected into the Input-output model to determine the total benefit of additional investment. Estimated benefit has

[12]See ***Andres et al. (2013)*** for the description on the methodology for computing these estimates. World Bank estimates to $59 billion of investment requirement in lower bound and $79.5 billion of investment requirement in upper bound for electricity, transports and WSS to mitigate investment gaps of these sectors.

been found to be 121 billion taka from additional investment. Table 9 shows that Bangladesh needs 471 billion to 634 billion taka per year for investments to close infrastructure gap. The Annual Development Program (ADP) is the main source to fill up this gap. Though Bangladesh has become able to increases allocation in ADP per year, this progress in ADP implementation seems to be negligible in reducing the huge infrastructure gap. Thus, this additional 100.4 billion taka revenue gain from these proposed interventions will be an additional source of financing for the government of Bangladesh to finance in the various infrastructure projects.

Benefit-Cost Analysis

Estimated monetary values of benefits and costs have been used in a standard benefit-cost framework to find the extent and nature of benefit – cost of the proposed intervention. The results are provided in Table 10. The benefit – cost ratios (BCR) found for discount rates 10%, 5% and 3% respectively are 5.46; 5.51 and 5.52.

Table 10: Benefit and Cost Ratios of the Proposed Interventions

(***In billions of Taka or otherwise Indicated***)

Benefit – Cost Components	**Value**	**Value as % of GDP**
Benefits From Intervention:		
A. Tariff Values Elimination	76.4	0.57
B. VAT Automation	24.0	0.18
C. Overall Revenue Gain	**100.4**	**0.75**
Estimated Benefits	**127.6**	**0.95**
D. Benefits from the savings of Compliance Cost	6.6	0.05
E. Benefits from Investment	121	0.90
Total Benefits per year	**127.6**	
Costs From Intervention:		
VAT program Cost (one-off)		
E. Direct Costs: Administrative, manpower, material costs, etc)	4.7	0.04
F. Indirect Costs: MCF***	18.1	0.13
G. Overall Costs per year:	**22.8**	**0.17**
H. NET Benefits from Intervention	**104.8**	**0.78**
Benefit-Cost Ratio[1] @ discount rate 10%	**5.46**	
Benefit-Cost Ratio[1] @ discount rate 5%	**5.51**	
Benefit-Cost Ratio[1] @ discount rate 3%	**5.52**	

Source: Authors' Estimates

**** Indicates the upper bound of MCF value, and consider 25 periods of time horizon for the calculation of Benefit-Cost Ratio.

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Appendix-1: Revenue Calculation from Removal of Tariff Values

Table A1: VAT Collection and Proposed Revenue Impact from Consumer Goods under Tariff Schedule 2014

H. S. Code	Item name as per Tariff Schedule	Tariff Rate in BDT/1	Units	Item category by NBR/2	Market Prices in BDT/*	Units	Market Prices after Unit Adjust. in BDT/3	VAT Collected using Tariff Rates in BDT	VAT Base (Units)/4	VAT Collected using Market Prices (in BDT)/5
04.02	From fluid milk to milk powder production	100	Per KG	Milk Powder	600	Per KG	600	1111319246	11113192	6667915476
				Milk(Condensed)	150	Per KG	150	17352000	173520	26028000
09.04	Chili powder, Coriander, Ada, Yellow or Spice Blend	35	Per KG	Spice	300	Per KG	300	193021600	5514903	1654470857
09.09										
09.10										
15.07	Refined Soybean Oil	4110	Per Metric Ton	Edible Oil : Soybean Oil	105	Per Liter	113400	1134122457	275942	31291845894
15.18										
15.11	Refined Palm Oil	3700	Per Metric Ton	Edible Oil : Palm Oil				54720500	14789	
15.14	Rapeseed Oil, Colza Oil and Canola Oil	6667	Per Metric Ton	Edible Oil : Mustard Oil	250	Per Liter	270000	3000	0	121494
19.05	Machine Prepared Biscuits:			Biscuits				1309502234		
	Crackers/ Digestive/Chocolate Biscuits	100	Per KG		50	250 gms	200		5344907	1068981416
	Energy/Cream Biscuit	80	Per KG		20	100 gms	200		5344907	1068981416
	Regular Biscuits	65	Per KG		50	350 gms	142.85		5344907	763519976
19.05	Hand Made Cake:			Others Food Products				1152362586		
	Dry Cake	85	Per KG		120	350gms	342.84		2376005	814589668
	Party Cake	400	Per KG		700	kg	700		2376005	1663203732
20.01	Pickle (Bottle)	50	Per KG	Pickle	100	200gms	500	705000	4406	2203125
	Pickle (Packet)	60	Per KG		120	500gms	240		4406	1057500
20.01	Chutney	50	Per KG		120	500gms	240		4406	1057500
20.09	Mango Juice	15	Per 1000 Mil. Gram	Fruit juice	22	250ml	30	88153083	1469218	44076542
20.09	Pineapple Juice	15	Per 1000 Mil. Gram		335	1 lt	335		1469218	492188047
20.09	Guava Juice	15	Per 1000 Mil. Gram		315	1 lt	335		1469218	492188047
20.09	Tamarind Juice	15	Per 1000 Mil. Gram		320	1 lt	335		1469218	492188047
24.02	Handmade cigarette (Without Filter)	1.37	Per 8 Piece Packet	Bidi	21.92	Per 8 Piece Packet	21.92	1224184160		1224184160
		2.05	Per 12 Piece Packet		32.8	Per 12 Piece Packet	32.8			
		4.27	Per 25 Piece Packet		68.32	Per 25 Piece Packet	68.32			
	Handmade cigarette (With Filter)	2.32	Per 10 Piece Packet	Cigarettes	80	Per 10 Piece Packet	80	26086552951		26086552951
		4.64	Per 20 Piece Packet		160	Per 20 Piece Packet	160			
	Total VAT (BDT in Billion)(ALL CONSUMER GOODS)							**32.12**		**73.86**
	Total VAT (BDT in Billion)(ALL CONSUMER GOODS Except Cigarettes)							**4.81**		**46.54**
Notes	***/ Market Prices of Listed Items collected from survey of market. In products with various prices, the median price has been considered.**									

Table A2: VAT Collection and Proposed Revenue Impact from Intermediate Goods under Tariff Schedule 2014										
H. S. Code	**Item name as per Tariff Schedule**	**Tariff Rate in BDT/1**	**Units**	**Item category by NBR/2**	**Market Prices in BDT/***	**Units**	**Market Prices after Unit Adjustment in BDT/3**	**VAT Collected using Tariff Rates in BDT**	**VAT Base (Units)/4**	**VAT Collected using Market Prices (in BDT)/5**
27.01	Coal from Bara Pukiria Coal Mine	$10	Per Metric Ton	POL Products	$20	Per Metric Ton	$20	10529606169	13162007.7	21059212338.0
27.10	Burnt/unusable transformer oil	2200	Per Barrel 205 Liters	Lub. Oil	4400	Per Barrel 205 Liters	4400	346715400	156178.1	687183675.7
27.10	Lube Blending/Rubber Pressing Oil**	20	Per Liter		400	Per Liter	400		156178.1	62471243.2
27.11	LP GAS:**			L.P Gas						
	To be charged at increasing rate from 45 kg and above	3	Per KG							
	From 31kg- 45 kg	125	Per Cylinder		1400	Per Cylinder	1400	135732400	616965.5	863751636.4
	From 11kg-30kg	60	Per Cylinder		1200	Per Cylinder	1200		616965.5	740358545.5
	From 5kg-10kg	35	Per Cylinder		800	Per Cylinder	800		616965.5	493572363.6
27.13	Bulk Imported Petroleum Bitumen	3500	Per Metric Ton	Bitumen	7000	Per Metric Ton	7000	130486680	37281.9	260973360.0
44.03 - 44.09	CCB/CCA Treatment, creozode treatment, seasoned and CCA treatment (own wood or on collected wood)	200	Per square feet	Wood Articles	400	Per square feet	400	111435699	397984.6	159193855.7
	Diffusion treatment, Seasoned treatment, seasoned and diffusion, seasoning (own wood or on collected wood)	80	Per square feet		160	Per square feet	160		397984.6	63677542.3
48.01	News print	10,000	Per metric ton	Paper (All Sorts)	20,000	Per metric ton	20,000	20000000000	75639.0	1512779202.3
48.02	**(1)White writing paper**									
	(a)Higher than 50/55 mg	22275	Per metric ton		44550	Per metric ton	44550		75639.0	3369715673.1
	(b)Higher than 35/40 mg	25500	Per metric ton		51000	Per metric ton	51000		75639.0	3857586965.9
	(2) White ruled paper 55-59.99	23408	Per metric ton		46816	Per metric ton	46816		75639.0	3541113556.8
	(3) White printing paper									
	(a) 60 mg or higher	22130	Per metric ton		44260	Per metric ton	44260		75639.0	3347780374.7
	(b) 55-59.99 mg	22646	Per metric ton		45292	Per metric ton	45292		75639.0	3425839781.6
	(c) 50-54.99 mg	24030	Per metric ton		48060	Per metric ton	48060		75639.0	3635208423.2
	(d) 45-49.99 mg	25595	Per metric ton		51190	Per metric ton	51190		75639.0	3871958368.3
	(e) 35-44.99 mg	27830	Per metric ton		55660	Per metric ton	55660		75639.0	4210064520.0
48.04	Liner paper	19000	Per metric ton		38000	Per metric ton	38000		75639.0	2874280484.4
	White liner paper	20000	Per metric ton		40000	Per metric ton	40000		75639.0	3025558404.6
	Craft liner paper	22000	Per metric ton		44000	Per metric ton	44000		75639.0	3328114245.1
48.05	Medium paper	16000	Per metric ton	Paper Board (All Sorts)	32000	Per metric ton	32000	95263700	242.4	7756840.7
48.09	Self copy paper	22000	Per metric ton		44000	Per metric ton	44000		242.4	10665656.0
48.10	Duplex board/Coated Paper	21000	Per metric ton		42000	Per metric ton	42000		242.4	10180853.4
48.13	Cigarette paper (26 +/- 2)mg	33000	Per metric ton		66000	Per metric ton	66000		242.4	15998484.0
48.20	Exercise book/ Spiral Note book/ Copy (45 or more gsm)	25000	Per metric ton		50000	Per metric ton	50000		242.4	12120063.6
48.23	Simplex paper	18000	Per metric ton		36000	Per metric ton	36000		242.4	8726445.8
	Packing paper	20000	Per metric ton		40000	Per metric ton	40000		242.4	9696050.9
	Colored Paper	21000	Per metric ton		42000	Per metric ton	42000		242.4	10180853.4
48.18	Kitchen towel (24-26 gsm)	50000	Per metric ton		100000	Per metric ton	100000		242.4	24240127.2
	Toilet tissue (18-24 gsm)	52000	Per metric ton		104000	Per metric ton	104000		242.4	25209732.3

Table A2: VAT Collection and Proposed Revenue Impact from Intermediate Goods under Tariff Schedule 2014										
	Napkin tissue (20-24 gsm)	55000	Per metric ton		110000	Per metric ton	110000		242.4	26664139.9
	Facial tissue/Packet tissue (12-16 gsm)	60000	Per metric ton		120000	Per metric ton	120000		242.4	29088152.7
52.02 - 52.07	Cotton Yarn waste, known as hard waste and cannot be used to produce any clothe	10	Per KG	Cotton Yarn	20	Per KG	20	342471646.8	17123582.3	342471646.8
	Cotton Yarn, Twist and Thread	10	Per KG		20	Per KG	20		17123582.3	342471646.8
68.10	Electric Pole	66.67% of invoice	% of Invoice value	PC Pole	66.67% of invoice	% of Invoice value	66.67% of invoice	682206437		
69.04	(a) Bricks produced without use of machinery (non-refractory building bricks)	See Notes (a)	Per thousand	Non-Ceramic Bricks	See Notes (a)	Per thousand		1433486433		
	(b) Machine Produced Brick (non-refractory building bricks) except bricks used in facing	2160	Per thousand		4320	Per thousand	4320		103883.4	448776099.0
	(c) Machine Produced Brick									
	First Grade									
	(1)3 hole brick	3456	Per thousand		6912	Per thousand	6912		103883.4	718041758.5
	(2)10 hole brick									
	(3) 100 hole brick									
	(4) Multi hole brick									
	Second Grade									
	(1)3 hole brick	2484	Per thousand		4968	Per thousand	4968		103883.4	516092513.9
	(2)10 hole brick									
	(3) 100 hole brick									
	(4) Brick Chips	3382	100 CFT		6764	100 CFT	6764		103883.4	702667021.7
	(D)Micad Bats	2317	100 CFT		4634	100 CFT	4634		103883.4	481395472.9
72.04	Scrap/Ship Scrap	2000	Per Metric Ton	Scrap	4000	Per Metric Ton	4000	446689000	223344.5	893378000.0
72.10	C R Coil to GP Sheet	6600	Per Metric Ton	G.P Sheet	13200	Per Metric Ton	13200	49318000	7472.4	98636000.0
72.12	C R Coil to C I Sheet	7010	Per Metric Ton	MS rod	14020	Per Metric Ton	14020	1142473730	162977.7	2284947460.0
	HR Coil to GP Sheet	14850	Per Metric ton	MS Product (Others)	29700	Per Metric ton	29700	434007154	29226.1	868014308.0
	HR Coil to CI Sheet	15260	Per Metric ton	C.I Sheet	30520	Per Metric ton	30520	753954174	49407.2	1507908348.0
72.17	G.I Wire	11000	Per Metric ton	G.I Wire, MS Wire	22000	Per Metric ton	22000	20405940	1855.1	40811880.0
73.08	Tower and steel stricture (using MS product)	27500	Per Metric ton	Iron & Iron Product	55000	Per Metric ton	55000	106621763	3877.2	213243526.0
	Electric Pole (produced using steel plate)	30000	Per Metric ton	Metal Containers	60000	Per Metric ton	60000	243945828	8131.5	487891656.0
73.17	Tar kata	6000	Per Metric ton	Steel/GI Pipe	12000	Per Metric ton	12000	152566330	11558.1	138696663.6
	Tope tarkata	7200	Per Metric ton		14400	Per Metric ton	14400		11558.1	166435996.4
73.18	(a) Different size and types of screw: Galvanized/ non-galvanized/zinc coated/nickel coating/other metal coating/not coated	10230	Per Metric ton	Nut, Bolt & Screw	20460	Per Metric ton	20460	21840768	528.1	10804209.7

Table A2: VAT Collection and Proposed Revenue Impact from Intermediate Goods under Tariff Schedule 2014										
	(b) Joint (Connector),nut, bolt of different sizes and types : Galvanized/ non-galvanized/zinc coated/nickel coating/other metal coating/not coated	9130	Per Metric ton		18260	Per Metric ton	18260		528.1	9642466.7
	(c) Electric line hardware and pole fittings produced using MS and Steel	22000	Per Metric ton		44000	Per Metric ton	44000		528.1	23234859.6
82.12	Blade produced using stainless steel strips	0.45	Per Piece	Blades	0.9	Per Piece	0.9	41324000	63575384.6	57217846.2
	Blade produced using carbon steel strips	0.2	Per Piece		0.4	Per Piece	0.4		63575384.6	25430153.8
Total VAT (BDT in Billions)(INTERMEDIATE GOODS)								**37**		**75.0**
Notes	(a)BDT 1950 for Brick Kilns based in Dhaka, Narayanganj, Munshiganj, Narshindhi, Gazipur, Manikganj and CTG; Tk 1650 for others */ Market Prices of Items marked (**) collected from survey of market. For all other items tariff rates were increased by a 100% and assumed to be the market rate.									

Table A3: VAT Collection and Proposed Revenue Impact from Capital Goods under Tariff Schedule 2014										
H. S. Code	**Item name as per Tariff Schedule**	**Tariff Rate in BDT/1**	**Units**	**Item category by NBR/2**	**Market Prices in BDT/***	**Units**	**Market Prices after Unit Adjustment in BDT/3**	**VAT Collected using Tariff Rates in BDT**	**VAT Base (Units)/4**	**VAT Collected using Market Prices (in BDT)/5**
85.04	5 kilovolt potential transformer	3000	each	Electric Transformer	6000	each	6000	212464112	71.2	427450.1801
	10 kilovolt potential transformer	6000	each		12000	each	12000		71.2	854900.3601
	11 kilovolt potential transformer	10000	each		20000	each	20000		71.2	1424833.934
	11 kilovolt current transformer	9900	each		19800	each	19800		71.2	1410585.594
	15 KVA electric transformer	9000	each		18000	each	18000		71.2	1282350.54
	20 KVA electric transformer	12000	each		24000	each	24000		71.2	1709800.72
	25 KVA electric transformer	15000	each		30000	each	30000		71.2	2137250.9
	33 kilovolt potential transformer	19800	each		39600	each	39600		71.2	2821171.188
	33 kilovolt current transformer	13100	each		26200	each	26200		71.2	1866532.453
	37.5 KVA electric transformer	22500	each		45000	each	45000		71.2	3205876.35
	50 KVA electric transformer	30000	each		60000	each	60000		71.2	4274501.801
	75 KVA electric transformer	45000	each		90000	each	90000		71.2	6411752.701
	100 KVA electric transformer	60000	each		120000	each	120000		71.2	8549003.601
	200 KVA Electric transformer	95000	each		190000	each	190000		71.2	13535922.37
	250 KVA Electric transformer	110,000	each		220000	each	220000		71.2	15673173.27
	300 KVA electric transformer	120000	each		240000	each	240000		71.2	17098007.2
	315 KVA electric transformer	122000	each		244000	each	244000		71.2	17382973.99
	400 KVA electric transformer	150000	each		300000	each	300000		71.2	21372509
	500 KVA electric transformer	180000	each		360000	each	360000		71.2	25647010.8
	630 KVA electric transformer	200000	each		400000	each	400000		71.2	28496678.67
	700 KVA electric transformer	210000	each		420000	each	420000		71.2	29921512.6
	800 KVA electric transformer	225000	each		450000	each	450000		71.2	32058763.5
	1000 KVA electric transformer	260000	each		520000	each	520000		71.2	37045682.27
	1200 KVA electric transformer	290000	each		580000	each	580000		71.2	41320184.07
	1500 KVA electric transformer	340000	each		680000	each	680000		71.2	48444353.74

Table A3: VAT Collection and Proposed Revenue Impact from Capital Goods under Tariff Schedule 2014										
	2000 KVA electric transformer	425000	each		850000	each	850000		71.2	60555442.18
85.39	1-10 Watt	40	each	Electrical Goods	80	each	80	559284079	260374.3	20829947.08
	11-20 Watt	45	each		90	each	90		260374.3	23433690.46
	21-30 Watt	50	each		100	each	100		260374.3	26037433.85
	31-50 Watt	70	each		140	each	140		260374.3	36452407.38
	50+ Watt	80	each		160	each	160		260374.3	41659894.15
85.42, 39.20	**(1)Bangladesh Machine Tools Factory Ltd**				0	0				0
	(a)Retro-Reflective vehicle number plate, vehicle type (1) and (2)	340	each		680	each	680		260374.3	177054550.1
	(b)Retro-Reflective vehicle number plate, vehicle type (3)	160	each		320	each	320		260374.3	83319788.31
	(c) Vehicle ownership card	20	each		40	each	40		260374.3	10414973.54
	BRTA fees				0	0				0
	Retro-Reflective vehicle number plate, vehicle type (1) and (2)	848	each		1696	each	1696		260374.3	441594878
	Retro-Reflective vehicle number plate, vehicle type (3)	395	each		790	each	790		260374.3	205695727.4
	Vehicle ownership card	100	each		200	each	200		260374.3	52074867.69
87.02	Bus (52 without special seat)	242000	each	Vehicle Assembly, Vehicle Bodies Building	484000	each	484000	398928746	186.7	90372748.72
	Bus (52 with special seat) delux	302500	each		605000	each	605000		186.7	112965935.9
	Bus (40 without special seat)	302500	each		605000	each	605000		186.7	112965935.9
	Bus (40 with special seat)	363000	each		726000	each	726000		186.7	135559123.1
	Bus (36/40 without special seat)	544500	each		1089000	each	1089000		186.7	203338684.6
	Bus (36 with special seat)	605000	each		1210000	each	1210000		186.7	225931871.8
	MiniBus (30 without special seat)	91300	each		182600	each	182600		186.7	34095173.38
	MiniBus (24/30 Deluxe Seat)	121000	each		242000	each	242000		186.7	45186374.36
87.04	Truck (7 Ton)	77000	each		154000	each	154000		186.7	28754965.5
	Truck van (7 Ton)	79200	each		158400	each	158400		186.7	29576535.94
	Truck (5 Ton)	60500	each		121000	each	121000		186.7	22593187.18
	Truck van (5 Ton)	67100	each		134200	each	134200		186.7	25057898.51
	Truck (3 Ton)	48400	each		96800	each	96800		186.7	18074549.74
	Truck van (3 Ton)	55000	each		110000	each	110000		186.7	20539261.07
	Truck van/ pickup (1.5 Ton)(Passenger vehicle or not)	36300	each		72600	each	72600		186.7	13555912.31
Total VAT (BDT in Billions)(CAPITAL GOODS)								**1.17**		**2.66**
Notes	*/ Market Prices of Items marked (**) collected from survey of market. For all other items tariff rates were increased by a 100% and assumed to be the market rate.									

Notes:1/Tariff rate has been collected from Tariff Schedule in Gazette 2014, 2/Categorization used by NBR for reporting VAT Collection under specific HS Codes, 3/ Market prices adjusted to the units used under the Tariff chart, 4/VAT Base Calculated using the following formula= VAT Collected from item/Tariff Value of Item. For items with multiple prices and Total VAT collection given, the following formula was used = [(Tariff rate/Sum of all Tariff rates under the specific HS Code) x Total VAT Collection for Item]/Tariff Rate, 5/ Calculated using the following formula= VAT base x Market Prices after Unit Adjustment

Appendix 2: Input-output Model

An input-output table focuses on the interrelationships between industries in an economy with respect to the production and uses of their products and the products imported from abroad. In a table form (see table I) the economy is viewed with each industry listed across the top as a consuming sector and down the side as a supplying sector.

Table I: A highly simplified input-output table

	Activities	Final Demand (FD-M)	Total Demand/Use
Commodities	**W**	**F**	**Y**
Value Added	**V**		
Total Output/Supply	**Y**		

Table II below shows a simplified set of accounts distinguishing three producers and showing theinput-output flow matrix describing their transactions. The values in the square box represent intermediateconsumption, i.e. uses of products as inputs in the production process.

Table II: Input-output flow table and account

	Activity A	Activity B	Activity C	Final Demand	Total Demand/Use
Commodity A	**0**	**20**	**45**	**35**	**100**
Commodity B	**30**	**0**	**30**	**140**	**200**
Commodity C	**0**	**80**	**0**	**70**	**150**
Value Added	**70**	**100**	**75**		
Total Output/Supply	**100**	**200**	**150**		

Input-output analysis became an economic tool when **Leontief introduced an assumption of fixed-coefficient linear production functions** relating inputs used by an industry along each column to its outputflow, i.e., for one unit of every industry's output, a fixed amount of input of each kind is required. This fixedrelationship is introduced in table III. The entries in each column of table 3 are obtained by dividing theentries in the column by the total input of the consuming industry.

Table III: Input-output coefficient table (inputs per unit of output)

	Activity A	Activity B	Activity C
Commodity A	**0.00**	**0.10**	**0.30**
Commodity B	**0.30**	**0.00**	**0.20**
Commodity C	**0.00**	**0.40**	**0.00**
Value Added	**0.70**	**0.50**	**0.50**

In the above table, for example, one unit of output of industry B requires 0.10 unit of output ofindustry A, 0.40 unit of output of industry C, and generates 0.50 unit of value added. Similarly, one unit ofoutput of industry C requires 0.30 unit of output of industry A, 0.20 unit of output of industry B and generates0.50 unit of value added. Thus, in order to produce output Y_A, Y_B and Y_C, the amount of product A (output of industry A) required as intermediate input is equal to

$$0.00\ Y_A + 0.10\ Y_B + 0.30\ Y_C \qquad (1)$$

Equation 1 calculates the total amount of product A used as intermediate input in the productionprocess of an economy. If the remaining value of the same product left for net final demand, i.e. 35 in table2 is further added to intermediate consumption, the total output of industry A is obtained in equation 2.

$$0.00\ Y_A + 0.10\ Y_B + 0.30\ Y_C + 35 = 100 \qquad (2)$$

It is possible to check the equality property of equation 2 by replacing the values of Y_A, Y_B and Y_C in table 2 by their actual values. The results are shown in equation 3.

$$0.00 \times (100) + 0.10 \times (200) + 0.30 \times (150) + 35 = 100 \qquad (3)$$

The utilization of products B and C as intermediate inputs of production may be similarly calculated. Ingeneral, the ratios shown table II could be written in more abstract terms, such as those in table IV, so that an input-output model may be formulated.

Table IV: Input-output coefficient table in more general terms

	Activity A	Activity B	Activity C	Final Demand
Commodity A	a_{11}	a_{12}	a_{13}	F_1
Commodity B	a_{21}	a_{22}	a_{23}	F_2
Commodity C	a_{31}	a_{32}	a_{33}	F_3
Value Added	V_1	V_2	V_3	

Were, a's are derived as (W/Y).

The relationships in equations 1, 2, 3 using general terms of table 4 can be written as follows:

$$a_{11}Y_1 + a_{12}Y_2 + a_{13}Y_3 + F_1 = Y_1$$
$$a_{21}Y_1 + a_{22}Y_2 + a_{23}Y_3 + F_2 = Y_2 \qquad (4)$$
$$a_{31}Y_1 + a_{32}Y_2 + a_{33}Y_3 + F_3 = Y_3$$

In matrix form, equation 4 can be written as follows:

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} X \begin{pmatrix} Y_1 \\ Y_2 \\ Y_3 \end{pmatrix} + \begin{pmatrix} F_1 \\ F_2 \\ F_3 \end{pmatrix} = \begin{pmatrix} Y_1 \\ Y_2 \\ Y_3 \end{pmatrix} \qquad (5)$$

In a more general form with n industry and n products, where a_{ij} stands for input i (product of industry i) used in the production of one unit of output of industry j, systems of equations 4 and 5 canbe written as follows:

$$\begin{array}{ccccccccccc} a_{11}Y_1 & + & a_{12}Y_2 & .... & + & + a_{1n}Y_n & & Y_1 & & F_1 & = & Y_1 \\ a_{21}Y_2 & + & a_{22}Y_2 & .... & + & + a_{2n}Y_n & + & Y_2 & + & F_2 & = & Y_2 \\ . & + & . & & + & . & + & . & & . & = & . \\ a_{n1}Y_3 & & a_{n2}Y_3 & .... & + & + a_{nn}Y_n & & Y_n & & F_n & = & Y_n \end{array} \qquad (6)$$

And in matrix form,

$$\begin{pmatrix} a_{11} & a_{12} & a_{1n} \\ a_{21} & a_{22} & a_{2n} \\ . & . & . \\ a_{n1} & a_{n2} & a_{nn} \end{pmatrix} X \begin{pmatrix} Y_1 \\ Y_2 \\ . \\ Y_n \end{pmatrix} + \begin{pmatrix} F_1 \\ F_2 \\ . \\ F_n \end{pmatrix} = \begin{pmatrix} Y_1 \\ Y_2 \\ . \\ Y_n \end{pmatrix} \quad (7)$$

The computation of the coefficient matrix can be described in the following mathematical form:

$a_{ij} = \frac{Wij}{Yj}$

Where W_{ij} stands for an element of the flow table as described in table 1. Equation 7 is usually written in matrix form, as

$AX + Y = X \quad (8)$

Relationship 8 is the basic input-output system of equations. Matrix A is called the input-outputcoefficient matrix, vector X is the vector of output and vector Y is the vector of net final demand. Thedimension (size) of matrix A is constrained only by the statistical information on inputs and outputsavailable to statisticians since some countries have constructed input-output tables of up to almost 500industries.

Inverse Matrix (Solution of an input-output model)

Equations in the form of equation 8 are much more suitable to model-building or analysis. If thevalues of the coefficients and of net final demand are known, then it is possible to solve this set ofsimultaneous equations in order to find the level of output of various industries necessary to satisfy thespecified level of net final demand.

Mathematically, the vector of output X in the system of equation 8 can be solved as follows:

$$X - AX = Y$$

$$(I - A)X = Y \quad (9)$$

$$X = (I - A)^{-1} Y$$

Where, I stand for the identity matrix which is a square matrix where all the diagonal elements are equal to1 and all other elements are equal to zero. $(I - A)^{-1}$ is the Leontief inverse which can be calculated.

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