

How Tariff Reduction Impact Global Economy— A Case of Wood Economy of Pakistan

ARSHAD MAHMOOD MALIK

Wood is used in paper industry, furniture, construction wood items, matches, sports goods, packing cases, and wooden articles used in mining. Pakistan is importing wood worth 199.18 million US\$ globally to cater the needs of local wood market. Share of wood imports is 2 percent of total imports of Pakistan as against negligible exports showing negative trade balance of 79 percent. Per capita timber consumption in Pakistan is 0.08 m³. Demand of wood in Pakistan is rising with the rise in population. To cater the demand, pressure on local forest increased. Government of Pakistan allowed importing wood products from abroad to save local forest. The tariff duty on import of wood in Pakistan was 16 percent. In Annual Budget 2017, Government of Pakistan has announced relief measure for wood importer and consumer to increase competitiveness of imported wood in the local market on demand of local importers. GoP provided a relief to local importers and decreased subsidy to 11 percent. The study in hand has been designed to analyse how this tariff reduction will affect global economy generally and Pakistan economy particularly. GTAP database version 9a will be used for analysing the results. GTAP database has 140 regions with 57 commodities and 8 factors of production by using SAM 2011 developed by IFPRI as base line data. All sectors of the economy are aggregated into 10 sectors. Wood remains separate sector of the economy. All regions of the world are also aggregated into 30 regions on the basis of trade of wood with Pakistan, thus developing 30x20 matrix database. A shock of 5 percent reduction in tariff of wood in Pakistan is given to the Model. Impact of this shock is studied on macroeconomic indicators of the economy of Pakistan in comparison to other regions of the world. Variable studied include GDP, Investment, Import, Export, Trade balance etc. This study identify losers and gainers of tariff subsidy in the country and in the globe. The results of the study are helpful for the decision makers and planners for effective planning process and implementation of such policies in future.

JEL Classification: F11, Q23, Q17, Q28

Keywords: Wood, GTAP, Pakistan, Import Duty, Policy

1. INTRODUCTION

Area under forest is about 5.2 percent in Pakistan [Pakistan (2017)] limiting wood availability in the country as against world average of 30 percent [FAO (2001)]. Out of total geographical area of (79.6 m ha.) of the country, only 4.57 m ha. is under forest cover. Sustainable and environment friendly economic growth require 25 percent area under forest. Per capita availability of forest in the country is 0.22 ha. (Area under forest/population) and capita availability of wood is 0.0178 m³ (wood production/

Arshad Mahmood Malik <arshadmm1@hotmail.com> is Assistant Professor, Department of Economics and Agricultural Economics, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi.

population). Average growth rate of forestry in 2016 was 14.49 percent. Share of forestry in GNP of Pakistan is 0.45 percent in 2015-16 [Pakistan (2017)]. Population of Pakistan is rising, in return increasing demand of housing and wood products [Ahmed and Mehmood (1998); ICIMOD (1998)].

Tariff on wood in Pakistan is based on Integrated Tariff of UK, classification on the basis of (i) how much they have been worked, (ii) their nature and purpose, and (iii) the type of wood they're made from. This classification is covered in chapter 44 of Integrated Tariff of United Kingdom classification. Bamboo and other woody materials are also included in it for classification purposes. Four digit HS code for wood and wood products is 4401 to 4421 under chapter 44 [GOV.UK (2012)].

Illegal dumping of wood under Afghan Pakistan Transit Trade Agreement (APTTA) is increasing and damaging local market. Numbers of containers of imported wood are entering in local market [Zaman and Shahid (2012)].

Government of Pakistan has announced reduction in import tariff of wood on the demand of wood importers union to increase import of wood in the country and to make imported wood more competitive in the domestic market [Pakistan (2017)]. This reduction in duty will generally affect the domestic market. The study in hand has been designed to investigate the effects of this policy issue on micro and macroeconomic variable of the country in specific and global economies in general.

2. WOOD ECONOMY OF PAKISTAN

Wood and wood products are used in construction, domestic uses and industrial uses. Forest and related industries provide employment of 500,000 labour beside acting as source of forage for 90 million livestock population of the country.

2.1. Production of Forestry Products in Pakistan

Forestry products were mainly used for timber, firewood and provision of vegetation cover to already fragile mountains. Forests include state owned forests, communal forests and privately owned forests [Zaman and Shahid (2012)]. Dominant production is of fuel wood non-coniferous. Its share in total production of Pakistan is above 75 percent (Table 2.1). Non-coniferous fuel wood production in Pakistan is 28 million cubic meter.

2.2. Trade of Various Kind of Wood of Pakistan (Import/Export)

As dominant portion of wood production in Pakistan is fuel wood, so Pakistan is importing industrial round wood of coniferous species from various countries depending upon prices. Total import of industrial round wood of coniferous species is around 58 thousand cubic metre during 2015-16. Total value of this import was worth US \$ 3522 thousand.

Table 1

Production of Forestry Products in Pakistan 2016

Item	Unit	Production	%age
Wood fuel, coniferous (production)	m3	1,133,349	3.01
Wood fuel, non-coniferous (production)	m3	28,400,000	75.54
Sawlogs and veneer logs, coniferous	m3	390,000	1.04
Sawlogs and veneer logs, non-coniferous	m3	1,633,000	4.34
Pulpwood, round and split, non-coniferous (production)	m3	59,000	0.16
Other industrial round wood, coniferous (production)	m3	82,000	0.22
Other industrial round wood, non-coniferous (production)	m3	826,000	2.20
Wood charcoal	tonnes	81,958	0.22
Wood residues	m3	0	0.00
Sawn wood, coniferous	m3	462,000	1.23
Sawn wood, non-coniferous all	m3	919,000	2.44
Veneer sheets	m3	217,000	0.58
Plywood	m3	174,000	0.46
Particle board and OSB	m3	76,000	0.20
Hardboard	m3	13,000	0.03
MDF/HDF	m3	67,000	0.18
Other fibre board	m3	0	0.00
Mechanical wood pulp	tonnes	20,000	0.05
Semi-chemical wood pulp	tonnes	21,000	0.06
Chemical wood pulp	tonnes	41,000	0.11
Chemical wood pulp, sulphate, unbleached	tonnes	18,000	0.05
Chemical wood pulp, sulphate, bleached	tonnes	23,000	0.06
Pulp from fibres other than wood	tonnes	370,000	0.98
Recovered fibre pulp	tonnes	104,000	0.28
Recovered paper	tonnes	163,000	0.43
Newsprint	tonnes	0	0.00
Printing and writing papers	tonnes	258,000	0.69
Printing and writing papers, uncoated, mechanical	tonnes	107,000	0.28
Printing and writing papers, uncoated, wood free	tonnes	117,000	0.31
Printing and writing papers, coated	tonnes	34,000	0.09
Other paper and paperboard	tonnes	662,000	1.76
Household and sanitary papers	tonnes	39,000	0.10
Wrapping and packaging paper and paperboard	tonnes	463,000	1.23
Case materials	tonnes	106,000	0.28
Carton board	tonnes	100,000	0.27
Wrapping papers	tonnes	30,000	0.08
Other papers mainly for packaging	tonnes	227,000	0.60
Other paper and paperboard n.e.s. (not elsewhere specified)	tonnes	160,000	0.43

Source: FAOSTAT (2016).

Table 2

Trade of Various Kind of Wood of Pakistan

Item	Unit	Import		Export	
		Qty	Value (000US\$)	Qty	Value (000US\$)
Wood fuel, all species (export/import)	m3	70	5		
Industrial round wood, coniferous (export/import)	m3	57,732	3522	1403	74
Industrial round wood, non-coniferous tropical (export/import)	m3	5,191	3659	3	122
Industrial round wood, non-coniferous non-tropical (export/import)	m3	885	16328	164	124

2.3. National Forest Policy of Pakistan

Forest is important source of environmental up-gradation of a country besides other positive externalities. All governments develop forest policies for improving the state of environment in the country. The major thrust of forest policies of Pakistan remain reducing deforestation in the country. Improving skill of forest management helpful in better forest health and increase its resilience against environmental factors. All these efforts are carried out on scientific lines provide better solutions for the economy. Forest also support in reducing carbon emissions.

2.4. Trade Policy of Pakistan

Trade policy of Pakistan aims at fulfilling international trade obligations under WTO to increase competitiveness of the country in the international markets. Free trade agreements, bilateral trade agreements and regional integration also posing challenges to existing trade setup of developing countries. National trade policy also works in meeting these challenges and search for opportunities of diversification and opening new markets for traditional and innovative products. These efforts will increase the share of Pakistan in international markets. Value addition, value chain management, will support Pakistan to achieve the target of opening new markets and increasing its international trade share. Another problem which Pakistan's exports are facing related to difficult procedures, laws, rules and regulations. These will be simplified for boosting exports.

2.5 Tariff Rates of Pakistan on Lumber /Wood on Different Countries

Pakistan is importing wood products from various countries. Government of Pakistan imposed variable tariff duty on import of wood products from different countries depending upon nature of agreements between two countries. Highest tariff is on 31.49 percent on Japan. Countries like SARAB, Korea, Turkey, Thailand, UAE, Australia and Brazil have 20-25 percent of tariff in ascending order. Tariff structure of Indonesia, Malaysia, China, Singapore, Rest of South Asia, Bangladesh, USA and Rest of South Asia is between 10-20 percent. Remaining countries have less than ten percent of tariff which include EU, India, Vietnam, New Zealand, Sri Lanka and Canada. Countries with zero tariffs include Peru, Iran, Brunei, Chile, Mexico and Egypt.

Table 3

Tariff Structure of Wood of Pakistan

Country	RTMS	Country	RTMS	Country	RTMS
1 Pakistan	0	11 Indonesia	18.49	21 Singapore	15.93
2 China	18.28	12 Australia	21.26	22 Brunei	0
3 India	8.49	13 Korea	24.25	23 Japan	31.49
4 Turkey	22.18	14 New Zealand	7.23	24 Chile	0
5 Thailand	21.91	15 United State	11.48	25 RS Asian	14.23
6 Malaysia	18.3	16 Vietnam	7.29	26 Rest of Asia	10.91
7 Sri Lanka	6.43	17 Brazil	19.69	27 Mexico	0
8 UAE	21.38	18 Peru	0	28 Egypt	0
9 SARAB	24.95	19 Iran	0	29 EU_25	8.68
10 Bangladesh	14.2	20 Canada	0.79	30 Rest of World	2.38

2.6. Global Production of Lumber /Wood in Different Regions of the World

The value of output of wood of Pakistan is about 2281 million US dollar per annum. This constitutes 0.21 percent of the world production. Dominant global producer of the wood are USA, EU, China which contributes 73 percent of the global output. US contributing more than 27 percent of world output of wood as against 26 percent share of Europe Union in global production. China is the third major producer of wood, contributing 20 percent global value of output of wood.

Table 4

Global Production of Lumber /Wood in Different Regions of the World

Country	Value of Output	% share	Country	Value of Output	% share
1 Pakistan	2280.92	0.21	16 Vietnam	5677.67	0.52
2 China	217408.06	20.02	17 Brazil	19035.96	1.75
3 India	10249.88	0.94	18 Peru	5047.71	0.46
4 Turkey	8082.95	0.74	19 Iran	1423.89	0.13
5 Thailand	7229.56	0.67	20 Canada	34119.12	3.14
6 Malaysia	9846.95	0.91	21 Singapore	465.81	0.04
7 Sri Lanka	281.68	0.03	22 Brunei	27.6	0.00
8 UAE	1644.19	0.15	23 Japan	28021.48	2.58
9 SARAB	2259.32	0.21	24 Chile	5500.07	0.51
10 Bangladesh	2344.94	0.22	25 RS Asian	189.65	0.02
11 Indonesia	18095.46	1.67	26 Rest of Asia	9212.39	0.85
12 Australia	12502.08	1.15	27 Mexico	12192.45	1.12
13 Korea	6784.53	0.62	28 Egypt	4609.42	0.42
14 New Zealand	4168.75	0.38	29 EU_25	279972.13	25.78
15 United State	294873.03	27.15	30 Rest of World	82471.09	7.59

2.7. Pattern of Imports of Pakistan from Different Regions/Countries of the World

Pakistan is importing wood mainly from China, Malaysia, EU, Thailand, United state and Canada. Pakistan is importing 53 million US\$ of wood from China. Malaysia is the second largest export of wood to Pakistan after China and Pakistan is importing 31 million US\$ of wood and its products from Malaysia. USA is also exporting 29 million US \$ of wood to Pakistan. Other major countries which act as import source are Thailand and Canada, from whom Pakistan is importing wood amounting 17 million US\$ each (Table 2.5).

Table 5

Pattern of Imports of Pakistan from Different Regions/Countries of the World

Country	VALEXPORTEs from ROW to		VALEXPORTEs from ROW to		VALEXPORTEs from ROW to	
	Pak	Country	Pak	Country	Pakistan	
1 Pakistan	0	11 Indonesia	0.78	21 Singapore	1.05	
2 China	53	12 Australia	0.04	22 Brunei	0	
3 India	0.41	13 Korea	1.59	23 Japan	4.21	
4 Turkey	0.88	14 New Zealand	0.03	24 Chile	0.01	
5 Thailand	17.31	15 United State	29.7	25 RS Asian	0.02	
6 Malaysia	31.23	16 Vietnam	1.81	26 Rest of Asia	3.73	
7 Sri Lanka	2.71	17 Brazil	0.07	27 Mexico	0.02	
8 UAE	2.83	18 Peru	0.06	28 Egypt	0.26	
9 SARAB	0.06	19 Iran	0	29 EU_25	28.38	
10 Bangladesh	0.01	20 Canada	16.69	30 Rest of World	13.09	

Note: Value of exports of wood from rest of the world to Pakistan =Imports of wood of Pakistan.

2.8. Share of Taxes in Global Output of Wood

Wood products are also a source of taxes for the country beside its environmental benefits. Contribution of wood in global taxes is estimated as 9.6 billion US\$. Major contribution of taxes come from EU estimating around 5.38 billion US\$ (56 percent) and in USA it is 1.7 (17 percent) billion US \$ (Table 8).

Table 6

Share of Taxes in Global Output of Wood (VALOUTPUT)

Country	Production Revenue	Output Tax	Total Value of Output	Country	Production Revenue	Output Tax	Total Value of Output
1 Pakistan	2,280.91	0	2,280.92	16 Vietnam	5,639.90	37.77	5,677.67
2 China	217,407.97	0.09	217,408.06	17 Brazil	18,876.85	159.11	19,035.96
3 India	10,232.21	17.67	10,249.88	18 Peru	4,940.45	107.26	5,047.71
4 Turkey	8,080.83	2.12	8,082.95	19 Iran	1,423.89	0	1,423.89
5 Thailand	7,229.56	0	7,229.56	20 Canada	33,893.67	225.45	34,119.12
6 Malaysia	9,846.04	0.91	9,846.95	21 Singapore	460.15	5.67	465.81
7 Sri Lanka	281.68	0	281.68	22 Brunei	27.53	0.06	27.6
8 UAE	1,644.19	0	1,644.19	23 Japan	27,743.65	277.82	28,021.48
9 SARAB	2,259.31	0	2,259.32	24 Chile	5,486.45	13.61	5,500.07
10 Bangladesh	2,343.31	1.63	2,344.94	25 Rest of S Asia	188.83	0.82	189.65
11 Indonesia	18,095.45	0.01	18,095.46	26 Rest of Asia	9,176.76	35.63	9,212.39
12 Australia	12,376.73	125.35	12,502.08	27 Mexico	12,177.9	14.55	12,192.45
13 Korea	6,782.37	2.16	6,784.53	28 Egypt	4,609.42	0	4,609.42
14 New Zealand	4,156.66	12.09	4,168.75	29 EU_25	274,587.69	5,384.44	279,972.13
15 United State	293,128.75	1,744.28	294,873.03	30 Rest of World	80,952.45	1,518.64	82,471.09
				Total	1,076,331	9,687	1,086,019

3. MODEL AND METHODOLOGY

3.1. Commutable General Equilibrium Model

The multi sector, multi region CGE model modeling framework has been adapted using a newly developed MyGTAP model [Minor and Walmsley (2013)], which is an extension of a standard GTAP model [Hertel and Tsigas (1997)]. A standard GTAP model captures the inter linkages of factor, price and markets [Minor and Mureverwi (2013)]. The model has a consistent global database covering all regions in such a way that the database can demonstrate the effects of a policy change on all other countries. The database depends on the individual country input-output tables and the global MyGTAP database of trade, macro economy, and protection data. The MyGTAP model is an enhanced version of standard GTAP model. The standard GTAP model has just one private representative household, however MyGTAP model gives the option to incorporate multiple household and factor types which help explain the comprehensive linkages between various households and their income and expenditure within the economy. The differentiated number of household based on the level of income and factors augments the model ability to capture impact of a policy change on the welfare of all the households. The expenditure is divided on three sides, the private expenditure, government expenditure and savings. Regional household own factors of production and they supply the endowments for income to the firms, which uses them and the intermediate goods to produce goods and supply further to

households and government to satisfy their demand. The private households and government saving is the total regional saving which is further channelised for investment. The new features introduced in the model are regional transfers including remittances, foreign aid and foreign income.

The model is used widely to analyse the policy changes related to trade policy, climate change, migration, poverty and recently in energy policy. The model provides the adequate framework and database for the analysis of trade policy.

3.2. Database and Aggregations

This research used two comprehensive data sets, the latest available GTAP Database 9a [Aguiar, *et al.* (2016)] and the additional data taken from Pakistan's Social Accounting Matrix (SAM) developed by International Food Policy Research Institute (IFPRI) for the year 2010-11. The latest comprehensive Pakistan's SAM 2010-11 is incorporated in the GTAP model to augment the required data. The reference years for GTAP database 9a, are 2004, 2007 and 2011. The model uses the latest 2011 reference year. The GTAP model includes 140 regions based on individual countries and aggregated regions. The database is based on total 57 sectors for each region. In this model, the regions have been aggregated to total 30 regions out of which 26 comprise of single region and rest are aggregated regions that include more than one region. The sectors are aggregated to 46 sectors.

The latest SAM 2010-11 for Pakistan incorporates a total of 16 household's types differentiated based on rural and urban types. With the household types, rural based households are 12, which are further based on land ownership, farm size and non-farm activity, 6 of the rural households are farmer, 2 are farm worker and 4 are based on non-farm activity. The small farmer owns under 12.5 acre and medium farmer owns more than 12.5 acre agriculture land. The rest of rural based types are employed in farm work but do not own land. The rest of 4 are urban based households. [Debowicz (2016)].

Table 7

Household Types in SAM 2010-11

No.	Household Types	HH Code	Population (Million)	Income (Billion)
1	Rural small farmer (quartile 1)	hhd-rs1	4,193	275.632
2	Rural small farmer (quartile 234)	hhd-rs234	15,565	2232.853
3	Rural medium+ farmer (quartile 1)	hhd-rm1	208	14.132
4	Rural medium+ farmer (quartile 234)	hhd-rm234	2,914	853.368
5	Rural landless farmer (quartile 1)	hhd-rl1	3,348	194.388
6	Rural landless farmer (quartile 234)	hhd-rl234	7,292	947.845
7	Rural farm worker (quartile 1)	hhd-rw1	6,333	238.934
8	Rural farm worker (quartile 234)	hhd-rw234	8,305	722.218
9	Rural non-farm (quartile 1)	hhd-rn1	12,595	481.570
10	Rural non-farm (quartile 2)	hhd-rn2	10,888	645.376
11	Rural non-farm (quartile 3)	hhd-rn3	9,088	849.502
12	Rural non-farm (quartile 4)	hhd-rn4	6,316	1388.453
13	Urban (quartile 1)	hhd-u1	5,930	271.7564
14	Urban (quartile 2)	hhd-u2	8,820	657.4251
15	Urban (quartile 3)	hhd-u3	11,506	1366.653
16	Urban (quartile 4)	hhd-u4	17,080	6979.068
All Households Total			130,381	18,119

Source: Pakistan SAM (2010-11), IFPRI (2016), HIES (2010-11).

3.2.1. Factor Aggregation

The factors used in Pakistan's SAM 2010-11 are detailed in the Table 8. In the SAM 2010-11, the factors of production have been divided into total 12 types. Of which 3 belongs to farm labour, 2 from non-farm labour, 3 from land, 1 belongs to livestock and 3 are capital types.

Table 8

Factors Types in SAM 2010-11

No.	Factor Code	Factor Types	No.	Factor Code	Factor Types
1	Flab-S	Labour-small farmer	7	FInd-M	Land – medium
2	Flab-M	Labour - medium+ farmer	8	FInd-L	Land – small
3	Flab-W	Labour-farm worker	9	Fliv	Livestock
4	Flab-L	Labour-non-farm low skilled	10	Fcap-A	Capital – agriculture
5	Flab-H	Labour-non-farm high skilled	11	Fcap-F	Capital – formal
6	FInd-S	Land – large	12	Fcap-I	Capital – informal

Source: Pakistan SAM (2010-11). IFPRI (2016). HIES (2010-11).

3.2.2. Regional Aggregation

GTAP database version 9a includes 140 regions of the world. These regions were further aggregated into 30 regions on the basis of import of wood by Pakistan. These regions are Pakistan, China, India, Turkey, Thailand, Malaysia, Sri Lanka, UAE, SARAB, Bangladesh, Indonesia, Australia, Korea, New Zealand, United State, Vietnam, Brazil, Peru, Iran, Canada, Singapore, Brunei, Japan, Chile, Rest of South Asian, Rest of Asia, Mexico, Egypt, EU_25 and Rest of World.

3.2.3. Sectoral Aggregation

In GTAP database, there are 57 commodities. These commodities were aggregated into forty sectors for further analysis.

3.3. Variables of the Study

Changes in import duties of wood affect various socio-economic factors of the economy. Study of effect on these sectors will support analyst in drawing some logical conclusions and policy recommendations. These sectors include government income, terms of trade, aggregate exports of wood in Pakistan, aggregate imports of wood in Pakistan, volume of merchandise exports of wood, volume of merchandise imports of wood, output of capital goods, market price of composite import of wood of Pakistan, GDP quantity index, household demand for import of wood.

4. RESULTS AND DISCUSSION

Reduction in duty of wood will affect Pakistan economy. Few of the variables shows positive developments while other indicate negative developments. These variables are analysed to get accumulative effect of duty reduction.

4.1. Impact of Duty Reduction on Macroeconomic Variables

Macroeconomic variables of an economy mainly constitutes government income, terms of trade, aggregates exports of wood in Pakistan, aggregate imports of wood in

Pakistan, volume of merchandise exports of wood, volume of merchandise imports of wood and output of capital goods. The government is always interested in increasing its revenue. Any relief in duty means decreasing revenue. Government income, terms of trade and output of capital goods has shown negative trend while others shown positive trend. Aggregate imports of wood in Pakistan will increase by 15.62 percent because of reduction in duty of wood. The volume of merchandise imports will only increase by 0.04 percent.

Table 9

Duty Reduction on Wood and its Impact on Macroeconomic Variables

Variable Description	Code	Unit	Value
Government income	Gincome	%	-0.08
Terms of trade	Tot	%	-0.02
Aggregates exports of wood in Pakistan	qxw lum	%	0.61
Aggregate imports of wood in Pakistan	qiw lum	%	15.62
Volume of merchandise exports of wood	qxw Pakistan	%	0.12
Volume of merchandise imports of wood	qiw Pakistan	%	0.04
Output of capital goods	Qegds	%	-0.00
Market price of composite import of wood of Pakistan	pim[lum*]	%	-5.00

Aggregate exports of wood in Pakistan will also increase due to increase in total supply of wood in the country. The surplus wood will be exported, but the quantity of export is very small i.e., 0.61 percent and volume of merchandise exports will increase by 0.12 percent (Table 9).

Market price is determined by supply and demand of wood [Ndoye, *et al.* (1997)]. When supply increased price decreased. The market price of wood will decrease by 5 percent. This reduction in duty causes more import of wood products in the country and in turn increased supply of wood lowered the market price. The consumer demand for wood will also increased.

4.2. GDP Quantity Index

GDP is an important indicator of production and in turn, trade of a commodity in a country. GDP has highest effect on import of wood [Lemai, *et al.* (2011)]. No change in GDP quantity index was envisaged due to change in duty of wood in Pakistan.

GDP is an important indicator of production and in turn trade of a commodity in a country. GDP has highest effect on import of wood [Lemai, *et al.* (2011)]. No significant change in GDP quantity index was envisaged due to change in duty of wood in Pakistan. A nominal increase in Quantity index of GDP of Pakistan is observed. Though the duty on wood products is reduced from 16 to 11 percent yet the GDP of Pakistan is slightly increased in Pakistan. Before reduction in duty of wood the GDP of Pakistan was 213686 million US\$, which increased to 213692 million US\$ after reduction of duty. The increase is 5.59 million US\$. The reason of increase might be the meeting of wood demand of domestic industry from import.

Table 10

Quantity Index of Global GDP (Qgdp)

Country	%age Change	Pre Simulation	Post Simulation	Absolute Change	Country	%age Change	Pre Simulation	Post Simulation	Absolute Change
1 Pakistan	0	213686	213692	6	16 Vietnam	0	135540	135540	0
2 China	0	7321874	7321873	-1	17 Brazil	0	2476695	2476695	0
3 India	0	1880101	1880100	0	18 Peru	0	170564	170564	0
4 Turkey	0	774754	774754	0	19 Iran	0	528425	528425	0
5 Thailand	0	345670	345670	0	20 Canada	0	1778629	1778629	0
6 Malaysia	0	289260	289260	0	21 Singapore	0	274065	274065	0
7 Sri Lanka	0	59178	59178	0	22 Brunei	0	16691	16691	0
8 UAE	0	348595	348595	0	23 Japan	0	5905634	5905634	0
9 SARAB	0	669509	669509	0	24 Chile	0	251162	251162	0
10 Bangladesh	0	111906	111906	0	25 Rest of S. Asian	0	40724	40724	0
11 Indonesia	0	845925	845925	0	26 Rest of Asia	0	1075268	1075268	0
12 Australia	0	1387013	1387013	0	27 Mexico	0	1170083	1170083	0
13 Korea	0	1202463	1202463	0	28 Egypt	0	236001	236001	0
14 New Zealand	0	163841	163841	0	29 EU_25	0	18518268	18518268	0
15 United State	0	15533784	15533784	0	30 Rest of World	0	7751837	7751837	0

4.3. Household Demand for Imports of Lumber in Different Provinces and Sectors in Pakistan (qpmh[lum])

Population of Pakistan is increasing gradually and size of household is decreasing resultantly increase number of household in the country. Rural urban migration, concentration of industry around metropolitan centers and urbanisation are other major factors increasing demand of wood products in the country [Kenal, *et al.* (2012)]. Results indicated that household demand of timber wood will increase more in case of rural small farmers and non-farm workers by 10 percent as compared to other households (Table 11).

Table 11

Household Demand of Import of Lumber/Wood in Pakistan

Household Type	Demand of Wood	Household Type	Demand of Wood	Household Type	Demand of Wood
1 MainHHL	0	7 hhd_rl234	4	13 hhd_rm4	10
2 hhd_rs1	1	8 hhd_rw1	1	14 hhd_u1	1
3 hhd_rs234	10	9 hhd_rw234	3	15 hhd_u2	3
4 hhd_rm1	0	10 hhd_rm1	2	16 hhd_u3	7
5 hhd_rm234	5	11 hhd_rm2	3	17 hhd_u4	45
6 hhd_rl1	1	12 hhd_rm3	5		

4.4. Impact on Aggregate Import of Lumber Wood in Pakistan

The aggregate import of lumber wood will increase in Pakistan due to decreasing the import duty by Nawaz Government 2017 of Pakistan. The imports in base year 2011 data was 271 million US\$ which increased to 316 million US\$. The absolute increase was 45 million US\$. The increase is 17 percent.

4.5. Change in Trade Balance by Commodities of Pakistan

By commodity analysis, the trade balance will decrease by 37 million US dollar which will be compensated through increase in taxes and public duties due to greater

import of wood. The taxes and duties will increase by 13.47 US million dollars. Domestic productivity will increase by 6.68 million dollar. Machinery, equipment and large scale manufacturing sector will increase by 7.21 US million dollars. The trade balance (X-M) of Pakistan will increase by 10.41 US million dollars due to this support (Table 12).

Table 12

Change in Trade Balance by Commodities of Pakistan

Commodity	Trade Balance	Commodity	Trade Balance	Commodity	Trade Balance	Commodity	Trade Balance
1 Pdr	0.22	12 ofd	0.67	23 lum	-37.11	35 nmm	0.44
2 Wht	0.55	13 wap	5	24 sgr	0.08	36 water	0
3 osd	0.04	14 milk	0.03	25 vol	1.07	37 GasMD	0
4 ocr	0.17	15 tex	13.47	26 b_t	0.1	38 ely	0.01
5 wol	0.01	16 livestock	0.03	27 p_c	-1.18	39 ele	1.37
6 per	1.5	17 gas	0	28 crp	6.68	40 construction	0.11
7 pfb	-1.03	18 oil	-0.97	29 nfm	0.84	41 TransComm	2.25
8 v_f	-0.01	19 coa	-0.13	30 omeomf	7.21	42 FinServ	0.21
9 c_b	0	20 omn	0.04	31 i_s	0.42	43 BusinServ	1.01
10 lea	0.24	21 fsh	0.01	32 fmp	0.97	44 OSG	2.33
11 gro	0.02	22 frs	0.83	33 mvhotn	2.09	45 RecServ	0.17
				34 ppp	0.63	46 OthServices	0

4.6. Gini-coefficient of Different Households in Pakistan

Gini-coefficient is the measure of income inequality in a country. Its value ranges between 0 and 1. Where 0 corresponds perfect equality and 1 perfect inequality. The rural medium type household of Punjab affected more from this change in duty. The income inequality of medium type farm household will increase by 0.04 percent as compared to other households. Urban household are less affected as compared to rural household.

Table 13

Gini-coefficient of Different Households in Pakistan

Household Types	Gini-coefficient	Household Types	Gini-coefficient	Household Types	Gini-coefficient
1 hhd_rs1	0.03	7 hhd_rw1	0.02	13 hhd_u1	0.02
2 hhd_rs234	0.01	8 hhd_rw234	0.01	14 hhd_u2	0.01
3 hhd_rm1	0.04	9 hhd_rm1	0.01	15 hhd_u3	0.01
4 hhd_rm234	0.01	10 hhd_rm2	0.01	16 hhd_u4	0
5 hhd_rl1	0.02	11 hhd_rm3	0.01		
6 hhd_rl234	0.01	12 hhd_rm4	0		

4.7. Effect on Income of the Household

Household income derived from wood sector in Pakistan, net of depreciation, will decrease by 0.02 percent. Major decrease was noticed in rural nonfarm households in Punjab, Sindh, KPK and Balochistan by 0.02 percent. The income of urban household will also decrease with the same pattern. Household income of rural small farmers in Punjab, KPK, Sindh and Balochistan will increase by 0.01 percent. The major increase in wages is found in rural managers in Punjab by 0.02 percent followed by KPK, Sindh and Balochistan by 0.01 percent.

The accumulated income of various Household will increase in general. Major increase was found in rural medium farmers in Punjab by 0.04 percent followed by rural small farmers household by 0.03 percent in Punjab and rural landless farmers by 0.02 percent

Order of household according to per capita income (p_HHINCPC_V) indicates that the per capita income of medium type rural household will increase more (0.04 percent) as compared to other household. The rural nonfarm and urban household are major loser due to this duty reduction as their income shows homogeneous negative trend of 0.01 percent (Table 14).

Table 14

Per Capita Income of Various Household in Pakistan

HH Type	Per Capita Income	HH Type	Per Capita Income	HH Type	Per Capita Income	HH Type	Per Capita Income
1 hhd_rs1	0.03	5 hhd_rl1	0.02	9 hhd_rm1	-0.01	13 hhd_u1	-0.01
2 hhd_rs234	0.03	6 hhd_rl234	0.02	10 hhd_rm2	-0.01	14 hhd_u2	-0.01
3 hhd_rm1	0.04	7 hhd_rw1	0.03	11 hhd_rm3	-0.01	15 hhd_u3	-0.01
4 hhd_rm234	0.03	8 hhd_rw234	0.02	12 hhd_rm4	-0.01	16 hhd_u4	-0.01

4.8. Welfare Effect/ Equivalent Variation Changes

Equivalent Variation is a measure of economic welfare changes associated with changes in prices. Equivalent variation of Pakistan will decreased by 7.04 US million dollars. Factor income at market prices, net of depreciations will decreased by .02 percent in Pakistan

4.9. Ratio of Domestic to Imported Prices

The ratio of domestic to import price is positive and 5.19 in case of wood in Pakistan due to lowering of import duty (Table 15). The import price will decrease in the domestic market and this must be coupled with lowering domestic market prices (-5 percent), which is envisaged from Table 9.

Table 15

Ratio of Domestic to Imported Prices in Pakistan

Sector	Ratio	Sector	Ratio	Sector	Ratio	Sector	Ratio
1 Pdr	-0.01	13 wap	-0.02	25 vol	-0.02	37 GasMD	-0.03
2 Wht	-0.01	14 milk	0	26 b_t	-0.02	38 ely	-0.02
3 osd	-0.01	15 tex	-0.02	27 p_c	0	39 ele	-0.03
4 ocr	-0.02	16 livestock	0	28 crp	-0.04	40 construction	-0.03
5 wol	-0.01	17 gas	0.05	29 nfm	-0.02	41 TransComm	-0.03
6 pcr	-0.03	18 oil	0	30 omeomf	-0.03	42 FinServ	-0.03
7 pfb	0	19 coa	0	31 i_s	-0.02	43 BusinServ	-0.03
8 v_f	0	20 omn	-0.03	32 fmp	-0.03	44 OSG	-0.03
9 c_b	-0.01	21 fsh	-0.02	33 mvhotn	-0.03	45 RecServ	-0.03
10 lea	0	22 frs	-0.53	34 ppp	-0.03	46 OthServices	0
11 gro	-0.02	23 lum	5.19	35 nmm	-0.02		
12 ofd	-0.02	24 sgr	-0.02	36 water	-0.03		

4.10. Ratio of Return to Primary Factor

The ratio of return to primary factor (pfactreal) is generally positive. The ratio of return to land is 0.1 percent to CPI in Pakistan. The major loser of this duty reduction is non-farm labour low skilled whose return to labour decreased by 0.02 percent. The ratio of return of land to CPI small, medium and large farms will increase by 0.1, 0.11 and 0.09 percent respectively.

Table 16

Ratio of Return to Primary Factor to CPI in Pakistan

Factor	Ratio of Return	Factor	Ratio of Return	Factor	Ratio of Return
1 Land	0.1	8 NatlRes	0.04	15 flnd_s	0.1
2 tech_aspros	0	9 Natres	0.04	16 flnd_m	0.11
3 clerks	0	10 flab_s	0.07	17 flnd_l	0.09
4 service_shop	0	11 flab_m	0.07	18 fliv	0.04
5 off_mgr_pros	0	12 flab_w	0.06	19 fcap_a	-0.27
6 ag_othlowsk	0	13 flab_l	-0.02	20 fcap_f	-0.01
7 capital	-0.01	14 flab_h	0	21 fcap_i	-0.01

4.11. Real Savings by Household Type, Foreign Income and Government Income in Pakistan

Saving leads to investment and investment leads to economic development. Savings has significant relationship with economic growth [Jagadeesh (2015)]. Real savings of household will increase by 0.01 percent (Table 17). Thus decreasing duty will increase saving of household in the country.

Table 17

Real Saving by Household Type in Pakistan

HH type	Real Saving	HH Type	Real Saving	HH Type	Real Saving	HH Type	Real Saving
1 MainHHLD	0.01	5 hhd_rm234	0.05	9 hhd_rw234	0.03	13 hhd_rm4	0
2 hhd_rs1	0.04	6 hhd_rl1	0.03	10 hhd_rm1	0	14 hhd_u1	0
3 hhd_rs234	0.04	7 hhd_rl234	0.03	11 hhd_rm2	0	15 hhd_u2	0
4 hhd_rm1	0.05	8 hhd_rwl	0.04	12 hhd_rm3	0	16 hhd_u3	0
						17 hhd_u4	0

Foreign income of different households in Pakistan will decrease by 0.03 percent. The foreign income of households in Pakistan will generally decrease. Major decrease was envisaged to be 0.01 percent in Household in rural medium farmers in Punjab while in other provinces this decrease is 0.07 percent. No effect on workers income in all provinces was observed.

Government income in Pakistan will also decrease by 0.08 percent. This decrease is mainly due to decrease in duties on wood from 16 to 11 percent. In other countries, no significant effect is envisaged in government income except slight changes. Regional household income (y) will decrease by 0.02 percent in Pakistan while no changes cited in other regions of the world.

5. CONCLUSION

Government of Pakistan has reduced import duty on wood from 16 percent to 11 percent on the demand of wood importers. The effect of this reduction in duty has been analysed using GTAP database on macroeconomic indicators of global economies with special reference to Pakistan. On overall basis the duty decrease of wood in Pakistan has both positive and negative effects on various sectors of the economy. Government income, terms of trade, market price of wood in Pakistan and output of capital in Pakistan will show negative trend. Aggregate exports and imports of wood in Pakistan and volume of merchandised exports and imports of Pakistan will increase. GDP quantity index of Pakistan will also improve slightly. Aggregate import and domestic demand of wood by different households will also increase. Due to this dependency on import increased beside environmental benefits

6. RECOMMENDATION

This duty reduction has positive effects on Pakistan economy and may continue as per policy of the Government. Mechanism may be developed to study the impact of such policy issues by the R&D institutions before the implementation of these policies.

REFERENCES

- Aguiar, A., B. Narayanan, and R. McDougall (2016) An Overview of the GTAP 9 Data Base. *Journal of Global Economic Analysis* 1:1, 181–208.
- Ahmed, J. and F. Mahmood (1998) *Changing Perspective on Forest Policy; Policy that Works for Forests and People, Pakistan Country Case Study*. IUCN, Islamabad, Pakistan.
- Debowicz, D. (2016) A Social Accounting Matrix for Iraq. *Journal of Economic Structures* 5:1.
- FAO (2001) State of the World Forests 2001. Information Division, Food and Agricultural Organisation. Rome.
- GOV.UK (2012) Guidance Classifying Wood for Import and Export. <https://www.gov.uk/guidance/classifying-wood>
- Hertel, T. W. and M. E. Tsigas (1997) Structure of GTAP. *Global Trade Analysis: Modeling and Applications*. 13–73.
- ICIMOD (1998) Land Policy, Land Management and Land Degradation in HKH Region: Pakistan Country Study. International Centre for Integrated Mountain Development (ICIMOD), Kathmandu Nepal.
- Jagadeesh, D. (2015) The Impact of Savings in Economic Growth: An Empirical Study Based on Botswana. *International Journal* 10.
- Kanel, K. R., S. A. Kumud, T. Ratna, and R. Mijan Raj (2012) The Demand and Supply of Wood Products in Different Regions of Nepal. REDD – Forestry Climate Change Cell Babarmahal, Kathmandu. p. 10.
- Limaie S. M., H. Roghayeh, H. V. Seyed Mahdi, and T. Javad (2011) Wood Import and Export and Its Relation to Major Macroeconomics Variables in Iran. *Forest Policy and Economics* 13, 303–307.

- Minor, P. and B. Mureverwi (2013) A Household Level Analysis of African Trade Liberalisation: The Case of Mozambique Vulnerability of Low Income Households, Research Report submitted to World Bank, BNPP Program April 2013.
- Minor, P. and T. L. Walmsley (2013) MyGTAP Data Application: Programme for Customizing and Extending the GTAP Database: Multiple Households, Split Factors, Remittances and Foreign Aid. Center for Global Trade Analysis Project USA.
- Ndoye, O., M. R. Pérez, and A. Eyebe (1997) The Markets of Non-Timber Forest Products in the Humid Forest Zone of Cameroon. London, UK: Overseas Development Institute.
- Pakistan, Government of (2017) *Pakistan Economic Survey 2016-17*. Finance Division, Government of Pakistan, Islamabad.
- Pakistan, Government of (2017) Budget Speech of Finance Minister of Pakistan in the National Assembly.
- Wani, B. A. (2011) National Forest Policy Review, Ministry of Environment, Local Government and Rural Development. Government of Pakistan, Islamabad.
- Zaman, S. B. and Shahid Mahmood (2012) Wood Supply and Demand Analysis in Pakistan —Issues and Options. *Research Briefings, PARC* 4:22.