IMPACT OF AGRICULTURAL TRADE LIBERALIZATION ON INCOME INEQUALITY IN PAKISTAN

Muhammad Aamir Khan*, Abdul Saboor*, Rauf-i-Azam**, Abdul Qayyum Mohsin* and Fayyaz-ul-Hassan***

ABSTRACT:- Trade liberalization has long been recognized as a key element in sustainable development. Liberalized Trade has been adopted by many developing countries to increase economic growth and therefore reducing poverty. In this backdrop, the current study evaluates the impact of Pakistan's agricultural trade liberalization using a modified Global Trade Analysis Project (GTAP) framework. The newly developed MyGTAP program was used to modify the Pakistan's data in the Global GTAP Database and Standard GTAP model to include multiple households and labor types. This disaggregation allows to analyze distributional impacts and to implement policy scenarios that target particular households. The economy wise results showed that agricultural trade liberalization increases income inequality and somewhat detrimental to the rural household types, who guage most of their income from agricultural business. Trade policy must be pursued keeping derivation and distributional narration in view.

Key Words: Trade Liberalization; Growth; Poverty; Inequality; Economy; Wide Framework; Pakistan.

INTRODUCTION

Trade liberalization has a stronger impact on increasing employment elasticity of economic growth and poverty reduction, as compared to import substitution and/or closed economies initiatives. An open economy allows a country to restructure its domestic production in line with its comparative advantage (Krueger, 1998). Nevertheless, staunch critics of globalization usually empha-size that the benefits of this economic growth have little likelihood of being evenly distributed; and thus, its impacts may affect the poor rather adver-sely.

Classical trade theory suggests a positive welfare with trade libera-lization. Heckscher Ohlin's two-country, two-good, and two-factor model states an increase in exports and production in the division that focuses more on the production economy. Still developing nations are more abundant in unskilled labor, and thus the real remuneration of unskilled labor can be improved by trade to increase proportionally the rise in the price of produced good. Modern trade theory suggests that efficiency gains due to liberalization are caused by the economies of scale, diffusion of information, technology transfer, spillover effects, etc. But, these powerful theories still fail to explain the effect of trade liberalization when factors such as non-tradable goods, non-homogenous goods, seg-

* Department of Economics and Agri.Economics, PMAS Arid Agriculture University Rawalpindi, Pakistan.
** University Institute of Management Sciences, PMAS Arid Agriculture University Rawalpindi, Pakistan.
*** Department of BioSciences, COMSATS University, Park Road Islamabad, Pakistan.
Corresponding author: aamir.economist@gmail.com

mented labor markets are considered (Winters et al., 2004).

Liberalization has been enhanced much during the last two decades. The upper limit of tariff has been remarkably drawn down from 80% to 25% since 1995, with simple average applied rate down to 15% which is a greater reduction compared to the rate in 1995 which was 51%. From 1995, this action plan achieved a rather high impulse and WTO and its associated agreements have persuaded Pakistan to progress; like reduction on import duties and eliminating several subsidies. In terms of potential advantages, liberalization is highly beneficial for Pakistan. The results of lifting tariff- and non-tariff barriers go much further than the apparent advantage like instantaneous formation of trade flows. It also includes the potential for enhancing productivity and increasing economic growth, and might also be extended to promote regional cooperation in all areas. Eliminating trade barriers, even if it is only partial, are likely to create effective trade flows that will ultimately benefits economic efficiency, in product groups which are currently being produced by Pakistan. Similarly, lowering trade barriers will also contribute in exploring new export opportunities for Pakistani products in South Asian Free Trade Agreements (SAFTA) countries (Siddique et al., 2006a; b).

Pakistan's economy remains defenseless across macroeconomic indicators like high inflation, energy shortages and declining foreign exchange reserves augmented by political instability and a variable security environment. According to IMF (2013) Pakistan Gross Domestic Product (GDP) growth in fiscal year 2013 was decreased to 3.2% as compared to India (5.90%), Bangladesh (6.10%), Afghanistan (6.50%) and Sri Lanka (6.70%).

Pakistan's agriculture sector is an important contributor which is accounting for 21% of GDP. It is the chief source of raw material to downstream industry and hence contributes significantly to Pakistan's exports. Moreover, it absorbs 45% of the total labor force (GoP, 2014). Agricultural sector not only provides food and fiber to consumers and local domestic industry; it is also a major attributor of country's export earnings. Almost 65 % of the Pakistan exports are agro-based. Growth trends of the agricultural sector and overall GDP growth revealed the dependence of Pakistan's economy on agriculture.

Major sectors contributing in agricultural exports are primary commodities, textile manufactures and other. The exports of agricultural commodities of Pakistan comprised Rs. 1340 billion during 2012-13 (GoP, 2014). The effect of exports of agricultural commodities was negative and significant with respect to economic growth of the country with elasticity of 0.58 (Faridi, 2012). Pakistan has a comparative advantage in important agricultural commodities, such as wheat, rice and cotton. Nevertheless, due to scant mechanism and disorganized manufacturing sector, transformation of our comparative advantage into efficient production and export surpluses is not fairly achieved.

Agricultural trade liberalization due to its volatile and uncertain international commodity prices has not benefited Pakistan regarding its

economic growth and human development. After the conclusion of Uruguay Round of trade negotiations, Pakistan settled to liberalize its agricultural sector. The Agreement on Agriculture (AoA) was considered to benefit the developing countries by eliminating market distortions. However, in practice the implementation and effectiveness of this agreement failed the developing countries.

A number of studies have identified different impacts on developing countries, both positive and negative, resulting from trade liberalization (Hertel et al., 2001; Vanzetti, 1998; Winters et al., 2004). Identifying and anticipating these trade liberalization impacts, especially on poor households and different labor types is important for policy formulation and planning pro-poor, sustainable growth.

This research aims at identifying the potential of Pakistan's agricultural trade liberalization and its impacts on household's income and different labor types taken from latest available Pakistan Social Accounting Matrix (SAM) 2007-08 using newly developed MyGTAP model that is an extension of global GTAP model.

MATERIALS AND METHOD

Changes in product prices or output any one product can have impacts on employment, wages and output in other industries, government revenue and expenditures, there by underscoring the importance of capturing significant linkages between products and markets. For this reason, Computable General Equilibrium (CGE) models are well suited to the analysis of trade agreements. CGE models emphasize the linkages between product and factor markets on prices and output through detailed input-output linkages and equations which model macro-economic linkages such as investment and savings (Minor and Mureverwi, 2013).

This research used a Global Applied CGE model linking Pakistani economy to rest of the world using the newly developed MyGTAP Model by Minor and Walmsley (2013), which is an extension of the standard GTAP model (Hertel,1997).The MyGTAP model eliminates the single regional household and the related distribution parameters and replace them by linking private and government expenditures directly to income sources. Furthermore, the single private household is replaced with multiple households allowing to analyze distributional impacts and to implement policy scenarios that target particular household. The new model specification also allows for a focused treatment of government income and expenditures, which in turn helps to track the effects of the subsidy removal on government budget deficits. The model is solved using the software GEMPACK (Harrison and Pearson, 1996).

MyGTAP model used in this study eliminates the single regional household in the standard GTAP model and the related distribution parameters and replaced with 18 types of households taken from latest available Pakistani Social Accounting Matrix (SAM) 2007-08 (Debowicz et al., 2012) allowing to analyze distributional impacts and to implement policy scenarios that target particular households. Apart from the multiple households and improved government specification, MyGTAP augments the standard GTAP model by including inter-regional transfers, such as remittances and foreign capital inco-

mes (Siddig et al., 2014).

Database

Two types of data set are used in this study; GTAP Database, version 8.1 (Narayanan et al., 2012) and Pakistan SAM 2007-08 (Debowicz et al., 2012). GTAP database characterizes the world economy for two reference years i.e., 2004 and 2007. In the present study the latest reference year 2007 is used. The database is composed of 129 regions, 109 countries and 20 aggregated regions. The database also describes 57 sectors for every region. Considering the imports and exports of Pakistan and also to facilitate computation, the number of regions have been aggregated into 12 regions namely, Pakistan, China, India, USA, other SAARC countries, ASEAN countries, other OECD, European Union, Latin America, rest of west Asia, rest of Asia and rest of the world. Similarly out of total 57 sectors, this study aggregated 37 sectors (out of which 12 sectors are agricultural commodities and are used in this study (Table 1).

This study used a Global Applied General Equilibrium (GAGE) model linking Pakistani economy to rest of the world. GTAP database 8.1 was modified by breaking down the regional household into multiple households based on a data tool documented in Minor and Walmsley (2013). The breakdown of households was based on the latest comprehensive Pakistani SAM (2008) and Household Integrated and Economics Survey(HIES) (2007-08). The Pakistani SAM (2007-08) provides detailed information on 18 types of house-holds classified by the province in which they are located (Sindh, Punjab and rest of Pakistan), and by area (rural vs urban).

Rural households are further disaggregated into agricultural and non-agricultural house-holds.

Household types used in this study are in turn split by ownership of land and size of owned land. Medium/large farms are greater than 12.5 acres, and small farms are between zero and 12.5 acres. Landless farmers own no land, but have some operated land. Finally, landless agricultural laborers (waged) households are defined as those who do not own or operate land, but have agricultural income. Rural non-farm households are located in rural areas but have no agricultural income. Urban households are those located in the urban areas. Urban and rural non-farm households are split into quintile 1, quintile 2, and rest (Debowicz et al., 2012).The implementation of multiple households is particularly useful for this study as it aims to assess the implications of Pakistan's agricultural tariff reduction scenarios that are combined with discriminatory transfer scheme targeting lower income of Pakistani households.

A unique feature of the MyGTAP model used in this study is the capability to disaggregate the regional household into both private and

Table 1. Sectoral aggregation

GTA Code	Description
Pdr	Paddy rice
Wht	Wheat
Gro	Cereal grains nec*
v_f	Vegetables, fruit, nuts
Osd	Oil seeds
Sugar	Sugar cane, sugar beet, crop nec*
Pfb	Plant-based fibers
Sugar	Sugar cane, sugar beet, crop nec*
Ctl	Cattle,sheep,goats,horses
Processed food	Animal products nec*, raw milk, wool, silk worm cocoons
Frs	Forestry
Fsh	Fishing

nec= not elsewhere classified

government entities. The regional household in Standard GTAP model were disaggregated to 18 types of households to conduct a detailed analysis of the effects to household income distribution and expenditures (Table 2). The data and weights required were obtained from the latest comprehensive Pakistani SAM 2007-08 (Debowicz et al., 2012).

In present study 26 factors of production from Pakistan SAM 2007-08 were aggregated in contrast to the standard five GTAP production factors to maintain consistency with the Pakistani SAM. In SAM 2007-08 there were 26 specified factors of production and 23 of them deal with agricultural production only including; 8 types of agricultural labor, 12 types of land, livestock capital, formal, informal capital and other agricultural capital. All 26 types of factors of production taken from Pakistan SAM 2007-08 were employed in this study (Table 3).

The adjustments and mapping were instigated using shares to retain the underlying values of the original GTAP Data Base. These weights were applied to the GTAP database such that the total returns to factors and consumption are consistent with the original GTAP database. The mapping of GTAP commodities and Pakistani SAM 2007-08 commodities/sectors was done in such a way that mapping and modifications need to be added up to the original database.

Income Inequality Estimation

The study in hand uses most commonly used measure of inequality known as Gini Coefficient. The coefficient value ranges between 0 and 1. Zero implies complete equality and 1 reflects complete inequality i.e., 1 person has all income and all others have none. Graphically it is represented as the area in the middle of the Lorenz curve and the equality line. In mathematics, can state the Gini Coefficient as:

$$Gini = \frac{2}{n^2 \bar{y}} \sum_{i=0}^{n} i \left(y_i - \bar{y} \right)$$

Policy Experiment / Simulation

This research eliminates all import tariffs and export subsidies on agricultural tradable commodities worldwide to investigate the potential of Pakistan trade liberalization experience on household level and then on overall income inequality in Pakistan.

Table 2. Pakistani household

Household Types	HH	Household Types	HH
Large and medium farm Sindh	H-MF1	Landless agri. labor Sindh	H-AGW1
Large and medium farm Punjab	H-MF2	Landless agri. labor Punjab	H-AGW2
Large and medium farm other Pakistan	H-MF3	Landless agri. labor other Pakistan	H-AGW3
		Rural non-farm quintile	H-NFQ1
Small farm Sindh	H-SF1	Rural non-farm quintile 2	H-NFQ2
Small farm Punjab	H-SF2	Rural non-farm quintile other Pakistan	H-NFOTH
Small farm other Pakistan	H-SF3		
Landless farmers Sindh	H-0F1	Urban quintile 1	H-UQ1
Landless farmers Punjab	H-0F2	Urban quintile 2	H-UQ2
Landless farmers other Pakistan	H-0F3	Urban other	H-UOTH

Source: Pakistan SAM 2007-08

Table 3.   Factors types in Pak SAM 2007-08

LA-AGL	Labor - agric (own)-large	LN-MD1	Land - irrigated - med Sindh
LA-MF1	Labor - agric (own)-med Sindh	LN-MD2	Land - irrigated - med Punjab
LA-MF2	Labor - agric (own)-med Punjab	LN-MD3	Land - irrigated - med other Pakistan
LA-MF3	Labor - agric (own)-med other Pakistan	LN-SM1	Land - irrigated - sm Sindh
LA-SF1	Labor - agric (own)-sm Sindh	LN-SM2	Land - irrigated - sm Punjab
LA-SF2	Labor - agric (own)-sm Punjab	LN-SM3	Land - irrigated - sm other Pakistan
LA-SF3	Labor - agric (own)-sm other Pakistan	LN-DR1	Land non-irrig - sm/m Sindh
LA-AGW	Labor - agric (wage)	LN-DR2	Land non-irrig - sm/m Punjab
LA-SKU	Labor - non-ag (unsk)	LN-DR3	Land non-irrig - sm/m other Pakistan
LA-SK	Labor -non-ag (skilled)	K-LVST	Capital livestock
LN-LG1	Land - large- Sindh	K-AGR	Capital other agric
LN-LG2	Land- large- Punjab	KFORM	Capital formal
LN-LG3	Land- large- other Pakistan	KINF	Capital informal

Source: Pakistan SAM 2007-08

RESULTS AND DISCUSSION

Impact of Pakistan Agricultural Trade Liberalization on Household Income

The SAM(2007-08) income is different from household survey data as SAM is highly aggregated (only a small number of household groups i.e., 18 types used in this study) and SAM includes numerous adjustments needed to reconcile the household data on expenditures with the national accounts of data on production, value added and household consumption.

The disaggregated analysis used in this study stands in contrast to a typical "national welfare analysis" often cited in CGE analysis is that we do not assume that all parties will be impacted equally - the assumption is that trade policy will have distributional impacts and that the impacts on poor households should be given special consideration when making trade policy.

The results predict that some households are better off while others worse off with respect to their income (Table 4). The medium and large household types are the major beneficiaries of the agricultural trade liberalization scenarios. For land income, almost all household types who own land increase their income. Rural non-farm household showed decreased income but the decrease in their income is very marginal. In all urban household types, the effects are unbiased to all households.

Table 4.   Impact on household income (percent changes from base)

Household Income	Simulation	Household Income	Simulation
H-MF1	1.97	HAGW1	-0.86
H-MF2	2.30	HAGW2	-0.93
H-MF3	1.57	HAGW3	0.56
H-SF1	1.23	HNFQ1	-0.50
H-SF2	-0.32	HNFQ2	0.53
H-SF3	-1.33	HNFOTH	0.52
H-0F1	-0.77	HUQ1	0.64
H-0F2	-0.21	HUQ2	0.61
H-0F3	0.96	HUOTH	0.72

Source: Author's simulation using MyGTAP Program

Impact of Pakistan Agricultural Trade Liberalization on Real Returns to Factors

Trade Liberalization reduced certain quietude to trade and therefore tends to elevate the rate of returns for at least some factors of production (Winters, 1996). Traditional Heckscher-Ohlin model assumes Pakistan's capital returns to drop as Pakistan is a capital-scarce relative to its trade partners. The typical Heckscher-Ohlin model is different in the way the actual world is as it is merely applicable to a specific square model where the number of factors of production is equal to amount of goods.

Heckscher-Ohlin model postulates homogeneous products, although knowledge and reality suggest that a whole lot of markets are represented in a far better way under the assumption that products are differentiated. The MyGTAP model used in this study personifies the purported Armington assumption in which products are categorized on the basis of their country of origin. A significant decline in tariff and trading cost on the import of capital equipment should control the escalating prices which the industry must pay for investment goods.

Agricultural Trade liberalization results show increase in the real wages of medium and large agricultural labors and farm households but that to small farmers even deteriorates (Table 5). Since the supply of labor in agriculture sector is fixed, every downward pull in factor demand owing to lesser output is going to lead to a lower wage rate. A similar mechanism affects the supply of production labor, which remains fixed. Thus, better demand for labor,

which mainly sprouts from cotton lint/yarn, rice and leather sectors of large and medium farm household in Punjab and Sindh provinces, because of the improvement in output in these areas, results in better wages for labor involved in production of these goods. The results oppose the popular theory that trade liberalization might decrease the wages of unskilled labour even in a labour-abundant country, thereby increasing poverty. This is in conformity with Stiglitz (1970), Davis (1996), Feenstra and Gordon (1997), Cunat and Maffezzoli (2001), Kremer and Maskin (2003), Banerjee and Newman (2004) and Topalova (2007.

This study used household types taken from Social Accounting Matrix 2007-08. Household incomes in the Pakistani SAM are 2.1 times higher than HIES Survey of the household expenditures. This is a reflection of ostensibly significant under-reporting of expenditures (especially on services) and incomes of informal sector in the household surveys of HIES and some others (Dorosh et al., 2012).

The base Gini Coefficient of 0.38 is confirming that income is still

Table 5.   Effect on real wages (percent changes from base)

Real wages	Simulation result	Real wages	Simulation result
LAAGL	1.10	LNMD1	-0.26
LAMF1	1.85	LNMD2	-0.27
LAMF2	2.06	LNMD3	2.35
LAMF3	1.70	LNSM1	3.67
LASF1	-1.32	LNSM2	1.51
LASF2	-1.03	LNSM3	2.65
LASF3	-1.56	LNDR1	3.19
LAAGW	1.35	LNDR2	1.68
LASKU	0.56	LNDR3	2.81
LASK	1.10	Klvstk	2.52
LNLG1	-3.63	Kothag	0.91
LNLG2	-2.45	Kform	2.60
LNLG3	-2.19	Kinf	2.29

Source: Author's simulation using MyGTAP Program

unequally distributed across the population (Table 6). The simulation

Table 6. Inequality Effect (percent change from base)

Simulation	Base Index	Simulation Index	Ordinary Change	Percent Change
AGRI-TL	0.3865	0.3884	0.0019	0.49

Source: Author's Simulation results

results show that Pakistan worldwide agricultural trade liberalization has a negative impact on overall income equality as inequality will be increased by 0.49% from baseline. Agricultural trade liberalization thus worsened income inequality by replacing labor-intensive crop production with subsidized cheap imports, and introducing capital-intensive practices. The opening up of agricultural sector has exposed the landless, banished and poor farmers of Pakistan to the market distortions and the volatility of global agricultural trade. The results of this study are in consistence with those of Cicowiez et al. (2010) who modeled effect of trade reforms on poverty and inequality in Argentina and their results show that income inequality deteriorated somewhat when only the agricultural goods were considered.

CONCLUSION

The results show that agricultural trade liberalization increases overall income inequality in Pakistan. Hence the findings personifies that the distributional impacts of Pakistan agricultural trade liberalization have been somewhat detrimental to the rural household types, who derive majority of their income from agricultural source. Hence this result opposes the popular theory of the trickling down effects of trade-induced growth within the developing

country context. Lastly, as pointed out by Duncan and Quang (2002) trade liberalization should not only be thought as a policy measure to decrease poverty; somewhat, it should be rather designed in such a way that sustained growth can be attained via minimal adjustment costs. Hence, poverty reduction strategies should be a separate focus, so that both the impacts from trade liberalization as well as the reduction of poverty and income inequality can be maximized. So reap fruit of any trade policy, poverty and inequality reduction would serve as a necessary condition.

LITERATURE CITED

Banerjee, A. and A. Newman. 2004. Inequality, growth and trade policy. Massachusetts Institute of Technology, Department of Economics, College London (manuscript).

Cicowiez, M., C. Díaz-Bonilla and E. Díaz-Bonilla. 2010. Impacts of trade liberalization on poverty and inequality in Argentina: Policy insights from a non-parametric CGE Microsimulation Analysis. Intern J. Micro-simulation, 3(1): 118-122.

Cunat, A. and M. Maffezzoli. 2001. Growth and interdependence under complete specialization. Department of Economics, Bocconi University, Milan, Italy. Working paper No. 183.

Davis, D.R. 1996. Trade liberalization and income distribution. National Bureau of Economic Research, Cambridge, MA. Working paper 5693. 15 p.

Debowicz, D., P. Dorosh, S. Robinson and S.H. Haider. 2012. A 2007-

08 Social Accounting Matrix for Pakistan. Pakistan Strategy Support Program (PSSP) Working paper No. 001. IFPRI, Pakistan. 28 p.

Duncan, R. and D. Quang. 2002. Trade liberalisation, economic growth and poverty reduction Strategies. National Centre for Development Studies, The Australian National University. 45 p.

Faridi, M.Z. 2012. Contribution of Agricultural Exports to Economic Growth in Pakistan. Pakistan J. Commer. Social Sci. 6(1): 133-146.

Feenstra, R. and H. Gordon. 1997. Foreign direct investment and relative wages: Evidence from Mexico's maquiladoras. J. Intern. Econ. 42(2): 371-393.

Foster, J., J. Greer and E. Thorbecke. 1984. A class of decomposable poverty measures. Econometrica, 52(3): 761-766.

GoP. 2014. Agricultural statistics of Pakistan 2012-13. Pakistan Bureau Statistics, Statistics Division, Government of Pakistan, Islamabad.

Harrison, W.J. and K.R. Pearson. 1996. GEMPACK User Documentation. Release 8.0. Centre of Policy Studies and Impact Project. Monash University, Melbourne, Australia.

Hertel, T.W. 1997. Global trade analysis: Modeling and applications, Cambridge University Press, Cambridge.

Hertel, T.W., P. Preckel , J. Cranfield and M. Ivanic. 2001. Poverty Impacts of Multilateral Trade Liberalization, Purdue University.

Kremer, M. and E. Maskin. 2003. Globalization and inequality. Department of Economics, Har-

vard University (manuscript).

Krueger, A. 1998. Why trade liberalisation is good for growth. The Econ. J. 108(450): 1513-1522.

Minor, P. and B. Mureverwi. 2013. A household level analysis of African trade liberalization: The case of Mozambique Vulnerability of low income households. World Bank, BNPP Program. 44p.

Minor, P. and T.L. Walmsley. 2013. MyGTAP Data Application: Program for Customizing and Extending the GTAP Database: Multiple. Households, Split Factors, Remittances and Foreign Aid.

Narayanan, B.G., A. Aguiar and R. McDougall. 2012. Global trade, assistance, and production: The GTAP 8 Database, Center for Global Trade Analysis, Purdue University.

Siddig, K., A. Aguiar, H. Grethe, P. Minor and T. Walmsley. 2014. Impacts of removing fuel import subsidies in Nigeria on poverty. Energy Policy, 69: 165-178.

Siddiqui, R. and A.R. Kemal. 2006a. Poverty-reducing or poverty-inducing? A CGE-based analysis of foreign capital inflows in Pakistan. PIDE Working Papers, 2: 1-43.

Siddiqui, R. and A.R. Kemal. 2006b. Remittances, trade liberalisation, and poverty in Pakistan: The role of excluded variables in poverty change analysis. PIDE Working Papers, 1: 1-40.

Stiglitz, J.E. 1970. Factor price equalization in a dynamic economy. J. Political Econ. 78(3): 456-488.

Topalova, P. 2007. Trade liberalization, poverty and inequality:

Evidence from Indian districts. In: Harrison, A.(ed.). Globalization and Poverty. University of Chicago Press, USA. p. 291-335.

Vanzetti, D. 1998. Global stocks, price stability and food security, Report No. 95. Danish Institute for Agricultural and Fisheries Economics, Copenhagen. 1-31.

Winters, L.A. 1996. Trade liberalisation and poverty: What are the links? The World Economy, 25(9): 1339-1367.

Winters, L.A., N. McCulloch and A. McKay. 2004. Trade liberalization and poverty: The evidence so far. J. Econ. Literature, XLII(March): 72-115.